Final Environmental Impact Statement

Tongass National Forest
Land Management Plan Revision

Alaska

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Introduction

Forest land and resource management planning is a process for developing, amending, and revising land and resource management plans (forest plans) for each of the National Forests in the National Forest System. Forest plans are required by the National Forest Management Act (NFMA) of 1976. Each forest plan is intended to guide the management of a National Forest for a 10-15 year period, at the end of which a formal revision is required.

The 17-million acre Tongass National Forest, the largest forest in the National Forest System, was also the first to complete a Land and Resource Management Plan under the National Forest Management Act. The original Tongass Forest Plan was approved in 1979, and has been amended twice (in 1986 and 1991). The first revision of this plan is now being considered.

A draft environmental impact statement (DEIS) documenting the environmental analysis for this revision was released for public review in June 1990. In November 1990, the Tongass Timber Reform Act (TTRA) was passed. This Act imposed several new requirements for management of the Tongass affecting the Forest Plan and resulted in the preparation of a Supplement to the DEIS, which was released in August 1991. (This Supplement is hereinafter referred to as the "1991 SDEIS.") TTRA made permanent changes to Forest Plan land allocations and standards and guidelines which applied to all alternatives in the Supplement. The 1991 SDEIS was in turn followed by the Revised Supplement in 1996. The Revised Supplement was necessitated by new information and analysis relevant to several important issues.

The release of a final environmental impact statement (FEIS) and decision had been scheduled for early 1993, but was put on hold in order to conduct the additional analysis which ultimately led to the Revised Supplement. A 1992 draft version of this FEIS included alternatives that became the basis of some Revised Supplement and FEIS alternatives. See Chapter 2.

This FEIS analyzes in detail 10 alternatives for future management of the Tongass National Forest. A separate document, the Land and Resource Management Plan (Forest Plan), is an expansion of the Preferred Alternative (Alternative 11) contained in this FEIS.

The "purpose and need" for the Tongass Forest Plan Revision, beyond the basic NFMA requirement for periodically revising forest plans, centers on the basic elements of what constitutes a forest plan. These plan elements include: multiple-use goals and objectives, management prescriptions, standards and guidelines, timber suitability, the Allowable Sale Quantity, and monitoring and evaluation. Together these are evaluated to determine the “need for change.”

Public Issues

Ten public issues were originally identified in 1988 for the Forest Plan Revision. These were used for the 1990 DEIS, and remained the same, with some updating, for the 1991 SDEIS. Each issue statement is framed as a question. These original issues are listed here. The 1991 SDEIS added an additional concern, identifying and considering for recommendation potential Wild, Scenic, and Recreational Rivers.

The Ten Original Issues

Scenic Quality. What areas of the Tongass National Forest should be managed to emphasize scenic resources?

Recreation. What areas should be managed to emphasize recreation opportunities?

Fish Habitat. What methods should be used to protect resident and anadromous fish habitat?

Wildlife Habitat. What amount of old-growth and undeveloped habitat should be managed for the protection of wildlife?

Subsistence. What should the Forest Service do to continue providing subsistence opportunities?

Timber Harvest. What areas of the Tongass should be managed to emphasize timber harvesting?

Roads. What road system should be developed in the Tongass National Forest?

Minerals. What areas and accessibility should be emphasized for exploration, development, and production of mineral resources?

Roadless areas. What areas and what amount of roadless lands should be recommended for Wilderness designation or other types of unroaded management?

Local Economy. What ways should National Forest lands be managed to provide for the local lifestyles of Southeast Alaska communities?

The Five Focus Issues

Since the release of and comment period on the 1991 SDEIS, considerable new information bearing on the Tongass Forest Plan Revision has come to light, including additional scientific reviews and studies, new or updated resource inventories, and comments and reports from interest groups and individuals. Out of this new information emerged five issues determined by the Regional Forester to need more study and evaluation before a final Revised Forest Plan could be adopted. Some of these issues are aspects or extensions of the ten public issues previously considered (fish and wildlife habitat, and the local economy), others are new as issues (caves and karst) or were not considered as issues in themselves (alternatives to clearcutting). These issues are discussed briefly here.

Wildlife Viability. The issue concerning wildlife viability centers on questions of whether the current Forest Plan, or the alternatives considered for revising the Forest Plan (in either the 1991 SDEIS or the unpublished 1992 Tongass Forest Plan Revision Final Environmental Impact Statement (FEIS)), provide for sufficient habitat to maintain viable wildlife populations in the Tongass National Forest within the context of overall multiple use objectives (as required by 36 CFR 219.19 and related NFMA regulations).

Early in 1993, the Alaska Regional Forester postponed a final decision on the Revised Forest Plan and requested the Forest Service's Pacific Northwest Research Station to conduct a scientific peer review of a viability strategy recommended by the Interagency Viable Population Committee, and other planning documents related to viability, as part of the Forest Plan Revision process. The peer review concluded that a strategy like that recommended by the Committee went further in ensuring habitat to support viable wildlife populations than the Revision alternatives, but that other methods and approaches also need to be considered. It also noted a lack of information about wildlife in Southeast Alaska, and the need for more study.

Also in 1994, the Alaska Region of the U.S. Fish and Wildlife Service (USFWS) accepted two petitions for listing under the Endangered Species Act, for the Queen Charlotte goshawk (as endangered) and the Alexander Archipelago wolf (as threatened), in Southeast Alaska. Although neither species was found in need of listing at this time, USFWS stated in both cases that without substantive changes in management of the Tongass, future viability was a definite concern. Very recently legal challenges have resulted in the USFWS being required to reevaluate both these decisions.

Fish Habitat. Concurrent with the work and actions taken relative to wildlife viability, in 1994 an Alaska Anadromous Fisheries Habitat Assessment (AFHA) was conducted, at the direction of Congress, for the purposes of studying the effectiveness of current procedures for protecting anadromous fish habitat, and determining if any additional protection was needed. This assessment concluded that current measures, and their implementation, were not fully effective for preventing habitat degradation or protecting salmon and steelhead stocks in the long term. AFHA included recommendations to consider for the Tongass Plan Revision, and additional recommendations were made by the team that conducted the on-the-ground analysis for AFHA.

Karst and Caves. The extent and importance of the cave resources of the Tongass have only recently come to light. The 1991 SDEIS considered caves, and included some recognition of the "karst" geology in which they are typically found, in Forest-wide standards and guidelines, and through a proposed Karst Areas Geological Area. More recent studies and surveys have indicated a more extensive resource of world-class significance, and the need to consider improved standards and guidelines. Several recent timber sale projects in karst areas have identified a similar need.

Alternatives to Clearcutting. Commercial timber harvest in the Tongass National Forest has traditionally relied on one even-aged silvicultural system, clearcutting. This system has proven successful in Southeast Alaska in several ways: it is relatively economical; it is effective in controlling forest diseases; it eliminates blowdown; and it results in adequate natural regeneration, particularly of less shade-tolerant species such as Sitka spruce. On the other hand, clearcutting continues to be controversial in Southeast Alaska. The Forest Service's ecosystem management policy includes a strong emphasis on limiting the amount of traditional clearcutting, and on using alternative silvicultural systems.

Socioeconomic Considerations. The socioeconomic environment of Southeast Alaska and its relation to the resources and uses of the Tongass has undergone some significant changes in recent years. Since the 1991 SDEIS, the timber industry has seen the permanent closure of one of two major pulp mills (the Alaska Pulp Corporation mill in Sitka), the development of several new small mill operations, and the termination in 1994 of one of two long-term sale contracts. In October 1996 the Louisiana Pacific Corporation announced its intent to close the sole remaining pulp mill in Southeast Alaska (the Ketchikan Pulp Company mill in Ketchikan) in March 1997. The tourism industry continues to see rapid growth, indicating the need to better reflect tourism needs and concerns through specific management direction and improved inventories. An extensive update of the social

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and economic settings and concerns of Southeast Alaska communities became necessary in order to have the best information on local uses of, and economic ties to, the Tongass.

Alternatives

Each alternative for the revision of the Tongass Land Management Plan is presented in the same format in Chapter 2 of the FEIS. Each alternative description includes a theme, multiple-use goals, narrative objectives, a set of Land Use Designations (a table with the acreages allocated to each LUD, and a map - included in the map packet - showing their locations), and other objectives and outputs displayed numerically. The prescriptions of each Land Use Designation are included in the Forest Plan, as are the Forest-wide standards and guidelines applying to all alternatives.

While the allocation of areas to different Land Use Designations can vary by alternative, the management prescriptions for each specific Land Use Designation (LUD) do not change (except for certain timber harvest practices in some LUD's, which are specified by alternative). Chapter 3 of the Revised Forest Plan includes the full set of management prescriptions for each Land Use Designation. These are summarized in Chapter 2 of the FEIS and on the alternative maps. Except for the "no action" alternative (the 1979 Forest Plan as amended), 19 Land Use Designations are used for each alternative.

Table 1 lists the Land Use Designations by name, and groups them by similarities in management direction or potential effects. These "LUD Groups" are used in comparing alternatives in the FEIS. Table 5 later in the summary gives the acreages of the LUD Groups by alternative. One LUD, Transportation and Utility Systems, is not included in the table or LUD Groups since it does not have an acreage associated with it.

Table 1
Land Use Designations and LUD Groups

LUD Group	Land Use Designation
Wilderness	Wilderness Wilderness National Monument Non-wilderness National Monument
Natural Setting	Research Natural Area Remote Recreation Special Interest Area Old-growth Habitat Enacted Municipal Watershed LUD II Semi-Remote Recreation Wild River Scenic River Recreation River
Moderate Development	Experimental Forest Scenic Viewshed Modified Landscape
Intensive Development	Timber production Minerals

The themes of the ten alternatives are included in Table 2. (The alternatives in the FEIS are numbered 1-7 and 9-11.) The goals of each alternative listed in Chapter 2 of the FEIS are not repeated for this summary, but Tables 3 and 4 below indicate how many of these goals have been translated into objectives and outputs.

Table 2
Alternative Themes

Alternative	Theme and Purpose
1	Emphasize high-quality fish and wildlife habitat, unroaded areas, wild, scenic, and recreational rivers, scenic quality, subsistence use, and a wide range of recreation and tourism opportunities in a natural setting. Geographic areas mentioned in public comments as deserving of protection, and all identified recreation places, are assigned non-development LUD's.
2	Emphasize scenery, recreation and tourism, subsistence uses, and timber production. Many of the more important wildlife habitats, recreation and subsistence opportunities, and scenic values will be maintained in a natural setting. Resources that will contribute to the local and regional economies of Southeast Alaska are emphasized.
3, 4 and 5	Provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska.
6	Provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and more emphasis than Alternatives 3-5 on resources contributing to the local and regional economies of Southeast Alaska.
7	Provide an economic timber supply from public lands to meet market demand in Southeast Alaska. Management of other resources will be done in an efficient manner consistent with the emphasis on timber supply, and while meeting environmental standards. Some areas with low timber volumes will be managed with an emphasis on non-commodity values.
9	This is the “No Action” alternative which represents the management direction of the current Tongass Land Management Plan (as approved in 1979, and amended in 1986 and 1991). Under this alternative, the Tongass National Forest would continue to be managed under the current land allocations reflected in the Plan’s four basic Land Use Designations (the LUD’s and LUD variations displayed on the enclosed map for Alternative 9), and related Plan direction.
10	Provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska. This was the Revised Supplement Preferred Alternative.
11	Provide a mix of National Forest uses and activities with an emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska. This is the FEIS Preferred Alternative.

For the Revised Supplement and this FEIS, alternatives were designed primarily to address in different ways the five focus issues. Table 3 shows how various issue-related components have been assigned to the ten FEIS alternatives.

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Table 3
Alternative Component Options

Component	Alternative 1	2	3	4	5	6	7	9	10	11
Alternative Base	1992 A	1992 P	1992 P	1992 P	1992 P	1992 P	1992 D++	Current Plan (No Action) [2]	1992 P	Alt. 10
Reserve Strategy [1]	None	None	All	None	4 Prov.	4 Prov.	None	None	All	All
Aver. Timber Stand Rotation (Years)	200	100	100	200	200	100	100	100	100	100
Silvicultural system	UM	ES	2A	UM, 2A	UM, 2A	UM, 2A	ES	ES	ES, 2A	ES
VCU Harvest Thresholds (%)	None	None	None	25%/ 50 yr.	25%/ 50 yr.	50%/ 50 yr.	None	None	None	None
OG Retention/VCU	None	None	None	33%	33%	33%	None	Retention	None	None
Riparian Habitat:										
FHIP 1 Watershed	Opt 2	Opt 3	Opt 1	Opt 2	Opt 2	Opt 2	Opt 3	TTRA/BMP	Opt 2	Opt 2A
All others	Opt 3	Opt 3	Opt 2	Opt 3	Opt 3	Opt 3	Opt 3	TTRA/BMP	Opt 3	Opt 2A
Beach1 (0-500')	S/G	S/G	S/G	S/G	S/G	S/G	None	None	S/G	S/G
Beach2 (500-1,000')	S/G, UM	None	S/G, UM	S/G, UM	S/G, UM	S/G, UM	None	None	None	S/G
Estuary (0-1,000')	S/G	S/G	S/G	S/G	S/G	S/G	None	None	S/G	S/G
Karst/Caves	K/C S/G	92 S/G	K/C S/G	K/C S/G	K/C S/G	K/C S/G	92 S/G	Cave Act	K/C S/G	K/C S/G
Deer Winter range	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No

1 This component refers to the use of a system of old-growth habitat reserves to address wildlife viability. Such a system is in addition to reserves that may already exist, such as within Wilderness or Legislated LUD II areas. The layout of the system is different for Alternative 11 than for Alternatives 3 and 10.

2 Implementation of projects under the Current Plan typically goes beyond current direction in providing protection for riparian areas and karst and cave areas; the retention method provides selected recognition of deer winter range and beach fringe, and eagle nest buffers also provide beach fringe protection. This table, however, is designed to represent only what is actually direction under the Current Plan.

Definitions

Reserves:
- All = Large, Medium, and Small reserves proposed by the Interagency Viable population Committee (Suring et al. 1993).
- 4 Provinces = N. POW, Kupreanof/Mitkof, Dall Isl., NE Chichagof, + individual reserves (Meyers Chuck, Lake Eva, Wright Lake).

Silvicultural system:
- UM = Uneven-aged management (single tree/group selection).
- ES = Even-aged Short Rotation (approximately 80-150 years, depending upon site potential).
- 2A = Two-aged stand management (permanent retention of 10-20% of trees during harvest).

Riparian:*
- Option 1 (Lowest Risk) - expanded riparian corridors on Class I-III streams, exclusion of high hazard soils, etc.
- Options 2 and 2A (Lower Risk) - expanded riparian corridors on Class I-III streams (but less so than Option 1), etc.
- Option 3 (Higher Risk) - 1991 SDEIS “Stream and Lake Protection” LUD.
- TTRA/BMP (Highest Risk) - Tongass Timber Reform Act/Best Management Practices.
- FHIP = Forest Habitat Integrity Project: FHIP 1 - highest quality watersheds for sport/commercial fish.

Deer Winter range: Application of management standards to maintain important deer winter range.

Karst/Caves: K/C S/G - Lower risk standards and guidelines; 92 S/G - Moderate risk standards and guidelines; Cave Act - Protect only identified caves.*

***The levels of risk indicated are relative terms only. They do not imply absolute risk levels.**

Table 4 includes some of the key outputs of the alternatives. Table 5 summarizes the Land Use Designation allocations of the alternatives using the LUD Group combinations previously discussed. A comparison of alternatives discussion follows these tables.

Table 4
Selected Alternative Dimensions[1]

Resource/Category	1	2	3	4	5	6	7	9	10	11
					Alternative					
Recreation - ROS Opportunities (million RVD's)										
Primitive and Semi-primitive Non-motorized	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Semi-primitive Motorized	1.7	1.6	1.6	1.7	1.7	1.6	1.6	1.6	1.6	1.6
Roaded Natural and Roaded Modified	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Scenery - VQO's (2) (million acres):										
Retention	5.9	3.6	4.4	3.6	3.9	4.0	2.0	5.2	4.4	4.8
Partial retention	4.9	3.1	2.9	3.1	3.0	3.0	1.3	1.1	2.9	3.2
Modification	<0.1	0.5	0.4	0.5	0.4	0.4	1.0	0.4	0.4	0.4
Maximum Modification	0.2	3.9	3.3	3.9	3.7	3.6	6.7	4.4	3.3	2.8
Timber:										
Suitable Lands (million acres)	0.0	1.2	0.8	0.8	0.8	1.0	1.6	1.4	0.9	0.7
Sale Quantities (MMBF): (3)										
Non-interchangeable I	0	375	210	107	100	250	520	447	245	219
Non-interchangeable II	0	87	46	23	22	59	120	102	55	48
Allowable Sale Quantity	0	463	256	130	122	309	640	549	300	267
Silvicultural Sstem (1,000 acres):										
Even-aged	0	14.7	0	0	0	0	20.3	17.4	0	6.7
Two-aged	0	0	9.4	6.3	4.6	11.4	0	0	11.2	1.9
Uneven-aged	0	0	<0.1	0	0	<0.1	0	0	0	0

1 Abbreviations used: ROS = Recreation Opportunity Spectrum; RVD = Recreation Visitor Day; VQO = Visual Quality Objective; MMBF = million board feet. RVD's, sale quantities, and silvicultural system acreages are average annual amounts.
2 Excluding Wilderness (5.7 million acres of Retention in all alternatives).
3 All timber volumes are sawlog plus utility.

Table 5
Land Use Designation Group Comparisons (million acres)[1]

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	5.9	10.8	<0.1	0.2
2	5.9	5.8	1.7	3.5
3	5.9	6.8	1.3	3.0
4	5.9	5.8	1.7	3.5
5	5.9	6.2	1.5	3.3
6	5.9	6.2	1.5	3.3
7	5.9	3.2	1.5	6.3
9	5.9	4.9	2.3	3.8
10	5.9	6.8	1.3	3.0
11	5.9	7.3	1.1	2.6

(1) LUD Group combinations are displayed in Table 1. For Alternative 9, Wilderness=LUD I; Natural Setting=LUD II; Moderate Development=LUD III; and Intensive Development=LUD IV.

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Comparison of Alternatives

The alternatives will now be briefly compared based on significant environmental consequences, mainly concentrating on the focus issues.

Wildlife Habitat and Wildlife Viability

The analysis of these issues in Chapter 3 includes both short-term and long-term considerations. Potential short-term effects focus on geographic areas within the Tongass that are currently experiencing, or may experience within the next decade, significant adverse effects due to losses of old-growth habitat, and where current levels of deer harvesting (hunting) may not be sustainable. Alternative 1 schedules no additional timber harvesting. Alternatives 3, 5, 6, 10 and 11 include old-growth reserve systems in all or most of the major geographic areas of concern, and Alternatives 4 and 5 would reduce potential effects by using extended timber harvest rotations. Alternatives 3, 4, 5 and 6 also maintain important deer winter range in areas where deer harvesting is high, to provide continued deer harvesting opportunities at current levels. Alternatives 2, 7 and 9 would be expected to exacerbate existing problems.

In the long-term, the ability of several alternatives to maintain habitats adequate to sustain well distributed viable wildlife populations Forest-wide is a concern, as suggested by the ratings from six wildlife species panel assessments. In these ratings the alternatives tended to cluster in groups, with Alternatives 1, 4 and 5 generally having the least risk to viability, and Alternatives 2, 7 and 9 the greatest risk. In terms of relative likelihoods of maintaining conditions in the future that would sustain well distributed viable populations, Alternatives 2, 7 and 9 rated lowest, Alternatives 3 and 6 somewhere in-between, and Alternatives 1, 4 and 5 highest. These relative ratings were fairly consistent between species overall, and the rankings (from low risk to high risk) very similar to those given by the old-growth ecosystem panel, and arrived at in other analyses.

Alternatives 10 and 11 were not rated by the panels. Alternative 10 is estimated to have a similar relative likelihood of maintaining habitat to sustain viable populations as Alternative 6. Alternative 11 is estimated to have a higher likelihood than Alternative 3, putting it closer to Alternatives 4 and 5.

Fish Habitat

Most alternatives include combinations of three "Riparian Options" designed to minimize to various degrees potential adverse effects to fish habitat. Alternative 11 uses a fourth option. Options 2 and 2A incorporate recommendations from the Anadromous Fish Habitat Assessment; Option 2A with somewhat lower risk than Option 2. Option 1 goes beyond these recommendations (lower risk), and Option 3 reflects the 1991 SDEIS proposals (higher risk). Alternative 3 applies Option 1 (the most protective) to key watersheds, and is the only alternative applying Option 2 to other watersheds. Alternative 11 applies Option 2A to all watersheds. Alternatives 1, 4, 5, 6 and 10 use Option 2 for key watersheds, Option 3 for the rest. Alternatives 2, 7 and 9 use either only Option 3 or only current direction (Alternative 9).

Beyond these riparian-area measures, risks to maintaining high-quality fish habitat come primarily from the amounts and methods of timber harvesting, and the associated amount of new roads constructed. These and other factors were considered by the Fish/Riparian panel. Their overall ranking of alternatives in terms of relative long-term risk to fish habitats Forest-wide, from lowest risk to highest, was: Alternatives 1, 5, 4, 3, 6, 2, 9 and 7. Alternative 10, not rated by the panel, is estimated to be similar in risk to Alternative 6. Alternative 11, also not rated, is estimated to fall somewhere between Alternatives 1 and 3.

Noticeable short-term effects to fish habitat are most likely to occur in watersheds where past and near-term future activities are concentrated. This is most likely in alternatives with the highest levels of permissible timber harvesting. These same alternatives project the greatest amounts of road construction over the next decade, and entry into more areas with steep slopes. Alternatives 2, 7 and 9 are distinctly higher in these categories, and also have the least-protective riparian measures. Alternative 1 has no additional timber harvesting or roads, and thus a very low risk. Alternatives 3, 4, 5, 6 and 10 all include at least Riparian Option 2 for key watersheds, helping to reduce short-term risks; Alternatives 6 and 10 have more timber harvest and roading and thus the higher risks within this group. Alternative 11, although projecting more timber harvest and roading than Alternatives 4 and 5, applies Riparian Option 2A to all watersheds and has a lower short-term risk than most alternatives in this group.

Karst and Caves

All alternatives comply with the Federal Cave Resources Protection Act in protecting designated significant caves. However, the cave resources of the Tongass are a part of an extensive limestone landscape type known as karst, which has complex relationships to water flows and forested lands. Fully protecting the cave resource requires a wider recognition of these karst areas. Special Karst and Caves Forest-wide standards and guidelines are applied in Alternatives 1, 3, 4, 5, 6, 10 and 11, and these alternatives are most likely to protect sensitive karst areas and the cave resource (still largely unexplored). Alternatives 2, 7 and 9 have less protection, and also greater amounts of timber harvesting, and pose a higher risk to karst areas and caves.

Timber Harvest and Alternatives to Clearcutting

Projected timber harvest levels, as inferred from the allowable sale quantities of the alternatives, range from 0 million board feet (MMBF) in Alternative 1 to 640 MMBF in Alternative 7. The allowable sale quantities are divided into two non-interchangeable components (NIC's) based on harvest economics and available technology. The NIC I portion is the amount considered likely to be economically viable over the next decade. It can be compared to the historic average harvest (340 MMBF per year average between 1980 and 1995 approximates NIC I, contrasted to an ASQ of 450 MMBF (net sawlog) for the same period). Alternatives 2, 7 and 9 have a NIC I sale quantity higher than this amount, and would be most likely to allow the timber industry in Southeast Alaska to operate at or above historic levels. Alternatives 6 and 10 are somewhat below this average, but probably have sufficient NIC I volumes to meet long-term timber sale contract requirements and supply a viable independent timber sale program. Alternatives 3 and 11 are marginal in this regard. Alternatives 4 and 5 would probably not provide sufficient volume to meet long-term contract requirements, but could supply a viable independent sale program in the absence of such a contract. Alternative 1 has no timber harvest scheduled.

Three alternative silvicultural systems were available as options for timber harvest in the forest plan alternatives: even-aged management (clearcutting), two-aged management, and uneven-aged management. Two harvest rotation ages were also available: an average 100-year rotation ("short" rotation), and an average 200-year rotation ("extended" rotation). The combination of even-aged management with 100-year rotations is the practice used currently, and forms the primary harvest system selected for Alternatives 2, 7, 9 and 11 (in 11 in combination with two-aged systems). Other combinations would be considered the "alternatives" to clearcutting. Two-aged systems are used in Alternatives 3, 4, 5, 6, 10 and 11; in

Alternatives 3, 6 and 10 using 100-year rotations, in Alternatives 4 and 5 using 200-year rotations, and in Alternative 11 in combination with even-aged systems and using 100-year rotations. The differences in acres scheduled for harvest and sale quantities among these combinations can be seen in Table 4.

Socioeconomic Considerations

The analysis of social and economic effects includes an examination of regional (Southeast Alaska) industry and employment impacts, and a more qualitative look at potential effects to each of Southeast Alaska's 30+ communities (including effects on the availability of subsistence resources). The regional analysis concluded that only two employment sectors - timber and recreation/tourism - would show direct or indirect effects from Tongass management over the next decade. There is a fairly direct, linear relationship between the Allowable Sale Quantity of an alternative and the timber jobs that would result from the harvest of that quantity - down to a certain point. For alternatives with sale quantities - either ASQ or the NIC I portion of ASQ - insufficient to keep a known mill operation in business, offering sales below that amount would not necessarily provide employment. Alternatives 7, 9 and 2 all have allowable sale quantities adequate to support an increase in Tongass timber-related employment over the next decade. Alternatives 6 and 10 show a slight decrease, and the other alternatives progressively more of a decrease (Alternative 3, followed by 11, 4 and 5, followed by 1).

Employment in the recreation and tourism sectors (considered together in the analysis) increases moderately, and about the same amount, under all alternatives during the first decade.

Recreation and Tourism

Table 4 displays first-decade annual Recreation Visitor Day capacity under the alternatives. The differences result from changes in Recreation Opportunity Spectrum classes, which will occur slowly over several decades, and thus appear relatively minor for the first decade. On a longer-term basis, Alternatives 7 and 9 would result in a greater shift towards the roaded types of opportunities than the other alternatives.

LUD group allocations (Table 5) are another way to generally identify recreation opportunities. Outside of Wilderness (which is the same for all alternatives), "roadless" recreation availability can be equated to acres within the Natural Setting LUD group. Alternative 1 has a considerably larger acreage in this category (10.8 million) than the other alternatives. Alternative 11 has over 7 million acres, Alternatives 3, 5, 6 and 10 all have over 6 million acres, and Alternatives 2 and 4 have 5.8 million. Alternatives 7 and 9 each have less than 5 million acres, with Alternative 7 the lowest at 3.2 million. "Roaded" recreation opportunities in the Moderate and Intensive Development groups are offered in the reverse of this order.

For the analysis of recreation and tourism, various types of "recreation places" - areas popular for specific types of recreation and for tourism - have been identified. In most cases, relatively undeveloped or natural settings for these places are preferred. Forest-wide, for all types of recreation places, Alternative 1 has the most recreation place acres in Natural Setting LUD's, followed by Alternatives 3, 10 and 11, then Alternatives 5 and 6, and then 2 and 4, all with fairly comparable recognition of recreation places. Alternatives 7 and 9 have the fewest recreation place acres in natural settings. Tourism recreation places are recognized in generally the same order and relative amount.

Scenery

Recognition of scenic quality through application of Visual Quality Objectives is indicated Forest-wide in Table 4. Outside of Wilderness, the Retention and Partial retention categories would be considered capable of maintaining natural or natural-appearing scenery. Acres in these combined categories are highest in Alternative 1. Alternatives 3, 6, 10 and 11 each have 7 million or more acres, closely followed by Alternatives 2, 4 and 5, then Alternative 9. Alternative 7 has considerably fewer acres in retention and partial retention objectives.

A list of "visual priority routes and use areas" has been developed to help recognize the areas most important for scenic values. Apart from Alternative 1 (which has essentially no future alterations affecting scenic quality), Alternatives 2-6, 10 and 11 all include the majority of these routes and areas either in natural setting LUD's, or in the Scenic Viewshed and Modified Landscape LUD's. Many are included in Alternative 9 in the LUD II and LUD III categories, but many are also allocated to LUD IV. Alternative 7 did not allocate LUD's based on these routes or areas, and did not use the Scenic Viewshed LUD.

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Purpose and Need

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Forest land and resource management planning is a process for developing, amending, and revising land and resource management plans (forest plans) for each of the National Forests in the National Forest System. Forest plans are required by the National Forest Management Act (NFMA) of 1976. Each forest plan is intended to guide the management of a National Forest for a 10-15 year period, at the end of which a formal revision is required.

The 17-million acre Tongass National Forest, the largest forest in the National Forest System, was also the first to complete a Land and Resource Management Plan under the National Forest Management Act. The original Tongass Forest Plan was approved in 1979, and has been amended twice (in 1986 and 1991). The first revision of this plan is now being considered.

A draft environmental impact statement (DEIS) documenting the environmental analysis for this revision was released for public review in June 1990. In November 1990, the Tongass Timber Reform Act (TTRA) was passed. This Act imposed several new requirements for management of the Tongass affecting the Forest Plan and resulted in the preparation of a Supplement to the DEIS, which was released in August 1991. (This Supplement is hereinafter referred to as the "1991 SDEIS.") TTRA made permanent changes to Forest Plan land allocations and standards and guidelines which applied to all alternatives in the Supplement. The 1991 SDEIS was in turn followed by the Revised Supplement in 1996. The Revised Supplement was necessitated by new information and analysis relevant to several important issues.

The release of a final environmental impact statement (FEIS) and decision had been scheduled for early 1993, but was put on hold in order to conduct the additional analysis which ultimately led to the Revised Supplement. A 1992 draft version of this FEIS included alternatives that became the basis of some Revised Supplement and FEIS alternatives. See Chapter 2.

This FEIS analyzes in detail 10 alternatives for future management of the Tongass National Forest. A separate document, the Land and Resource Management Plan (Forest Plan), is an expansion of the Preferred Alternative (Alternative 11) contained in this FEIS.

The actions preceding issuance of this FEIS have included identifying public issues (discussed later in this chapter and in Appendix A), developing criteria (guidelines) for use in assembling and analyzing data and information, and collecting and analyzing this data. The result was the "analysis of the management situation" (AMS) which examined, in detail, the historical trends, current situation, and supply and demand features of the resources and uses of the Tongass National Forest. (The Analysis of the Management Situation, Tongass National Forest, January 1990, is a separate document incorporated here by reference.) Both the public issues and the AMS have been updated based on analysis completed since passage of the Tongass Timber Reform Act (TTRA) (updated in the 1991 SDEIS) and completion of the public comment periods on the 1990 DEIS and 1991 SDEIS (updated in the 1996 Revised Supplement).

This environmental impact statement is tiered to the EIS for the Alaska Regional Guide, which establishes Regional standards and guidelines and distributes targets from the National Resources Planning Act program to the forests. ("Tiering" is the process under the National Environmental Policy Act of relying on programmatic or "higher-level" environmental analyses for the treatment of general matters and focusing on more specific matters in the subsequent analysis.). Environmental analysis for projects will in turn tier to this, the Tongass Land Management Plan Revision EIS.

The Regional Forester, in the Record of Decision, has selected Alternative 11, the Preferred Alternative, as the Tongass Forest Plan. This revised Forest Plan replaces all current Tongass Forest Plan direction. (See Chapter 5, "Implementation," in the Forest Plan.)

The "purpose and need" for the Tongass Forest Plan Revision, beyond the basic NFMA requirement for periodically revising forest plans, centers on the basic elements of what constitutes a forest plan. These plan elements include: multiple-use goals and objectives, management prescriptions, standards and guidelines, timber suitability, the Allowable Sale Quantity, and monitoring and evaluation. Together these are evaluated to determine the "need for change." (For the 1991 SDEIS, requirements of the Tongass Timber Reform Act affecting forest planning became additional needs for change. These are discussed in applicable sections of Chapter 3, especially "Fish," "Roadless areas," "Timber," and "Wilderness.")

Need for Change

The need for change is based on the results of monitoring and evaluation, an assessment of current direction, new information, resource supply potentials and projections of demand, and public issues and management concerns. Examples are: changes in market conditions or resource demands; shifts in public values; and new information about the Forest's resources and their interrelationships.

Six categories of planning direction from the current Tongass Land Management Plan that might need changing were identified (Chapter 7: The Need for Change, The Analysis of the Management Situation, Tongass National Forest, January 1990). These are described briefly here, and explained in more detail in Chapters 2 and 3.

1. **Multiple-use goals and objectives**. The goals and objectives of the Tongass Land Management Plan were developed in 1979, and updated in 1986. Forest management is dynamic, and changes in public views, resource uses and demands, and natural resource knowledge require periodic re-evaluation of multiple-use goals and objectives.

2. **Management prescriptions**. The current Tongass Land Management Plan uses four broad Land Use Designations, with several variations, to allocate land areas to different types of management (such as Wilderness, or emphasis on timber production). More specific management prescriptions, which have become the standard in more recent Forest Plans nationally, were not used in 1979. Such prescriptions (groups of coordinated management directions applied to specific areas of land) needed to be developed and evaluated for the Tongass.

3. **Standards and Guidelines**. Standards and guidelines specify how projects and activities are to be carried out to satisfy multiple resource needs. Resource management policies for projects and activities to be carried out under the current Tongass Plan were first contained in the

Southeast Alaska Area Guide. Many of these later became Region-wide standards and guidelines in the Alaska Regional Guide. Standards and guidelines have also been included in project implementation documents, and have been developed as a part of Regional direction in the form of handbooks, manual supplements and a Forest Plan amendment. The Tongass Plan Revision provides an opportunity to aggregate this direction into a Forest-specific package, and to validate, update and add to these existing standards and guidelines.

4. **Timber Suitability**. Under the Tongass Land Management Plan, lands were made available for a variety of uses including timber production. The methodology for determining the location of suitable lands for timber production (the "suitable" land base) was different than it is now. Revising the Forest Plan provides an opportunity to better identify suitable lands for timber management using current methodology.

5. **Allowable Sale Quantity**. The current Tongass Plan established an Allowable Sale Quantity (a decadal ceiling on the amount of timber that can be supplied). This quantity was designed to meet market demands in Southeast Alaska, and to provide a significant contribution to Southeast Alaska's employment and local community stability while meeting multiple-use resource goals.

   Market demand for Southeast Alaska's timber is expected to remain high during the 1990's. However, during the same period a decrease is likely in the timber supply from Native Corporation lands, potentially increasing the demand for Tongass National Forest timber to supply markets for wood products and maintain timber-related employment. At the same time, in recognition of the needs of some non-timber resources, and in response to public issues, the maintenance or even reduction of the current Allowable Sale Quantity needs to be considered. Both higher and lower allowable sale quantities are evaluated.

6. **Monitoring and Evaluation**. The current Tongass Plan provides direction for monitoring and evaluation, primarily for monitoring development-related activities. A revised monitoring plan is needed to ensure that the revised management prescriptions and standards and guidelines are effective in achieving the desired results.

Public Issues

Ten public issues were originally identified in 1988 for the Forest Plan Revision. These were used for the 1990 DEIS, and remained the same, with some updating, for the 1991 SDEIS. Each issue statement is framed as a question. These original issues are listed and briefly described here. The 1991 SDEIS added an additional concern, identifying and considering for recommendation potential Wild, Scenic, and Recreational Rivers.

The Ten Original Public Issues

Scenic Quality. What areas of the Tongass National Forest should be managed to emphasize scenic resources?

The Tongass National Forest is a unique combination of land and marine environments that provides outstanding ocean, mountain, and glacier scenery. Maintaining the scenic quality of the Forest landscape, and how this is to be achieved in combination with resource uses that alter natural landscapes, such as timber harvesting and road construction, is of concern to Forest visitors, individuals, groups, businesses, and communities. A specific interest for many are the views from the Alaska Marine Highway and cruiseship routes.

Recreation. What areas should be managed to emphasize recreation opportunities?

Outdoor recreation opportunities offered by the Tongass National Forest play an important role in the quality of life for the majority of Southeast Alaska residents. Many families have favorite places were they fish, hunt, beachcomb, hike, or just go to get away. Many non-residents visit the Tongass for these same opportunities. Forest management has the potential to alter some of these unique recreation settings, raising the question of the compatibility of activities such as timber harvesting with the recreation opportunities that these settings provide.

Fish Habitat. What methods should be used to protect resident and anadromous fish habitat?

The fisheries resource of the Tongass contributes significantly to the economic, recreational, and subsistence needs of residents and non-residents alike. Most of the salmon caught in the waters of Southeast Alaska and in the Gulf of Alaska originate in streams and lakes lying within the boundaries of the Tongass National Forest. Changes in stream habitat can alter a stream's ability to produce fish. The level of protection necessary to maintain or enhance the fisheries resource, while allowing other resource activities such as timber harvest, is the heart of this issue. (See also Fish Habitat under "The Five Focus Issues" below.)

Wildlife Habitat. What amount of old-growth and undeveloped habitat should be managed for the protection of wildlife?

The Tongass National Forest supports a wide variety of wildlife species, including the largest populations of brown bears and breeding bald eagles in the world. Alaskans and visitors engage in sport and subsistence hunting of moose, brown and black bears, mountain goat, and deer; many other species also provide the public with sport, commercial, and subsistence use opportunities. The demand for opportunities to watch and photograph wildlife is growing. The habitat needs of the wildlife species of the Tongass, the majority of which are associated with old-growth forests, must be integrated with the management of other resources, especially the timber resource. (See also Wildlife Viability under "The Five Focus Issues" below.)

Subsistence. What should the Forest Service do to continue providing subsistence opportunities?

For many rural Alaskans, subsistence means hunting, fishing, trapping, and gathering natural resources to provide needed food and supplement rural incomes. For Southeast Alaska's Native Americans, subsistence is that and more: a lifestyle that preserves customs and traditions reflecting deeply-held attitudes, values and beliefs. The subsistence issue revolves around ensuring subsistence opportunities and protecting traditional subsistence areas while managing for multiple resource uses. The potential effects of continued logging on resources and places important to subsistence users is the main concern. Another concern is roads, which can provide new access opportunities, but can also result in competition among sport and subsistence users.

Timber Harvest. What areas of the Tongass should be managed to emphasize timber harvesting?

In the 1950s, establishing an Alaskan timber processing industry was encouraged to promote stable year-round employment. Since then, timber harvesting has been one of the principal uses of the Tongass. The issue of where to emphasize (or allow) timber harvest is many-faceted, and includes consideration of the compatibility of timber activities with other resource uses and needs, the identification of lands suitable for timber management, and the question of what is an appropriate, sustainable level of timber harvest, all in combination with the local economic importance of timber-related employment. (See also Alternatives to Clearcutting and Socioeconomic Considerations under "The Five Focus Issues" below.)

Roads. What road system should be developed in the Tongass National Forest?

The land transportation system in Southeast Alaska has evolved almost entirely from the need to access areas for timber harvest. Some of the roads linking island communities have more recently been upgraded and incorporated into the State Highway System, a trend expected to continue in the future. Roads have also become a popular means of access for recreation, hunting, and subsistence uses. On the other hand, roads can adversely affect scenic quality, wildlife habitat, unroaded recreation, and other aspects of a natural environment. Future road development will still be primarily in support of timber management. The benefits and drawbacks to extending the road system in the Tongass need to be analyzed.

Minerals. What areas and accessibility should be emphasized for exploration, development, and production of mineral resources?

The Tongass National Forest contains many important mineral resources, from precious metals to chemical-grade minerals. Mining and mineral exploration activities have occurred for over one hundred years. Today, along with new explorations, many historical mineral deposits are being revisited. This renewed interest in mining could, directly or indirectly, provide an increase in employment in Southeast Alaska. The identification of areas with high mineral development potential, and assuring development opportunities where appropriate, are major facets of this issue, as are the potential environmental effects of mineral development.

Roadless areas. What areas and what amount of roadless lands should be recommended for Wilderness Designation or other types of unroaded management?

Approximately 5.5 million acres of the Tongass were added to the National Wilderness Preservation System in 1980 by the Alaska National Interest Lands Conservation Act and another 0.3 million by the Tongass Timber Reform Act of 1990. TTRA also designated 0.7 million acres for perpetual LUD II management (see Chapter 2). Additional roadless areas have been identified by the public for consideration for similar non-development types of management. The issue centers on the question of how much roadless land to maintain in its natural condition, versus the development of these lands for their timber and mineral values.

Local Economy. What ways should National Forest lands be managed to provide for the local lifestyles of Southeast Alaska communities?

Dependency on the land and natural resources is an economic fact of life throughout much of Southeast Alaska. Employment and income generated by timber, fishing, mining, and tourism industries is critical to the social and economic well-being of most existing and emerging Southeast Alaska communities. Many individuals also rely on the subsistence use of Forest resources to provide needed food and supplement their income. For these reasons, management of the Tongass National Forest has been, and continues to be, closely tied to the issue of regional and community socioeconomic development and structure. But maintaining current employment, especially in the timber sector, will require the development of more areas of the Forest.

The Five Focus Issues

The "need for change" portrayed the general purpose and need for doing the Revision. Addressing the ten issues just listed further defined the purpose and need for the 1990 DEIS and 1991 SDEIS. Part of the purpose and need of the 1996 Revised Supplement and this FEIS is to further address several issues that have continued to be of concern for the Tongass and are relevant to National Forest planning.

Since the release of and comment period on the 1991 SDEIS, considerable new information bearing on the Tongass Forest Plan Revision has come to light, including additional scientific reviews and studies, new or updated resource inventories, and comments and reports from interest groups and individuals. Out of this new information emerged five issues determined by the Regional Forester to need more study and evaluation before a final Revised Forest Plan could be adopted. Some of these issues are aspects or extensions of the ten public issues previously considered (fish and wildlife habitat, and the local economy), others are new as issues (caves and karst) or were not considered as issues in themselves (alternatives to clearcutting). Background on these issues is presented here (much of which, especially recent studies and assessments, is discussed in more detail in the relevant resource sections of Chapter 3). The new issues are not framed as questions as was done for issues previously.

Wildlife Viability

The issue concerning wildlife viability centers on questions of whether the current Forest Plan, or the alternatives considered for revising the Forest Plan (in either the 1991 SDEIS or the unpublished 1992 Tongass Forest Plan Revision Final Environmental Impact Statement (FEIS)), provide for sufficient habitat to maintain viable wildlife populations in the Tongass National Forest within the context of overall multiple use objectives (as required by 36 CFR 219.19 and related NFMA regulations).

Early in 1993, the Alaska Regional Forester postponed a final decision on the Revised Forest Plan and requested the Forest Service's Pacific Northwest Research Station to conduct a scientific peer review of a viability strategy recommended by the Interagency Viable Population Committee, and other planning documents related to viability, as part of the Forest Plan Revision process. Results of this peer review were released in 1994 ("Review of the Wildlife Management and Conservation Biology on the Tongass National Forest: A Synthesis with Recommendations," March 1994). The peer review concluded that a strategy like that recommended by the Committee went further in ensuring habitat to support viable wildlife populations than the Revision alternatives, but that other methods and approaches also need to be considered. It also noted a lack of information about wildlife in Southeast Alaska, and the need for more study.

Also in 1994, the Alaska Region of the U.S. Fish and Wildlife Service (USFWS) accepted two petitions for listing under the Endangered Species Act, for the Queen Charlotte goshawk (as endangered) and the Alexander Archipelago wolf (as threatened), in Southeast Alaska. In June 1994 a reserve strategy for maintaining habitats for viable wildlife populations was used in developing the Fiscal Year 1994-95 timber sale/timber offerings schedule for the Tongass. This was partly based on the recommendations of the Interagency Viable Population Committee, and also used preliminary information from an interagency goshawk meeting. After additional study, this scheduling effort was followed by the release of a draft Environmental Assessment for a proposed Forest Plan amendment to further address short-term habitat concerns related to wildlife viability ("Interim Habitat Management Guidelines for Maintaining Well-Distributed Viable Wildlife Populations within the Tongass National Forest," September, 1994). A second interagency meeting on the goshawk, in October 1994, used new inventory information to refine proposed goshawk habitat management guidelines.

During the first half of 1995, the USFWS announced decisions on the wolf and goshawk petitions. Neither species was found in need of listing at this time, but USFWS stated in both cases that without substantive changes in management of the Tongass, future viability was a definite concern. (Very recently legal challenges have resulted in the USFWS being required to reevaluate both these decisions.) The Forest Service and four other federal agencies have signed a National Memorandum of Understanding (MOU) for the conservation of species that may be considered for listing under the Act, and an emphasis on species tending toward listing. In addition, a similar MOU with similar purposes pertaining specifically to Alaska has recently been entered into between the Alaska Regions of the Forest Service and USFWS, and the State of Alaska Department of Fish and Game. Early and adequate conservation of candidate species may preclude the need for additional protection and listing. (For a review of Forest Service policy on preservation strategies and preventing the need to list under the ESA, see Capp 1996.)

Fish Habitat

Concurrent with the work and actions taken relative to wildlife viability, in 1994 an Alaska Anadromous Fisheries Habitat Assessment (AFHA) was conducted, at the direction of Congress, for the purposes of studying the effectiveness of current procedures for protecting anadromous fish habitat, and determining if any additional protection was needed. This assessment concluded that current measures, and their implementation, were not fully effective for preventing habitat degradation or protecting salmon and steelhead stocks in the long term. AFHA included recommendations to consider for the Tongass Plan Revision, and additional recommendations were made by the team that conducted the on-the-ground analysis for AFHA.

Karst and Caves

The extent and importance of the cave resources of the Tongass have only recently come to light. The 1991 SDEIS considered caves, and included some recognition of the "karst" geology in which they are typically found, in Forest-wide standards and guidelines, and through a proposed Karst Areas Geological Area. More recent studies and surveys, including a "Karst and Cave Resource Significance Assessment" (Aley et al., 1993) done for the Ketchikan Area, have indicated a more extensive resource of world-class significance, and the need to consider improved standards and guidelines. Several recent timber sale projects in karst areas have identified a similar need.

Alternatives to Clearcutting

Commercial timber harvest in the Tongass National Forest has traditionally relied on one even-aged silvicultural system, clearcutting. This system has proven very successful in Southeast Alaska in several ways: it is relatively economical; it is effective in controlling forest diseases; it eliminates blowdown; and it results in adequate natural regeneration, particularly of less shade-tolerant species such as Sitka spruce. On the other hand, clearcutting continues to be controversial in Southeast Alaska. The principal objections are to the visual changes in the landscape, and potential adverse effects to streams, slope stability, and loss of old-growth forest, particularly as habitat for wildlife. Since the 1991 SDEIS the Forest Service's Ecosystem management policy has come out, which includes a strong emphasis on limiting the amount of traditional clearcutting, and on using alternative silvicultural systems.

Socioeconomic Considerations

The socioeconomic environment of Southeast Alaska and its relation to the resources and uses of the Tongass has undergone some significant changes in recent years. Since the 1991 SDEIS, the timber industry has seen the permanent closure of one of two major pulp mills (the Alaska Pulp Corporation mill in Sitka), the development of several new small mill operations, and the termination in 1994 of one of two long-term sale contracts. In October 1996 the Louisiana Pacific Corporation announced its intent to close the sole remaining pulp mill in Southeast Alaska (the Ketchikan Pulp Company mill in Ketchikan) in March 1997. The need to address habitat for wildlife viability discussed above has led to some reductions in timber sale offerings, and other potential sales have been delayed through legal action.

The timber industry is not the only economic segment undergoing change. For instance, the tourism industry continues to see rapid growth, indicating the need to better reflect tourism needs and concerns through specific management direction and improved inventories. An extensive update of the social and economic settings and concerns of the 30+ Southeast Alaska communities became necessary in order to have the best information on local uses of, and economic ties to, the Tongass, and to better understand what each community itself desires from the Tongass National Forest.

Organization of the Document

This final environmental impact statement is organized into several chapters and a number of appendices. Chapter 1, "Purpose and Need," describes the reasons for proposing and completing a plan revision. Chapter 2, "Alternatives," describes the process used to develop alternatives, explains what the components of a Forest Plan are, discusses alternatives not considered in detail, and then describes in detail a Preferred Alternative and nine other alternatives. Chapter 2 also includes comparisons of these alternatives based on the issues and significant environmental effects.

The discussions of the "Affected Environment" and the "Environmental Consequences" are combined in Chapter 3, "Environment and Effects." This is done so that the environmental consequences (effects) of the alternatives on forest resources, and the background information needed to understand these consequences, are discussed together for each resource. The focus is on significant effects, with the analysis centered on the public issues. The chapter begins with a general description of the Tongass National Forest.

The FEIS also includes a list of preparers, a list of agencies, organizations and persons receiving copies of the document, a bibliography, and a glossary (Chapters 4 through 7), and an index. Appendices, contained in separate volumes, give more background on planning actions (such as identifying issues), certain resources (such as roadless areas), and analysis and modeling techniques. An additional appendix summarizes all substantive public comments received on all Revision drafts (1990 DEIS, 1991 SDEIS, 1996 Revised Supplement), and provides Forest Service responses to these comments.

A separate document, the Land and Resource Management Plan, is a complete exposition of the Preferred Alternative (Alternative 11) in this FEIS. It includes a Plan map, goals and objectives, the management prescriptions for 19 Land Use Designations, lands suitable for timber management and an Allowable Sale Quantity, Forest-wide standards and guidelines, plan implementation direction, and a monitoring and evaluation plan. Proposed resource schedules are presented in a Plan appendix.

Additional information, maps and reference documents used in the Tongass National Forest Land Management Plan revision process are contained in the planning record. These may be reviewed at the Tongass Plan Revision Team Office, 8505 Old Dairy Rd., Juneau, Alaska, during regular business hours. The planning record in its entirety is incorporated here by reference.

Forest Location and Description

The 17-million acre Tongass National Forest is located in Southeast Alaska, a part of the Alexander Archipelago, and occupies about seven percent of the State's area. The Tongass extends from Dixon Entrance in the south to Yakutat in the North, and is bordered on the east by Canada and on the west by the Gulf of Alaska. It extends approximately 500 miles north to south, and approximately 120 miles east to west at its widest point. Figure 1-1 is a vicinity map of the Tongass.

The Tongass includes a narrow mainland strip of steep, rugged mountains and icefields, and over one thousand offshore islands. Together, the islands and mainland equal nearly 11,000 miles of meandering shoreline, with numerous bays and coves. A system of seaways separates the many islands and provides a protected waterway called the Inside Passage. Federal lands comprise about 95 percent of Southeast Alaska, with about 80 percent in the Tongass National Forest (and most of the rest in Glacier Bay National Park and Preserve). The remaining land is held in State, Native and private ownerships.

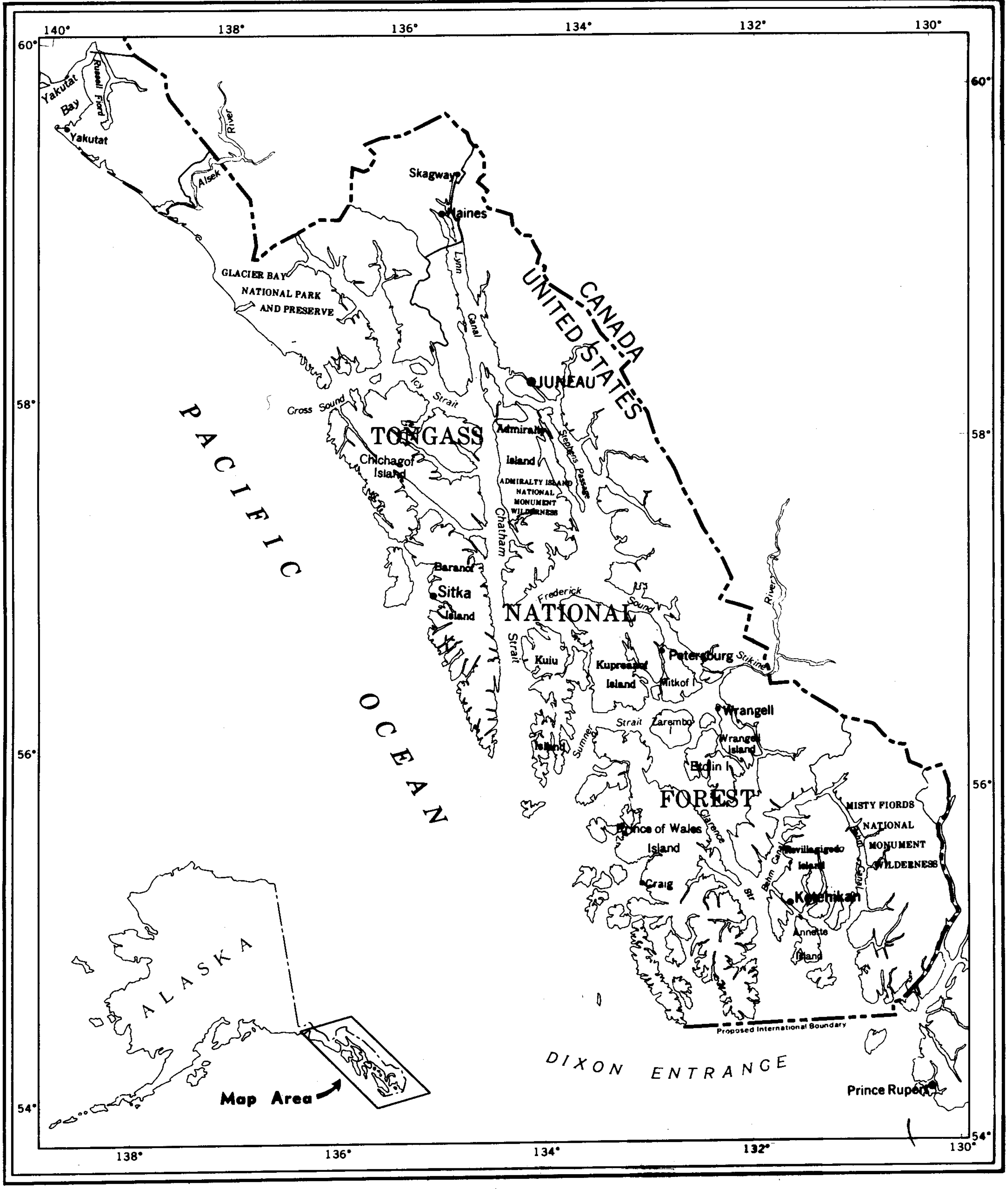
Glossary

Most of the area of the Tongass is wild and undeveloped. About 65,000 people inhabit Southeast Alaska, most living in 33 communities located on island or mainland coasts. Only eight of the communities have populations greater than 1,000 persons. Most of these communities are surrounded by, or adjacent to, National Forest land. Just three towns are connected to other parts of the mainland by road: Haines and Skagway to the north, and Hyder to the south.

The economies of Southeast Alaska's communities are largely dependent on the Tongass National Forest to provide natural resources for uses such as fishing, timber harvesting, recreation, tourism, mining and subsistence. Maintaining the abundant natural resources of the Forest while also providing opportunities for their use is a major concern of Southeast Alaska residents.

Because of its immense size, the Tongass National Forest is divided into three Administrative Areas, each with its own Forest Supervisor: the Chatham Area with its Supervisor's Office at Sitka, the Stikine Area with its Supervisor's Office at Petersburg, and the Ketchikan Area with its Supervisor's Office in Ketchikan (see Figure 1-1). There are nine Ranger Districts, with offices in Yakutat, Juneau, Hoonah, Sitka, Petersburg, Wrangell, Thorne Bay, Craig, and Ketchikan. There are also two National Monuments, Admiralty Island and Misty Fiords, with offices in Juneau and Ketchikan.

Figure 1-1



Yakutat Bay
Russell Fiord
Yakutat
Alsek River
Skagway
Haines
GLACIER BAY NATIONAL PARK AND PRESERVE
Lynn Canal
CANADA
UNITED STATES
JUNEAU
Icy Strait
Cross Sound
PACIFIC OCEAN
TONGASS NATIONAL FOREST
Chichagof Island
Admiralty Island
ADMIRALTY ISLAND NATIONAL MONUMENT WILDERNESS
Stephens Passage
Chatham Strait
Baranof
Sitka
Island
Frederick Sound
Kuiu
Island
Kupreanof Island
Petersburg
Stikine
Mitkof I
River
Wrangell
Wrangell Island
Zarembo
Sumner Strait
Etolin I
Prince of Wales Island
Clarence Str
Craig
Ketchikan
Annette Island
MISTY FIORDS NATIONAL MONUMENT WILDERNESS
Proposed International Boundary
DIXON ENTRANCE
Prince Rupert
ALASKA
Map Area
140° 138° 136° 134° 132° 130°
60° 58° 56° 54°

Chapter 2

Alternatives

Introduction

Chapter 2 is divided into four parts:

- a discussion of how alternatives were developed, and of what constitutes an alternative
- a discussion of alternatives considered but eliminated from detailed study
- a full description of the alternatives that are considered in detail
- a comparison of the alternatives considered in detail.

A large-scale map for each of the ten alternatives considered in detail is included in the map packet accompanying this document. Each alternative map shows the locations of the Land Use Designations for that alternative.

Alternative Development Process

What a Forest Plan Includes

Land management planning may be compared to city, county or borough zoning. Just as areas in a community are zoned as commercial (allowing business uses), industrial (allowing factories), or residential (allowing only homes, schools, etc.), the forest is also "zoned" to allow, or not allow, various uses and activities. Land management (forest plan) zoning is done through the use of Land Use Designations.

Land Use Designations (LUD's) specify ways of managing an area of land and the resources it contains. LUD's may emphasize certain resources (such as Wilderness, or old-growth wildlife habitat), or combinations of resources (such as providing for scenic quality in combination with timber harvesting). Each Land Use Designation has a detailed management prescription which includes practices and standards and guidelines.

Practices are specific actions or treatments used in the management of forest resources, such as even-aged timber harvest methods (clearcutting, for instance). Each management prescription specifies which practices are allowed to be considered for site-specific project proposals, and under what conditions. *Standards and guidelines*, on the other hand, impose limitations on how, where, and when management activities are carried out, usually for specific resource protection purposes.

The Land Use Designations are assigned, or "allocated," to specified areas of land. Some LUD's, such as Wilderness, are congressionally designated, but many can be allocated differently depending on the resource issue or issues being addressed. Under any one alternative, a given area of land will normally have only one LUD assigned to it (or, in the case of the Minerals and Transportation and Utility Systems LUD's, only one LUD in use at one time). In some cases, two LUD's may apply to the same area, such as a Wild River within a Wilderness. In these cases, the more restrictive direction always applies.

Glossary

2 Alternatives

Forest resource use opportunities (such as timber harvesting or recreation) can be made available in different amounts. What lands to make available for timber harvest, or how much of a particular kind of recreation "opportunity" to provide, are questions that land management planning must also address. It is not always possible to provide all the resource use opportunities in necessarily the amounts desired.

Alternatives themselves are usually designed around a "theme" that emphasizes a particular issue (such as the local economy) or a group of compatible issues (such as scenic quality and wildlife habitat). How alternatives were developed to address the issues is discussed later. The comparison of alternatives section at the end of this chapter also discusses ways in which the alternatives address the issues.

The computer model used for National Forest planning (FORPLAN), and the "benchmarks" originally run to determine forest resource potentials, are discussed in Appendix B. A summary of the "Analysis of the Management Situation," including the overall supply and demand situation for the Tongass, is included in the Revised Forest Plan.

How Alternatives are Constructed

Each alternative for the revision of the Tongass Land Management Plan will be presented in the same format. This includes the following components:

- **Theme.** The overall management intent and resource emphasis.
- **Goals.** More specific statements of emphasis, by issue or resource.
- **Objectives and Outputs.** Amounts of resource use opportunities, protected habitats, etc., that will be provided.
- **Land Use Designations.** The acreages allocated to each Land Use Designation.
- **Standards and Guidelines.** Which options for Forest-wide direction to be applied at the project level will be used.

A simple example of how these components work together can be given. Let's assume that part of the theme of an alternative is to emphasize tourism in support of the local economy. Two goals including aspects of this theme might be:

> Emphasize recreation places and opportunities important to the tourism industry.
>
> Emphasize scenic quality along the Alaska Marine Highway, major cruise ship routes, State highways, and frequently-used Forest roads.

Objectives to carry out these goals could include providing sufficient tourism-related recreation places to accommodate a certain amount of user capacity (usually expressed as "Recreation Visitor Days"), and applying the more-protective Visual Quality Objectives ("retention" and "partial retention") to areas seen from the routes mentioned in the second goal. Land Use Designations that are compatible with the goals - such as remote and semi-remote recreation, scenic viewshed and modified landscape - could be assigned to geographic areas having the desired opportunities or locations. Forest-wide standards and guidelines for recreation and scenery would also be applied at the project level to carry out the goals and objectives.

Land Use Designations

While the allocation of areas to different Land Use Designations can vary by alternative, the management prescriptions for each specific LUD do not change (except for certain timber harvest practices in some LUD's, which will be specified by alternative). Chapter 3 of the Revised Forest Plan includes the full set of management prescriptions for each Land Use Designation. These are summarized below, following a discussion of current Forest Plan LUD's.

The current Tongass Forest Plan uses four basic Land Use Designations (LUD's) and several LUD variations to specify how areas of the Tongass National Forest are to be managed. Each of the four basic LUD's has a stated purpose and related management implications describing how the land should be used. LUD II - Legislated, a variation of the basic LUD II, was added to the Plan because of the Tongass Timber Reform Act. In the 1991 SDEIS, the LUD's of the current Forest Plan were converted to the new set of Land Use Designations described below, primarily to facilitate the effects analysis and comparisons of alternatives. Technical difficulties made this conversion less-than-perfect, however, and we have gone back to the original LUD's for Alternative 9, the "current" alternative. These are defined here using the wording from the most recent Tongass Land Management Plan map (March 1991).

- **Land Use Designation I (Wilderness).** Wilderness Areas will be managed as directed by the 1964 Wilderness Act, as amended by ANILCA, which provides for the following uses: fishing, hunting, trapping, subject to State Fish and Game regulations; subsistence uses; public recreation cabins (existing and limited new); structures and facilities under Special Use Permit and/or public use; fish habitat enhancement; access to private, State, Native lands; use of airplanes, motor boats, and snow machines; beach log salvage, subsistence, and recreation use of timber.

  Lands released from Wilderness recommendation - to be allocated through the land management planning process, and Nonwilderness National Monument Lands - as described in the following list of Land Use Designations, are considered variations of LUD I in the current Plan.

- **Land Use Designation II**. These lands are to be managed in a roadless state to retain their wildland character, but this would permit wildlife and fish habitat improvement and primitive recreational facility development. This designation will exclude: (1) Roads, except for specifically authorized uses; (2) Timber harvesting, except for controlling insect infestations or to protect other resource values; (3) Major concentrated recreational facilities. LUD II - Legislated is a variation of this basic LUD, to be managed in perpetuity as LUD II.

- **Land Use Designation III**. These lands will be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits. These areas have either high use or high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use objectives. These lands may include concentrated recreational developments.

[A "LUD III Special" category is also included, with the purpose of minimizing effects on visual and recreation resources in areas directly adjacent to communities. Timber harvest is designed to be compatible with local recreation and visual resource uses, and does not count towards the Forest Plan's Allowable Sale Quantity.]

- **Land Use Designation IV**. Opportunities will be provided for intensive resource use and development where emphasis is primarily on commodity or market resources. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.

The 1991 SDEIS included 23 different Land Use Designations developed for the Tongass Forest Plan Revision. These LUD's represent a wide range of allocation choices for managing specific areas of the Forest, from wilderness (essentially no land-disturbing activities) to full commodity development (intensive timber harvesting or mining). For the Revised Supplement and FEIS, two of these LUD's have been dropped, and two have been changed to Forest-wide standards and guidelines. The "Other Areas" LUD served no real purpose, simply representing areas left over after the allocation process. "Fish Habitat and Water Quality Requirements" was a slightly less protective version of one of two riparian area LUD's, and was only used for one alternative. It has been dropped, and the other riparian area LUD, "Stream and Lake Protection," is now one of three options under the Riparian Forest-wide standards and guidelines. Similarly, the "Beach Fringe and Estuary" LUD is now a Forest-wide standard and guideline. Among the 19 remaining LUD's, only the Old-growth Forest LUD has changed significantly since the 1991 SDEIS.

Following are brief descriptions giving the general intent of the 19 Land Use Designations considered for Alternatives 1-7, 10 and 11. Two name changes have occurred: Primitive Recreation is now called Remote Recreation, and Semi-primitive Recreation is now Semi-remote Recreation.

- **Wilderness** - Manage for the protection and perpetuation of essentially natural biophysical and ecological conditions and provide outstanding opportunities for solitude, primitive recreation, and scientific and educational uses, consistent with ANILCA and the Wilderness Act. Roads are normally not permitted and use of mechanical transport and motorized equipment is limited.

- **Wilderness National Monument -** Manage the Wilderness portions of Admiralty Island and Misty Fiords National Monuments to provide outstanding opportunities for solitude and primitive recreation and to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest, consistent with ANILCA and the Wilderness Act. Roads are not normally permitted and use of mechanical transport and motorized equipment is limited.

- **Non-wilderness National Monument** - Manage the nonwilderness portions of Admiralty Island and Misty Fiords National Monuments to facilitate development of significant mineral resources, and to ensure that mining activities are compatible, to the maximum extent feasible, with the purposes for which the Monument was established.

- **Research Natural Area** - Manage forest resources for research and education and/or to maintain natural diversity. Current natural conditions are maintained insofar as possible. No timber harvest is allowed.

- **Remote Recreation** - Provide recreation opportunities and experiences outside Wilderness in unmodified natural environments where interaction with other visitors is infrequent, and the opportunity for independence and self-reliance is high. Timber harvesting is limited to insect and disease control. Roads are generally absent.

- **Enacted Municipal Watershed** - Manage enacted municipal watersheds to meet State Water Quality Standards for domestic use. Timber harvest is limited to insect and disease control; however, timber may be removed under conditions which safeguard the quantity and quality of water. Roads are generally limited to those needed to administer the municipal watersheds.

- **Old-growth Habitat** - Maintain a diversity of old-growth conifer habitats in their natural condition to favor old-growth associated fish and wildlife species. No timber harvesting will be scheduled and roads will be located outside the area when possible.

- **Semi-remote Recreation** - Provide motorized and non-motorized recreation opportunities in natural and natural-appearing environments where interaction with others is low and the opportunity for independence and self-reliance is moderate to high. Allow occasional concentrated recreation and tourism facilities in a natural-appearing setting. When present, roads are few and used primarily to expand and improve access to recreation opportunities or to permit access to other parts of the Forest and other ownerships. Timber harvest is limited to salvage of catastrophic events or beach log recovery.

- **LUD II** - Manage these Congressionally designated areas in a roadless state to retain the wildland character. Wildlife and fish habitat improvement and primitive recreational facility development may be permitted. Timber harvesting is limited to insect and disease control. Roads will not be built except to serve mining and other authorized activities and vital Forest transportation system linkages (These areas are sometimes referred to as "Legislated LUD II.").

- **Experimental Forest** - Manage to provide a variety of long-term opportunities for Forest research and demonstration areas. Timber harvesting will occur only for these purposes. Roads may be developed to facilitate ongoing research.

- **Scenic Viewshed** - Management activities are not visually apparent to the casual observer in the near distance from visual priority travel routes and use areas. In the middle to background distance, activities are subordinate to the landscape character of the area. Timber harvest is allowed and roads are permitted.

- **Modified Landscape** - Manage for a variety of uses. Management activities are subordinate to scenic quality as seen in the near distance. In the middle to background distance, activities may dominate but are

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designed to be compatible with features found in the characteristic landscape. Timber harvest is allowed and roads are permitted.

- **Timber production** - Manage the area to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the timber resource and for long-term timber production. Roads are permitted.

- **Minerals** - Encourage the exploration and development of mineral resources in areas having high potential for mineral commodities including nationally-designated strategic and critical minerals. Until mineral activities are initiated, the area will be managed according to the underlying Land Use Designation.

- **Special Interest Area** - Provide for the inventory, maintenance, protection, and interpretation of areas with unique archeological, historical, recreational, scenic, geological, botanical, zoological or paleontological features. No timber harvest is scheduled. Roads are normally not permitted unless compatible with interpretive objectives.

- **Wild River** - Maintain and enhance the outstandingly remarkable values of river segments which qualify the river to be classified a Wild River. Shorelines are primitive and undeveloped. Timber harvesting is limited to insect and disease control. Roads are generally not present. Access is by trail, airplane or boat.

- **Scenic River** - Maintain and enhance the outstandingly remarkable values of river segments which qualify the river to be classified a Scenic River. Shorelines are largely undeveloped but may be accessible in places by roads. Timber harvesting is limited by the ability of the landscape to visually absorb the activity. Roads are designed to be compatible with the landscape.

- **Recreational River** - Maintain and enhance the outstandingly remarkable values of river segments which qualify the river to be classified a Recreational River. Shoreline development may occur and the river may be readily accessible by road. Timber harvesting is allowed with priority to maintain existing and proposed recreation sites within the corridor. Roads are permitted.

- **Transportation and Utility Systems** - Emphasize existing and potential state-identified major public Transportation and Utility Systems. Until transportation or utility systems are constructed, the area will be managed according to the underlying Land Use Designation.

Considerations Used for the Original Issues

Table 2-1 lists the primary Land Use Designations that were used to develop alternatives in response to the ten original public issues (see Chapter 1 for a discussion of the issues). It also indicates when standards and guidelines and other specific considerations were used to respond to these issues. Under "scope," those aspects of an issue that were emphasized by the public are highlighted. This helps to define the "decision space" (or range) within which the issue needs to be addressed.

The comparison of alternatives section at the end of this chapter also discusses ways in which the alternatives address these issues.

Table 2-1
Considerations used to Develop Alternatives

Issue	LUD Emphasis[1]	Other Considerations	Scope
Scenic Quality	Scenic Viewshed, Modified Landscape, Remote and Semi-Remote Recreation	Standards and Guidelines	Emphasize area viewed by local residents and tourists.
Recreation	Scenic Viewshed, Modified Landscape, Remote and Semi-Remote Recreation	Standards and Guidelines, Recreation places	Tourism and locally popular recreation areas
Fish Habitat	"Non-development" LUD's	Standards and Guidelines, Improvement Projects	Riparian areas, key watersheds
Wildlife Habitat	Old-growth Habitat, "Non-development" LUD's	Standards and Guidelines, Improvement Projects	The amount and location of old growth habitat needed for wildlife.
Subsistence	Old-growth Habitat, "Non-development" LUD's	Standards and Guidelines	Providing for subsistence uses.
Timber Harvest	Timber production, Scenic Viewshed, Modified Landscape	Harvest Objectives	Local timber markets and demand estimates.
Road System	Same as Timber Harvest, plus Transportation and Utility System	Standards & Guidelines	Support for Forest uses; potential major systems.
Minerals	Minerals	Standards & Guidelines	Access to areas with high potential.
Roadless areas	Remote and Semi-Remote Recreation		Emphasize roadless areas with strong public support.
Local Economy	Some combination of those under Timber Harvest, Minerals, Fish Habitat, Scenic Quality, and Recreation.	Standards & Guidelines	Effects on local communities.

[1] Some LUD's proposed in the 1990 DEIS and for the 1991 SDEIS, such as Beach Fringe and Estuary, and Stream and Lake Protection (Riparian area), have been replaced by Forest-wide Standards and Guidelines.

Considerations Used for the Five Focus Issues

Chapter 1 discussed the five new - or expanded - issues that became the focus of the alternatives in the Revised Supplement. Information about these issues, including the results of recent science assessments, resource reports, and public comments, was combined with the information used to develop the DEIS and SDEIS alternatives to create the alternatives considered in detail in the Revised Supplement and in this FEIS.

Discussed briefly here are some of the principal ways in which the five focus issues are addressed through alternatives.

Wildlife Viability. Wildlife conservation strategies addressing individual species viability and ecosystem diversity have generally employed one or both of two key features: protected habitat reserves, and modifications of practices within timber harvest areas (see Wilcove et al. 1986). Habitat reserves have often been the focal point of conservation strategies since the pioneering work of MacCarther and Wilson (1967) on the theory of island biogeography: that the equilibrium number of species on an island generally depends on island size, and island distance from (usually mainland) source populations. Reserves are viewed as islands of undisturbed or natural habitat within a landscape of management-altered or dissimilar habitat. Reserves attempt to protect the integrity of an isolated landscape. From this theory, five general concepts of reserve design have evolved in conservation planning (Thomas *et al.* 1990):

- well-distributed species are less prone to extinction than species confined to small portions of their range;
- larger reserves supporting many pairs of individuals are superior to smaller reserves supporting only a few pairs;
- reserves that are close together are better than ones far apart;
- reserves should have the least amount of induced fragmentation possible; and
- reserves should be connected, either through specific corridors (such as beach fringe or riparian areas) or through maintaining habitat characteristics similar to the reserves on the lands between them.

In the other approach, harvest areas (conventionally called the "matrix") are managed as landscapes within which particular vegetative or habitat characteristics are to be provided. This approach often uses extended timber rotations or silvicultural prescriptions patterned after natural ecological processes or events.

A reserve-based strategy relies on blocks of intact, largely undisturbed habitats (such as old-growth forest) of the appropriate size, spacing, and composition to meet a desired design that will maintain viable, well-distributed populations of one or more species. The habitat conservation area (HCA) network used for the conservation of spotted owl habitat in the Pacific Northwest is a classic example (Thomas et al. 1990). The interagency Viable Population Committee developed a similar strategy for maintaining habitat for viable wildlife populations across the Tongass (Suring et al. 1993). Influenced by the spotted owl strategy, this Tongass strategy includes a system of large and medium HCA's, small HCA's within each 10,000-acre watershed, and coastal beach fringe and riparian buffers for landscape connectivity. The reserve strategy discussed below and applied to some alternatives is based on the Viable Population Committee's work. Other landscape management approaches developed in recent years are discussed in Verner et al. 1992, and Andersen and Mahato 1995.

An alternative wildlife conservation approach is to recognize the dynamic nature of ecosystems, in particular the related natural disturbance regimes, and manage an entire area (the matrix) to achieve a desired mixture of vegetation cover types and seral (age class) stand structures. Under this strategy, optimal percentages of such factors are determined based on individual species needs, and the landscape is managed for a spatially dynamic, but proportionately stable, composition of habitat types, including young growth. The approach used for the northern goshawk in the southwestern United States is an example (Reynolds et al. 1992).

Implicit in this matrix management approach is the use of extended silvicultural rotations (the time period between two harvests of the same unit) to achieve the desired distribution and abundance of seral stage classes (Henderson 1993). Uneven-aged management systems may also be selected over even-aged systems. Such practices are particularly necessary to perpetuate the structures and processes of old-growth forests (Weigand et al. 1994).

Potential drawbacks of a reserve approach are the failure to consider natural disturbance processes-the dynamic nature of ecosystems, and not being able to preserve landscape integrity (Irwin and Wigley 1992). These can be overcome by combining a reserve system with some type of matrix management approach (Thomas et al. 1990, Franklin 1993). As a complement to reserves, matrix management can serve at least three important roles: 1) providing habitat at smaller spatial scales, 2) increasing the effectiveness of the reserves, and 3) improving landscape connectivity.

Information from several species assessments, an old-growth forest inventory, and other recent wildlife surveys and studies was evaluated and synthesized to help identify conceptual approaches in which adequate wildlife habitats capable of supporting viable wildlife populations could be provided. Four general strategies (each of which could include a variety of options or component parts) were identified:

1. A system of large, medium, and small old-growth forest reserves (or "habitat conservation areas") distributed across the forest, in which most management activities are restricted. Habitat corridors connecting reserves may be provided through expanded beach fringe corridors and riparian areas.

2. Modifications to silvicultural harvest practices throughout the area of planned timber harvesting so that old-growth habitat characteristics, if not true old growth, are perpetuated or extensively achieved. All the methods discussed below under "Alternatives to Clearcutting" can be used.

3. A combination of the first two strategies could be used, such as using reserves in areas which have a history of extensive timber harvesting, and employing alternative silvicultural practices elsewhere.

4. Relying on existing withdrawn areas (such as Wilderness), areas to be managed for purposes other than timber harvesting, and other ways in which old-growth forest would be maintained (such as within riparian areas). This approach does not necessarily identify areas for protection based on specific wildlife habitat values, or their location and distribution across the Forest.

Fish Habitat. Four options for streamside (riparian) habitat management are available, all in the form of Riparian Forest-wide standards and guidelines. Option

3 is similar to the Stream and Lake Protection LUD used in the 1991 SDEIS for most alternatives (and also used, but called Riparian area, in the unpublished 1992 FEIS for Alternatives P and D++). Option 2 basically represents the protection called for in the Anadromous Fish Habitat Assessment (AFHA - discussed in Chapter 1, and under "Fish" in Chapter 3). Option 2 provides greater protection than Option 3, which does not include all measures recommended by AFHA to provide long-term protection. Option 2A is a modified version of Option 2 offering a still higher level of protection. Option 1 is the most protective, incorporating additional measures over Option 2 to reduce the risk to fish habitat.

Karst and Caves. Three options for karst and cave resources protection are available. The 1992 FEIS included Forest-wide standards and guidelines (Minerals, Geology, and Caves) for caves which included some recognition of karst features but not of karst as an ecosystem or unique system. The Karst and Cave Resources Assessment (1995) has used considerable new information, much of it from field studies, than was available in 1992, and has proposed in-depth, detailed Forest-wide standards and guidelines for Karst and Cave Resources. A third option would be to apply cave protection measures only to the extent needed to comply with the Federal Cave Resources Protection Act, which provides for the identification and protection of significant caves.

Alternatives to Clearcutting. Many alternative silvicultural systems to standard clearcutting exist, but their applicability to the forests and terrain of Southeast Alaska is largely unknown. Studies are lacking on the effects and implementability of these methods. Systems that come close to matching natural disturbance processes are more likely to be successful from a silvicultural as well as ecological standpoint. Two alternatives to, and one variation of, clearcutting as traditionally planned and practiced in the Tongass are being considered: uneven-aged management, which can be the harvest of individual trees or small groups of trees; a system called "two-aged" management, which leaves roughly 10-20 percent of the trees within a harvest unit uncut (and in various aggregations); and clearcutting where planned future harvests occur at longer time intervals than the minimum allowed by regulation (a variation of, rather than alternative to, clearcutting). The time intervals of this latter approach are called "rotation ages," signifying the age of a stand at the time it is harvested again. These can be extended from the current anticipated average rotation of about 100 years to rotations of 200 years or greater.

Socioeconomic Considerations. Alternative P from the unpublished 1992 FEIS emphasizes several economically-important resources: recreation and tourism, minerals, subsistence, and timber. Providing a supply of timber sufficient to meet market demands is a goal. Alternative 2 in this FEIS carries forward Alternative P essentially unchanged, and Alternatives 3-6 and 10 use Alternative P as a starting point. Alternative 11 used Alternative 10 as a starting point. Another alternative considered in the unpublished 1992 FEIS and labeled there Alternative D++ was developed to offer the maximum opportunity for supplying timber. It would provide an annual timber supply well above Alternative P (in the 1992 FEIS D++ had an annual average Allowable Sale Quantity of 520 million board feet). It was not considered in detail in the 1992 FEIS since it did not appear to address other economic sectors or local issues well. Alternative 7 carries forward Alternative D++, now considered in detail. Alternative 9, the “No Action” alternative, is the current Forest Plan, which has an annual average Allowable Sale Quantity of 450 million board feet. Recreation, tourism, and subsistence are emphasized variously in Alternatives 1-6, 10 and 11 as are both commercial and sport fishing and hunting through greater protection for important habitat elements.

Alternatives Eliminated from Detailed Study

The 1991 SDEIS discussed the rationale for not considering an alternative that would recommend declassifying Wilderness. That reasoning is still valid. The unpublished 1992 FEIS also discussed two alternatives proposed at that time by the State of Alaska, and developed in joint meetings with them, which were considered but eliminated from detailed study. As just discussed, one of these, Alternative D++, is now being considered in detail (as Alternative 7). The other alternative was actually several versions of an alternative that attempted to provide greater wildlife habitat protection while reducing timber harvest (from Alternatives D or D++) as little as possible. These attempts were generally unsuccessful, and none of these versions were considered in detail. On considering the State comments on the Revised Supplement, the "State" alternatives presented in the 1992 FEIS appear to be superseded by the 1996 State proposal, discussed below.

The previous discussion of the five focus issues indicated several options or approaches possible for addressing each one. Literally hundreds of slightly different alternatives could be developed using all the possible combinations of these various options. By focusing on broad alternative themes, many incompatible combinations can be eliminated, but this may still leave dozens of reasonable combinations. It is also the case that the same goal may be achieved in different ways: for instance, greater riparian area protection may be achieved by using a stricter riparian option, or by using an alternative silvicultural system such as uneven-aged management. The Interdisciplinary Team did not try out each of these combinations, but sought a broad array of alternatives addressing the five issues in measurably different ways.

This resulted in much "fine-tuning" of several of the alternatives considered here in detail, but few overall distinctions that represented substantially different alternatives. One "option" that was eliminated from detailed study was the use of timber stand rotation ages averaging more than 200 years (although many public comments continue to support longer time periods between harvests). These appeared to create such uneconomic logging conditions that any level of timber program would likely be infeasible.

The Interagency Viable Population Committee's strategy, and the peer review of that strategy, are discussed under the "wildlife viability" issue in Chapter 1. Following the peer review, the Committee responded by recommending a number of additions to their original proposal. This information was considered and used in developing many of the alternative options, but an alternative adopting the full set of the Committee's recommendations was not considered necessary to evaluate in detail. Of the numerous ways to combine the several alternative options that address wildlife viability, other combinations than the Committee's were felt to provide a reasonable range while also responding to other issues. Our analysis indicates that an alternative matching the Committee's recommendations would be similar in wildlife viability effects to Alternatives 5 and 11.

Southeast Alaska Conservation Council and The Sierra Club Legal Defense submitted information for additional alternatives to include in the Revised Supplement. This information was submitted too late to be considered at that time, but has since been evaluated and is included in the following discussion.

One alternative from the Revised Supplement, Alternative 8, has not been carried forward in the FEIS. This alternative combined the development-oriented emphasis of Alternative 7 with a Forest-wide old-growth reserve strategy (as was used for Alternatives 3 and 10) and other wildlife habitat features. Further evaluation showed these two emphases to be largely incompatible, nor did Alternative 8 provide for scenic quality or recreation opportunities commensurate with the wildlife emphasis. The goals of either resource development or wildlife habitat protection were better achieved by other alternatives. The outputs of Alternative 8 were generally similar to those of Alternative 6.

An alternative meeting all of the most recently published RPA Program tentative objectives (Alaska Regional Guide, 1983) was not considered in detail, because the recreation objective exceeds the Forest's recreation capacity under the current inventory. All other main RPA Program objectives are met by one or more of the alternatives. These are discussed further in the "Comparison of Alternatives" section at the end of this chapter.

Conservation Group Alternatives

Several alternative proposals were received from conservation groups as public comment on the Revised Supplement. An additional alternative (with three variations) was received prior to issuing the Revised Supplement, but too late to be evaluated for that document. These various recommended alternatives are now discussed. Table 2-2 presents many of the key features of each in abbreviated form. In general these alternatives emphasize fish and wildlife resources and habitat, subsistence opportunities, and maintaining specific areas in natural settings. Most are based on recent studies and reports, including products of the Interagency Viable Population Committee, the Viability Peer Review, the Anadromous Fish Habitat Assessment, and various wildlife species assessments (all used and discussed in the Revised Supplement and in this FEIS), as well as their own additional analysis. As noted in the table, some groups supported or endorsed the recommendations of other groups.

Groups submitting proposed alternatives were: Alaska Rainforest Campaign, Association of Forest Service Employees for Environmental Ethics (AFSEEE), Defenders of Wildlife, Narrows Conservation Coalition, Sierra Club Legal Defense Fund (SCLDF), Southeast Alaska Conservation Council (SEACC), and the Wilderness Society. Groups endorsing one or more of these alternatives included the Natural Resources Defense Council (NRDC) and Sitka Conservation Society (SCS). Other groups submitted alternative proposals in a more abbreviated form that generally coincide with the Alaska Rainforest Campaign alternative: these included the Alaska Wilderness Recreation and Tourism Association (AWRTA), Lynn Canal Conservation Inc., and the Tongass Community Alliance. Many public comments from individuals also endorsed particular conservation group alternatives, in particular those of Alaska Rainforest Campaign, AFSEEE and SEACC (the latter as the "Transition Alternative").

None of these alternatives were ultimately considered for detailed study in this FEIS. It was generally the case that after applying just the major features of each, little or no suitable timber land remained available, making the alternatives comparable to Alternative 1. Regardless of the intent of any particular component or option, if the aggregate of the recommendations resulted basically in no timber program, then the overall goals of protecting habitats and preserving natural settings (as stated or implied for these alternative) will have been achieved. (Taken individually, these components or options were also considered in relation to specific resources or issues; for that analysis, refer to the Comment/Response Appendix. They may also be compared to the components in Table 2-3.) Based on estimated available suitable acres, a couple of the alternatives could possibly provide a small timber program, although one considerably lower than Alternative 5, the lowest of those considered in detail other than Alternative 1. These proposals did not appear to offer wildlife or related benefits different enough from Alternatives 5 or 11, or enough potential for a sustained timber program above Alternative 1, to make this trade-off desirable to analyze in detail.

The various proposals summarized in Table 2-2 will now be discussed primarily as they are estimated to affect the availability of suitable timber lands. This is not done because only timber-program-oriented alternatives are of interest, but because, without a timber program, essentially all the effects associated with estimated reductions in fish and wildlife habitat, scenic quality, roadless recreation opportunities, etc., go away, as is evidenced from the analysis of Alternative 1 throughout Chapter 3 (the exception being effects resulting from past actions). From a forest plan, forest-wide standpoint, it matters little how specific habitats or favorite places are addressed, if the outcome in either case is no significant effect. Since it became immediately obvious that most of the conservation group proposals were likely to have this result, one focus was to then determine if they were able to support any sort of managed timber program. If not, then they offered nothing different than Alternative 1 and there was no reason to consider them in detail.

This was not necessarily the intent of these proposals, which evidenced considerable thought and analysis. Among their stated goals were: "a sustainable, biologically responsible vision for the Tongass" (AFSEEE); "providing for balanced, sustainable use of our region's resources" (SEACC); and, providing alternatives other than Alternative 1 "that provide adequate conservation measures" (Defenders of Wildlife). Implied in these and similar statements appears to be a desire for some level of sustainable timber harvest from the Tongass. But except for the SEACC proposal, little if any sustainable timber harvest seems likely; the AFSEEE alternative would have to be changed substantially to even have any suitable timber acres available.

All the alternatives recommended several features already present in Alternative 3 (a reserve system, use of riparian Option 1, etc.; see Table 2-3), and it was thus used as a starting point for the additional recommendations, with the exception of the SEACC/SCLDF 11/95 proposals, which were based on Alternative A from the 1991 SDEIS. Both Alternative 3 and the 1991 SDEIS Alternative A had a suitable timber base of 1.2 million acres. All the proposals also expressed the desire that the long-term timber contract with Ketchikan Pulp Company be canceled (implied but not actually stated in the 11/95 proposals), a feature not shown in Table 2-2. (Other features not displayed or evaluated included increased protection for karst areas and caves, and dropping the two-aged timber harvest system.) Although not identical, the proposals of Alaska Rainforest Campaign, SEACC and the Wilderness Society were similar enough to be discussed together (and are shown together in Table 2-2), as were the proposals from Defenders of Wildlife and Narrows Conservation Coalition.

Table 2-2
Conservation Group Recommended Alternatives

Conservation Group [2]	Alternative Components [1] Old-growth (OG) Habitat Reserves	Beach Buffers	Riparian Areas	Forest Matrix	Geographic Areas	Wild and Scenic Rivers	Wildlife Corridors	Other Key Features
AFSEEE (endorsed by SCS)	80,000 acre reserves Other watershed reserves	1,000 ft. no harvest 500 ft. uneven-aged (UM)	Option 1 for all streams	No harvest of vol. class (VC) 6 or 7 200-300 year rotation, UM	No roads into unroaded watersheds Cleveland, Honker Islands <1,000 acres	67 rivers (w/ 1/2-mile corridors)		1-mile salt chuck buffers No harvest in forested wetlands or traditional use areas
Defenders of Wildlife, Narrows Conservation Coalition	64,000-acre reserves w/1-mile UM buffers	1,000/500 (as above)	Options 1 and 2	No harvest of VC 7 400-year rotation for UM areas	SEACC's list [3] Islands <1,000 acres	All "125" rivers (Defenders), 67 rivers (as above) (for Narrows)	1,600-ft. corridors between reserves	No new roads in brown bear habitat Brown bear riparian zones Deer S&Gs
Alaska Rainforest Campaign, SEACC, Wilderness Society (endorsed by NRDC)	As in Alternative 3, w/1/2-mile UM buffer (1 mile for Wilderness Society) Additional reserves	1,000/500 (as above)	Options 1 and 2	Limited or no harvest of VC 6/7 Use methods that mimic natural disturbance No clearcutting in "Sitka Use Area" (SEACC) 300-year rotation (NRDC)	SEACC's list Other (tourism)	67 rivers (as above)	"Minimum corridor requirements"	No roads into unroaded watersheds in (at least) brown bear habitat No harvest in key subsistence areas Deer S&Gs Provide up to 100 mmbf of SBA sales annually (SEACC)
SEACC and SCLDF (11/95) (also endorsed by NRDC)	As in Alternative 3, w/ 1/2-1 mile UM buffers Also, the "three largest" OG patches per province	3,300-ft. UM buffer	Option 1 (Option 2 if supported by watershed analysis)	No harvest in VC 6/7 <800 ft. Emphasize small sales (<5 mmbf)	As in Alternative A from 1991 SDEIS Additional areas	67 rivers (as above)	1,600 ft. for large reserves 1,000 ft for medium reserves	Add to reserves the old-growth retention areas identified in past sales Provide a "high likelihood" of meeting projected demands (all types) for wildlife and fish "through first rotation"

[1] As abbreviated from the public comments. Not all components are included.
[2] AFSEEE = Association of Forest Service Employees for Environmental Ethics; SCS = Sitka Conservation Society; SEACC = Southeast Alaska Conservation Council; NRDC = Natural Resources Defense Council; SCLDF = Sierra Club Legal Defense Fund
[3] SEACC's list of 20 "Special Places" includes Honker Divide, Cleveland Peninsula, Port Houghton, East Kuiu, Ushk Bay, Upper Tenakee Inlet, North Sea Otter Sound islands, and all of the Salmon Bay Lake watershed.

The following brief discussion of the four major alternatives includes estimates of suitable acreage reductions in brackets. Estimates are based on information from the Revised Supplement and FEIS for Alternative 3 and some of the individual components (Chapter 2, Chapter 3 "Timber" section, and Appendix B), the 1991 SDEIS (Alternative A), and information provided in the analyses submitted with the various proposals. The estimates do not include all potential overlaps between the different options, and this may tend to overstate some effects; on the other hand, no estimate has been made of how the options may isolate or make unavailable areas of otherwise suitable land, and this may tend to understate some effects.

AFSEEE Alternative

1. Large reserves are expanded to 80,000 acres (using the same percentage composition criteria), and other "watershed" reserves are added [350,000 acres].
2. The "no harvest" beach fringe is expanded to 1,000 feet [125,000 acres].
3. Option I riparian management is applied to all streams [60,000 acres].
4. No harvest of timber volume classes 6 or 7 [100,000 acres].5. No roads into unroaded watersheds [200,000 acres].
6. 67 Wild and Scenic Rivers with 1/2-mile corridors [100,000 acres].
7. No harvest of forested wetlands and 1-mile buffers around salt chucks [500,000 acres].

Conclusion: Together the above components of this alternative would make an estimated 1.435 million acres of suitable timber lands unsuitable, which exceeds the acres of suitable land available in Alternative 3. (No estimate was made for removing islands 1,000 acres or smaller, or traditional use areas.) If we assume that this is an overestimate and some suitable land remained available, it would be subject only to uneven-aged management using 200- to 300-year harvest rotations, and would include only the lower volume classes. Timber harvest under such a scenario is not likely to be economically viable. The 70,000 acres of suitable land remaining in Alternative 1, with less restrictive harvest requirements, were not scheduled for harvest for economic reasons.

Defenders of Wildlife and Narrows Conservation Coalition Alternatives

1. Reserves are expanded to 64,000 acres, using the same percentage composition criteria [200,000 acres].
2. The "no harvest" beach fringe is expanded to 1,000 feet [125,000 acres].
3. Riparian management is similar to that of Alternative 3 [no reduction].
4. No or limited harvest of timber volume classes 6 and 7 [75,000 acres].
5. No harvest of "SEACC's list" areas (see table) [200,000 acres].
6. 67 Wild and Scenic Rivers with 1/2-mile corridors (125 for Defenders) [100,000 acres (200,000 for Defenders)].
7. 1,600-ft. corridors between reserves [125,000 acres].
8. No new roads in brown bear habitat (Chichagof and Baranof Islands) [50,000 acres].

Conclusion: Together the above components of this alternative would make an estimated 0.875 million acres of suitable timber lands unsuitable, leaving approximately 325,000 acres of suitable land available (for Defenders of Wildlife, 0.975 million acres unsuitable, 225,000 acres available). Of this, one mile around each reserve and the additional 500-foot beach buffer are subject only to uneven-aged management using 400-year harvest rotations and limited primarily to the lower volume classes. (The number of reserves is not given. At 6,600 suitable acres for each 23,700-acre reserve buffer, 34 reserves would take up the remaining

225,000 suitable acres.) Timber harvest under such a scenario is not likely to be economically viable. The 70,000 acres of suitable land remaining in Alternative 1, with less restrictive harvest requirements, were not scheduled for harvest for economic reasons.

Alaska Rainforest Campaign, SEACC and Wilderness Society Alternatives

1. Additional reserves (beyond Alternative 3) [100,000 acres]. (This is a conservative educated guess, since these reserves are not specified.)
2. The "no harvest" beach fringe is expanded to 1,000 feet [125,000 acres].
3. Riparian management is similar to that of Alternative 3 [no reduction].
4. No or limited harvest of timber volume classes 6 and 7 [75,000 acres].
5. No harvest of "SEACC's list" areas (see table) [200,000 acres].
6. 67 Wild and Scenic Rivers with 1/2-mile corridors [100,000 acres].
7. "Minimum" corridor requirements [35,000 acres]. (Not specified; we used those discussed under the SEACC/SCLDF 11/95 Alternative.)
8. Removing additional areas important for tourism, and key subsistence areas (again, a rough guess) [100,000 acres].
9. No new roads into unroaded watersheds in (at least) brown bear habitat (Chichagof and Baranof Islands) [50,000 acres].

Conclusion: Together the above components of this alternative would make an estimated 0.785 million acres of suitable timber lands unsuitable, leaving approximately 415,000 acres of suitable land available. This acreage would be subject to additional constraints, or managed differently, under the three proposals:

Alaska Rainforest Campaign - adds 1/2-mile uneven-aged management buffers around reserves, and an additional 500-foot beach buffer (uneven-aged management), with all timber harvest moving towards methods that mimic natural disturbances (envisioned as uneven-aged management also). If economic, uneven-aged management on 415,000 suitable acres (using 200-year rotations) could provide an Allowable Sale Quantity of about 40 MMBF annually. Such a program, however, could not support additional road construction or alternative harvest systems (such as helicopter), so that much of the 415,000 acres would in effect not be available. (Note: NRDC endorsed this alternative, with the addition of a minimum 300-year timber harvest rotation requirement.)

SEACC - SEACC primarily differs from the Alaska Rainforest Campaign only in how timber management would be done outside the specified uneven-aged management buffers and an additional "Sitka Use Area" within which no clearcutting would occur. These uneven-aged management areas are estimated to include over one-half of the 415,000 available suitable acres, leaving about 200,000 for possible even-aged management (with an Allowable Sale Quantity around 60 MMBF), and the rest for uneven-aged (around 20 MMBF assuming a 200-year rotation). SEACC included a goal of providing up to 100 MMBF of small business administration sales annually. While this level would not likely be attainable, a small but viable timber sale program appears possible under this scenario, probably limited to the southern half of the Tongass (outside brown bear habitat and the Sitka area).

Wilderness Society - the Wilderness Society adds a one-mile buffer around large reserves, and allows no harvest of volume classes 6 or 7. It does not include additional tourism areas in a no harvest category, but appears to call for more additional reserves than the other groups. Like the Alaska Rainforest Campaign, it calls for harvest methods that mimic natural disturbance. Overall it would likely have a somewhat smaller available timber base than the 415,000 acres, with even less potential for economically viable harvesting.

Of the three proposals, SEACC's offers the highest likelihood that a small-scale timber program could be maintained at a sustainable level, although considerably below any alternative considered in detail except Alternative 1. Opportunities for economic timber harvest under the other two proposals, and for much of SEACC's available acreage, remain problematical, noting again that the 70,000 acres of suitable land remaining in Alternative 1, with less restrictive harvest requirements, were not scheduled for harvest for economic reasons.

SEACC/SCLDF 11/95 Alternative

This proposal is actually one alternative with three minor variations. These variations revolve around an item in the SEACC/SCLDF list of alternative components related to the Peer Review of the Viability Strategy, and the Viable Population Committee's response to that review. Two alternative variations focus on that response, one adopting it wholly, the other requesting that it be evaluated "incrementally" (for effects on Allowable Sale Quantity). The third variation requests that measures be adopted that respond to all the key Peer Review criticisms. Since the Committee's response (their Appendix 2) did respond to the criticisms, and alternative measures are not suggested, it is assumed that the two are the same thing. The following list can also serve as the incremental analysis (items 1, 2, 4 and 7). (Additionally, one of the three variations eliminates the Option 2 possibility for riparian areas. That would have little effect on the following analysis.) The following changes are applied to Alternative A from the 1991 SDEIS, rather than Alternative 3.

1. A system of reserves similar to Alternative 3, with additional large blocks for each biogeographic province, is added to Alternative A from the 1991 SDEIS [400,000 acres].
2. The beach fringe is expanded to a 3,300-ft. zone of uneven-aged timber management, but an additional "no harvest" buffer is not specified [no reduction].
3. Option 1 for riparian areas is the general rule [75,000 acres].
4. No harvest of timber volume classes 6 and 7 under 800 feet in elevation [100,000 acres].
5. No harvest of specified areas [100,000 acres].
6. 67 Wild and Scenic Rivers with 1/2-mile corridors [100,000 acres]. (One variation increases this to 136 rivers.)
7. 1,600-ft. corridors between large reserves, 1,000-ft. between medium reserves [35,000 acres].

Conclusion: Together the above components of this alternative would make an estimated 0.810 million acres of suitable timber lands unsuitable, leaving approximately 390,000 acres of suitable land available. (No estimate was made for removing old-growth "retention" areas identified in past sales.) Of this, 1/2-1 mile around each reserve and a 3,300-ft. beach buffer are subject only to uneven-aged management. The suitable acres within these two categories substantially exceeds 390,000 acres (a 3,000-ft. beach buffer alone would include over 500,000 suitable acres). This makes this alternative similar in outcome to the Alaska Rainforest Campaign alternative, with the small amount of potential uneven-aged harvest not likely to be economically viable.

State of Alaska Proposal (1996)

The State of Alaska proposed several modifications to the Revised Supplement Preferred Alternative that would make it a substantially different alternative. Some of these proposals could be evaluated as in the previous examples, such as: 1) applying riparian area Option 1 within the 50 percent "highest value" watersheds for fish production; 2) applying the additional 500-ft. uneven-aged management beach buffer (as in Alternatives 3-6); not using the two-aged management system for timber harvest; and 4) using only the minimum legal protection for karst and caves (as in Alternative 9). Taken together, these changes would move the Revised Supplement Preferred somewhat closer to Alternative 3.

However, the major proposed change involves a list of 125 specified watersheds (identified by TLMP Value Comparison Units (VCU's)) termed "high value community use areas." These are areas identified as important for subsistence, big game hunting (brown bear, black bear, urban deer hunting), and/or fish production (coho and pink salmon, sport fish harvest), and that are allocated to a timber harvest LUD in the Revised Supplement Preferred Alternative. No clear guidelines are given for which to select for special management, or what that management should be. To quote from the State's letter (p. 7):

> The list of high value community use areas is enclosed for both the Forest Service and the public's information ... . We request the Forest Service work with the Department of Fish and Game and Southeast communities to determine which of these areas should have appropriate management prescriptions that protect community use, and fish and wildlife values. Avoiding or minimizing timber harvest in areas of high community use will increase the predictability and reliability of the timber supply and ensure the viability of all forest dependent industries.

These 125 VCU's represent over one-half of the acreage in the available timber base of the Revised Supplement Preferred Alternative. The average VCU within these areas is about 20,000 acres in size, of which about 6,000 acres are suitable timber lands. Therefore, the unknown disposition of these 125 VCU's, whose suitable timber lands total approximately 750,000 acres, made it impossible to model this alternative or consider it in detail.

Alternatives Considered in Detail

Before presenting the alternatives themselves, this section will define terminology and present information on several aspects of the alternatives.

Non-declining even flow

The Forest Service follows a policy of "non-declining even flow" for timber harvest to ensure that a Long-term Sustained Yield of timber will be available. This means that the amount of timber harvested in any one decade can not exceed that of any succeeding decade. Non-declining even flow is determined in cubic feet of timber volume, which is the measure used for long-term modeling purposes. The timber outputs for each alternative are shown in board feet, which is currently the more common measure, and in cubic feet. The ratio of board feet to cubic feet changes from decade to decade, depending on the timber volume and size of timber harvested per acre, and because timber yield tables based on board feet and cubic feet are constructed independently (cubic feet being a better overall measure of usable wood). Therefore, the board foot volume can vary, even decline, by decade while timber harvest measured in cubic feet remains constant.

Falldown

"Falldown" as used here refers to the difference, usually a reduction, between the number of acres planned for timber harvest and those actually harvested. The Tongass National Forest has commonly experienced falldown in timber sale planning in recent years. Two kinds of falldown have been identified. "Hard" falldown, a reduction in the land base considered suitable for timber harvesting, occurs when unmapped features that would make lands unsuitable (such as high hazard soils or streams requiring buffers) are identified during the planning process, or when the original suitability mapping is found to be in error. "Soft" falldown, a reduction due to project planning, design, or layout, can result from a project-level emphasis on resource issues such as scenic quality, wildlife habitat, or unique features (cave or karst resources, for example), from logging infeasibilities, unfavorable timber market conditions, or from data errors. The primary cause of soft falldown is an incomplete review of site conditions prior to designing or implementing a project. A review of five recent projects showed falldown ranging from 4.5 percent to almost 21 percent (Timber "Falldown" During Implementation, August 1995).

The FEIS alternatives address many of the factors that have resulted in falldown at the project level, in particular those resulting from "emerging" issues such as wildlife viability and cave and karst features. More clearly defined standards and guidelines, and more precise mapping of objectives such as for scenic quality, will mean better information for project-level planning. Timber land suitability criteria have also been reexamined, and the mapping of suitable acres improved. High hazard soils will be more consistently defined. Falldown associated with these factors is likely to be substantially less in the future. Other falldown factors, such as unmapped streams requiring Tongass Timber Reform Act buffers, small inclusions of unsuitable soils within soil mapping units, and new resource issues, will remain likely to occur. Therefore, the allowable sale quantities of the alternatives include adjustments for future falldown, called the “modeling implementation reduction factors.” These are discussed in the Timber section of Chapter 3, and Appendix B.

The Allowable Sale Quantity

The amount of timber that could be sold under a Forest Plan alternative is expressed as an "Allowable Sale Quantity" (ASQ). This concept is often misunderstood. The Allowable Sale Quantity is the maximum amount of timber that may be sold from the area of suitable land covered by the Forest Plan within a given decade (although it is usually expressed in average annual terms). It is neither a targeted amount, nor is it a required amount (except as a ceiling). The amount of timber offered for sale by year can exceed the annual average as long as the total decade ASQ is not exceeded; it can also be anywhere below the annual average, and the amount offered for sale over a decade can be below the decadal ASQ. Many factors can result in timber sale offerings that are below the average annual ASQ, including lack of funding, new resource issues that need to be addressed, changes in timber markets, sales held up by appeals or lawsuits, or any of the falldown factors previously discussed.

Allowable sale quantities and other timber harvest figures pertaining to the Tongass have traditionally been expressed in an amount known as "net sawlog," which means sawlog volume only. Another way to express these amounts is in "sawlog plus utility" volume. Utility logs are those with less than one-third usable sawlog volume but at least one-half usable wood chip volume. (Net sawlog includes logs used all or part for chips other than these “utility” logs.) Sawlog plus utility amounts are roughly 15-17 percent higher than sawlog by itself. Both these amounts have been expressed in the common measure known as "board feet." National policy is

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to replace the board foot measure - which seldom accounts for all the usable wood volume of a log - with a cubic foot measure - which is a more accurate representation of the amount of usable wood fiber.

To ease the transition in moving from a board foot to a cubic foot measure, the Alaska Region and the Tongass will begin expressing timber harvest and sale amounts as sawlog plus utility board foot measure. Thus the standard expression for the ASQ in the future, until only a cubic foot measure is used, will be as sawlog plus utility, and will be a greater amount than if expressed only as sawlog. In comparing current and future timber harvest and sale amounts with past amounts, this will need to be kept in mind. If not otherwise indicated, timber volumes in the FEIS are expressed as sawlog plus utility.

Non-interchangeable components

Economics is an important consideration in determining what lands can be harvested; however, experience has shown that it is seldom feasible to effectively factor in economics as part of the overall timber suitability determination. Economic conditions can fluctuate greatly during the course of a plan period, and even from year to year specific timber species can shift from being economic to uneconomic to harvest. This makes it difficult to assess the economics of harvesting a particular site even over a 10-year period. Also, the value of the timber sale program must be considered as a whole, rather than by only evaluating individual timber sales or harvest units in isolation, since some sales or units of low value are offset by other higher-value sales or units.

Economic considerations can be adequately addressed using the concept of non-interchangeable components. Non-interchangeable components (NIC's) allow for separating the ASQ into discrete, individually accountable categories. Chargeable timber volume from one NIC cannot be substituted for the achievement of the volume limit of another NIC, nor can the limits on the sale of chargeable timber volume associated with each non-interchangeable component be exceeded. All alternatives have an Allowable Sale Quantity for the first decade made up of two non-interchangeable components (see Chapter 3, Timber, and the glossary for more detailed definitions):

> **NIC I.** Normal operable volume scheduled from suitable lands that are available for harvest using standard logging systems (e.g. high-lead and single-span skyline, shovel, and some helicopter). This is the best (most economic) operable ground and is typically where the Forest has been offering sales since 1980.
>
> **NIC II.** Non-standard (difficult and isolated) operable volume scheduled from suitable lands that are available for harvest using logging systems not in common use (e.g. some helicopter, balloon, and multi-span skyline). These lands are presently considered economically and technologically marginal. This volume component has rarely been economic in the past.

1992 Alternative Allocations

The two alternatives from the unpublished 1992 FEIS that form the basis of the majority of the present FEIS alternatives were in turn based on 1991 SDEIS alternatives (Alternative P on Alternative P, Alternative D++ on Alternative D). Changes in land allocations between the 1991 and 1992 versions were made for both: for Alternative P, to better address concerns about specific areas as reflected in the public comments on the 1991 SDEIS; and for Alternative D++, to provide the maximum opportunity for intensive timber management. Alternative 2 is based closely on the 1992 version of Alternative P, and Alternative 7 closely resembles 1992 Alternative D++. The changes occurring since the 1991 SDEIS are now discussed.

1992 Alternative P. Changes from "development" to "non-development" LUD's (usually to Semi-primitive Recreation - now Semi-remote Recreation) were made for Mansfield Peninsula, the interior portions of Port Snettisham and the Whiting River area, Farragut Bay, the Chilkat Range and upper Chilkat Peninsula, Kah Sheets Bay, the Sarkar Lakes area, Naha Bay, and most of Dall Island. The Semi-primitive Recreation LUD replaced the Primitive Recreation or Old-growth Habitat LUD's to the north of Bradfield Canal, between Bradfield Canal and Revilla Island, and at Kegan Lake. Scenic Viewshed replaced Modified Landscape in several areas adjacent to the Alaska Marine Highway or cruiseship routes.

Several interior areas previously assigned to Scenic Viewshed or Modified Landscape were changed to Timber Production where scenic values were not an emphasis. Included were areas on Chichagof Island, portions of Port Houghton and the lower Chilkat Peninsula, areas north of Sitka and on north Kruzof Island, portions of north Etolin Island, and a few areas on Prince of Wales and Revilla Islands. Minerals LUD boundaries were changed to exclude it from Wilderness or LUD II.

1992 Alternative D++. Alternative D in the 1991 SDEIS, while it emphasized intensive timber management elsewhere, allocated most lands adjacent to or near local communities to either reduced-timber LUD's (Scenic Viewshed or Modified Landscape) or to Semi-primitive Recreation. Alternative D++ changed most of these allocations to Timber Production, with some areas in the north part of the Tongass remaining in or changing to Modified Landscape. At the same time Alternative D++ used the more-protective Stream and Lake Protection (Riparian area in the 1992 FEIS) LUD. These changes have been retained for Alternative 7. Three other elements, however, remain as they originally were in Alternative D (Minerals LUD allocations; the Wild, Scenic, and Recreational River LUD allocations; and no Beach Fringe and Estuary requirement).

Standards and Guidelines; Mitigation

With the exceptions noted below, the Forest-wide standards and guidelines included in Chapter 4 of the revised Forest Plan apply to all alternatives, and are not repeated here. Appendix I of this FEIS includes those alternative standards and guidelines used by some of the alternatives but which are not part of the final revised Forest Plan. The Forest-wide standards and guidelines for the Forest Plan revision have gone through numerous versions since originally being developed in 1989. For many resources, most of the changes that have occurred between the 1991 SDEIS, the 1992 FEIS, and the present set are not significant, representing improved wording, streamlining to avoid redundancy with higher-level direction, incorporation of Forest Service policy changes, etc. Significant changes and options related to the five focus issues are discussed below and in Chapter 3. Also for most resources, the Forest-wide standards and guidelines parallel or build on other current planning direction, such as the Alaska Regional Guide, and Alaska Region supplements to Forest Service manual and handbook direction (such as the Soil and Water Conservation Handbook), therefore representing the current Forest Plan as well as the other alternatives. This common direction is not discussed further here.

Since they serve as the basic mitigation measures for individual projects under the revised Forest Plan, the applicable Land Use Designation management prescriptions and Forest-wide standards and guidelines are discussed throughout the environmental consequences sections of Chapter 3. The Forest-wide standards and guidelines, and the practices and standards and guidelines of each LUD management prescription, are the full set of mitigation measures for each alternative.

Alternative Component Options

Table 2-3 shows how the various issue-related components described earlier in this chapter (see also table footnotes) have been assigned to the ten FEIS alternatives. (Allocations of all the Land Use Designations are displayed later for each alternative.) The options for silvicultural systems, riparian habitat, beach fringe and estuary, and deer winter range that are not a part of the Forest-wide standards and guidelines of the revised Forest Plan are included in Appendix I. The reserve option emphasizes the Old-growth Forest LUD, but takes into account other non-Development LUD's. The timber stand rotation lengths, and the use of harvest thresholds and percentages of old-growth habitat retained by Value Comparison Unit (VCU - somewhat analogous to a watershed), are not otherwise specified except in the table and alternative descriptions. (Retention for the current Forest Plan is described in the 1986 Tongass Land Management Plan Amendment.)

The revised Forest Plan includes only the new Forest-wide standards and guidelines for Karst and Cave Resources (K/C S/G in the table). The previous proposed standards and guidelines for caves are included within the Minerals, Geology, and Caves Forest-wide standards and guidelines of the 1991 and 1992 Proposed Revised Forest Plan. The 1992 version used here (92 S/G) is slightly expanded from, but comparable to, the version published as part of the 1991 SDEIS. Under Alternative 9, only significant caves as determined under the Cave Resources Protection Act would be protected.

Changes Between Revised Supplement and FEIS

The allowable sale quantities of most alternatives in the FEIS show a 5-10 percent reduction from those of the same alternatives in the Revised Supplement. These reductions are the result of several modeling changes, including better accounting for the effects of Visual Quality Objectives; improvements and adjustments in identifying suitable timber lands; and a technical change in determining harvest ages for second-growth stands. These changes are further discussed in Appendix B. One alternative, however, Alternative 9, shows an increase in Allowable Sale Quantity. This is a result of a change in calculating the utility component of the ASQ. The sawlog component for Alternative 9, the "current" Forest Plan, remained the same at 450 MMBF; the total ASQ, sawlog plus utility, increased because of its higher utility component.

One other change is in the portrayal of suitable timber lands by alternative. In the Revised Supplement (and previous drafts), the total suitable acres available for timber harvest by alternative were displayed. This did not meet the technical definition of suitable acres for an alternative, however. In this FEIS, only those suitable acres scheduled for timber harvest by the FORPLAN computer model over the 160-year modeling period are included as the suitable acreage for an alternative.

The Ten Alternatives

Each alternative description includes a theme, multiple-use goals, narrative objectives, a set of Land Use Designations (a table with the acreages allocated to each LUD, and a map - included in the map packet - showing their locations), and other objectives and outputs displayed numerically. The prescriptions (practices, LUD- specific standards and guidelines) of each Land Use Designation are included in the Forest Plan, as are the Forest-wide standards and guidelines applying to all alternatives. Appendix I includes the options not a part of the Preferred Alternative. These are also integral parts of the alternatives. Details on the modeling of each alternative for FORPLAN analysis are included in Appendix B. The Regional Economy section of Chapter 3 also includes a map for each alternative displaying the suitable timber lands that could be scheduled for timber harvest.

Several of the multiple-use goals are the same for all alternatives, and are listed here. Current Forest Plan goals for these resources are similar. The Tongass Timber Reform Act (Section 101) direction for the Tongass to "seek to provide a supply of timber ... which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle" will be followed by each alternative "to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources," as determined by that alternative, and subject to appropriations and applicable law.

The Revised Supplement described in detail nine alternatives, numbered 1-9, and was accompanied by a tenth Preferred Alternative. One of these nine, Alternative 8, was eliminated from detailed consideration in the FEIS for the reasons previously discussed. In order not to confuse comparison with the Revised Supplement, and because some of the analysis specific to alternatives is retained by the FEIS, the original numbering has been retained. The Preferred Alternative from the Revised Supplement is numbered Alternative 10. The Preferred Alternative in this FEIS is Alternative 11. There are thus ten alternatives considered in detail, Alternatives 1-7 and 9-11.

Alternative 11, the final Preferred Alternative, was developed from Alternative 10 (the former Preferred Alternative) considering public and agency comments on the Revised Supplement, and using additional analysis (as presented in Chapter 3 of the FEIS). In terms of its major components, outputs and effects, Alternative 11 most closely resembles Alternative 3.

Table 2-3
Alternative Component Options

Component	Alternative									
	1	2	3	4	5	6	7	9	10	11
Alternative Base	1992 A	1992 P	1992 P	1992 P	1992 P	1992 P	1992 D++	Current Plan (No Action) [2]	1992 P	Alt. 10
Reserve Strategy [1]	None	None	All	None	4 Prov.	4 Prov.	None	None	All	All
Aver. Timber Stand Rotation (Years)	200	100	100	200	200	100	100	100	100	100
Silvicultural System	UM	ES	2A	UM, 2A	UM, 2A	UM, 2A	ES	ES	ES, 2A	ES
VCU Harvest Thresholds (%)	None	None	None	25%/ 50 yr	25%/ 50 yr	50%/ 50 yr	None	None	None	None
OG Retention/VCU	None	None	None	33%	33%	33%	None	Retention	None	None
Riparian Habitat:										
FHIP 1 Watershed	Opt 2	Opt 3	Opt 1	Opt 2	Opt 2	Opt 2	Opt 3	TTRA/BMP	Opt 2	Opt 2A
All others	Opt 3	Opt 3	Opt 2	Opt 3	Opt 3	Opt 3	Opt 3	TTRA/BMP	Opt 3	Opt 2A
Beach1 (0-500')	S/G	S/G	S/G	S/G	S/G	S/G	None	None	S/G	S/G
Beach2 (500-1000')	S/G, UM	None	S/G, UM	S/G, UM	S/G, UM	S/G, UM	None	None	None	S/G
Estuary (0-1000')	S/G	S/G	S/G	S/G	S/G	S/G	None	None	S/G	S/G
Karst/Caves	K/C S/G	92 S/G	K/C S/G	K/C S/G	K/C S/G	K/C S/G	92 S/G	Cave Act	K/C S/G	K/C S/G
Deer Winter range	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No

[1] This component refers to the use of a system of old-growth habitat reserves to address wildlife viability. Such a system is in addition to reserves that may already exist, such as within Wilderness or Legislated LUD II areas. The layout of the system is different for Alternative 11 than for Alternatives 3 and 10.

[2] Implementation of projects under the Current Plan typically goes beyond current direction in providing protection for riparian areas and karst and cave areas; the retention method provides selected recognition of deer winter range and beach fringe, and eagle nest buffers also provide beach fringe protection. This table, however, is designed to represent only what is actually direction under the Current Plan.

Definitions

Reserves:
All = Large, Medium, and Small reserves proposed by the Interagency Viable population Committee (Suring et al. 1993).
4 Provinces = N. POW, Kupreanof/Mitkof, Dall Isl., NE Chichagof, + individual reserves (Myers Chuck, Lake Eva, Wright Lake).

Silvicultural system:
UM = Unevenaged Management (single tree/group selection).
ES = Evenaged Short Rotation (approximately 80-150 years, depending upon site potential).
2A = Two-aged stand management (permanent retention of 10-20% of trees during harvest).

Riparian:*
Option 1 (Lowest Risk) - expanded riparian corridors on Class I-III streams, exclusion of high hazard soils, etc.
Options 2 and 2A (Lower Risk) - expanded riparian corridors on Class I-III streams (but less so than Option 1), etc.
Option 3 (Higher Risk) - 1991 SDEIS “Stream and Lake Protection” LUD.
TTRA/BMP (Highest Risk) - Tongass Timber Reform Act/Best Management Practices.

FHIP = Forest Habitat Integrity Project: FHIP 1 - highest quality watersheds for sport/commercial fish.
Deer Winter range: Application of management standards to maintain important deer winter range.
Karst/Caves: K/C S/G - Lower risk standards and guidelines; 92 S/G - Moderate risk standards and guidelines; Cave Act - Protect only identified caves.*

***The levels of risk indicated are relative terms only. They do not imply absolute risk levels.**

Goals Common to All Alternatives

Air. Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Biodiversity. Maintain healthy forest ecosystems; a mix of habitats at different spatial scales (site, watershed, island, province, and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Fish. Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to sustain the diversity and production of fish and other freshwater organisms.

Heritage Resources. Identify, evaluate, preserve, and protect heritage resources.

Local and Regional Economies. Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Rare Natural Areas. Protect a variety of areas with natural, scenic, or geologic features distinct to the region, including areas set aside specifically for future research needs.

Research. Continue to seek out and promote research opportunities that are consistent with identified information needs.

Soil and Water. Maintain soil productivity Forest-wide, and minimize soil erosion resulting from land-disturbing activities. Minimize sediment transported to streams from land-disturbing activities. Maintain and restore the biological, physical, and chemical integrity of Tongass National Forest waters.

Subsistence. Provide for the continuation of subsistence uses and resources by all rural Alaskan residents.

Wetlands. Minimize the destruction, loss or degradation of wetlands, and preserve and enhance the associated wetland functions and values.

Wilderness. Manage designated Wilderness to maintain an enduring wilderness resource while providing for public access and uses consistent with the Wilderness Act of 1964 and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA)..

Alternative 1

Theme

The theme and purpose of this alternative is to emphasize high-quality fish and wildlife habitat, unroaded areas, wild, scenic, and recreational rivers, scenic quality, subsistence use, and a wide range of recreation and tourism opportunities in a natural setting. Geographic areas mentioned in public comments as deserving of protection, and all identified recreation places, are assigned non-development LUD's.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a wide range of recreation opportunities in a natural setting, with emphasis on identified recreation places and areas identified by the public.

Scenery

Maintain visually-appealing scenery Forest-wide. Limit extensive landscape modifications to seldom-seen areas, consistent with the other resource goals.

Timber

Manage timber to maintain forest structure, function and dynamics similar to existing natural conditions. Within this context, provide opportunities for small-scale timber production using uneven-aged management systems.

Transportation and Utilities

Develop and manage roads as required to support resource management objectives. Allow the development of utility systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain as much contiguous, undisturbed old-growth habitat as possible, with emphasis on identified high-value areas for old-growth associated species, to provide a high likelihood of insuring the maintenance of viable populations. Minimize adverse effects from human activities through road and facility management.

Objectives

Manage suitable timber lands using uneven-aged systems with an average management age of 200 years.

Apply riparian management option 2 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 3 to the rest.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Apply the Forest-wide standards and guidelines for karst areas and caves.

Apply Forest-wide standards and guidelines for deer winter range.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and all 112 eligible Wild, Scenic and Recreational Rivers.

Do not apply the Minerals or Transportation and Utility Systems LUD's.

Table 2-4 (1)
Land Use Designation Allocations for Alternative 1[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	4,590,131
Enacted Municipal Watershed	9,713
Old-growth Habitat	63,497
Semi-remote Recreation	4,850,194
Land Use Designation II	719,000
Wild, Scenic, Recreational River	329,904
Experimental Forest	17,260
Scenic Viewshed	820
Modified Landscape	0
Timber production	222,052
Minerals	0

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (1)
Selected Dimensions of Alternative 1[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,432,000
Semi-primitive Motorized	1,666,000
Roaded Natural and Roaded Modified	1,850,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	5,920,967
Partial retention	4,877,611
Modification	1,180
Maximum Modification	220,912
River Recommendations (miles):	
Wild River	1,085
Scenic River	154
Recreational River	55
Suitable Timber Lands (acres)	0
Allowable Sale Quantity: (million cubic feet/million board feet) (2)	
Non-interchangeable component **I**	0/0
Non-interchangeable component **II**	0/0
Total	0/0
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	0
Uneven-aged management	0
Precommercial thinning (acres)	0
Road Construction (miles)	0
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	52,765,000

(1) All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
(2) For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlogs plus utility. Totals may not add due to rounding.

Alternative 2

Theme

The theme and purpose of this alternative is to emphasize scenery, recreation and tourism, subsistence uses, and timber production. Many of the more important wildlife habitats, recreation and subsistence opportunities, and scenic values will be maintained in a natural setting. Resources that will contribute to the local and regional economies of Southeast Alaska are emphasized.

Goals

Karst and Caves

Protect caves, and maintain selected karst features.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation places. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for the production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads to support resource management activities. Recognize the potential for the future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain contiguous old-growth habitat in selected areas, and provide some likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using even-aged systems with an average rotation age of 100 years.

Apply riparian management option 3 to all watersheds.

Apply beach and estuary fringe standards and guidelines (500-foot beach corridor and 1,000-foot estuary corridor).

Use the Forest-wide standards and guidelines for caves from the 1992 FEIS.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (2)
Land Use Designation Allocations for Alternative 2[(1)]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,310,239
Enacted Municipal Watershed	9,713
Old-growth Habitat	49,685
Semi-remote Recreation	2,461,558
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	810,199
Modified Landscape	851,484
Timber production	3,477,368
Minerals	166,215

[(1)] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (2)
Selected Dimensions of Alternative 2[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,405,000
Semi-primitive Motorized	1,639,000
Roaded Natural and Roaded Modified	1,902,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	3,551,073
Partial retention	3,079,740
Modification	452,668
Maximum Modification	3,944,635
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	1,180,000
Allowable Sale Quantity: (million cubic feet/million board feet) (2)	
Non-interchangeable component I	91/375
Non-interchangeable component II	22/87
Total	113/463
Timber Harvest by System (acres):	
Even-aged (clearcut) management	14,705
Two-aged management	0
Uneven-aged management	0
Precommercial thinning (acres)	592
Road Construction (miles)	190
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	90,675,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Glossary

Alternative 3

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation places. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain a system of old-growth habitat areas as part of a strategy to provide a moderately-high likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using two-aged systems with an average management age of 100 years.

Apply riparian management option 1 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 2 to the rest.

Apply a Forest-wide system of large, medium, and small old-growth reserves following the criteria in the Old-growth Habitat LUD.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Apply Forest-wide standards and guidelines for deer winter range.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (3)
Land Use Designation Allocations for Alternative 3[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,310,239
Enacted Municipal Watershed	9,713
Old-growth Habitat	963,259
Semi-remote Recreation	2,461,558
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	572,232
Modified Landscape	675,812
Timber production	2,977,433
Minerals	166,215

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (3)
Selected Dimensions of Alternative 3[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,415,000
Semi-primitive Motorized	1,647,000
Roaded Natural and Roaded Modified	1,883,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	4,422,726
Partial retention	2,908,900
Modification	366,293
Maximum Modification	3,330,198
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	795,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	51/210
Non-interchangeable component II	12/46
Total	62/256
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	9,423
Uneven-aged management	82
Precommercial thinning (acres)	1,575
Road Construction (miles)	104
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	70,820,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Alternative 4

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation places. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for the production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for the future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain as much contiguous old-growth habitat as possible for old-growth associated species to provide a high likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using two-aged systems with an average management age of 200 years.

Within each VCU where timber harvest is scheduled: harvest no more than 25 percent of the productive old growth during any 50-year period; retain a minimum of 33 percent of the VCU in an old-growth forest condition.

Apply riparian management option 2 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 3 to the rest.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Apply Forest-wide standards and guidelines for deer winter range.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (4)
Land Use Designation Allocations for Alternative 4[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,310,239
Enacted Municipal Watershed	9,713
Old-growth Habitat	49,685
Semi-remote Recreation	2,461,558
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	810,199
Modified Landscape	851,484
Timber production	3,477,368
Minerals	166,215

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (4)
Selected Dimensions of Alternative 4[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,419,000
Semi-primitive Motorized	1,652,000
Roaded Natural and Roaded Modified	1,876,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	3,551,073
Partial retention	3,079,740
Modification	452,668
Maximum Modification	3,944,635
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	845,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	26/107
Non-interchangeable component II	6/23
Total	32/130
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	6,288
Uneven-aged management	0
Precommercial thinning (acres)	0
Road Construction (miles)	52
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	58,410,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Glossary

Alternative 5

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation places. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for the production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for the future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain as much contiguous old-growth habitat as possible for old-growth associated species to provide a high likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using uneven-aged and two-aged systems with an average management age of 200 years.

Apply a system of large, medium, and small old-growth reserves, or individual reserves, to the biogeographic provinces and other areas specified in Table 2-1.

Within each VCU where timber harvest is scheduled: harvest no more than 25 percent of the productive old growth during any 50-year period; retain a minimum of 33 percent of the VCU in an old-growth forest condition.

Apply riparian management option 2 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 3 to the rest.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Apply Forest-wide standards and guidelines for deer winter range.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (5)
Land Use Designation Allocations for Alternative 5[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,306,311
Enacted Municipal Watershed	9,713
Old-growth Habitat	441,989
Semi-remote Recreation	2,431,490
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	754,330
Modified Landscape	750,181
Timber production	3,276,232
Minerals	166,215

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (5)
Selected Dimensions of Alternative 5[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,420,000
Semi-primitive Motorized	1,653,000
Roaded Natural and Roaded Modified	1,871,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	3,881,020
Partial retention	3,041,219
Modification	421,656
Maximum Modification	3,684,220
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	786,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	24/100
Non-interchangeable component II	6/22
Total	30/122
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	4,550
Uneven-aged management	0
Precommercial thinning (acres)	0
Road Construction (miles)	49
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	57,635,000

[1] All figures are average annual amounts for the first decade (1996-2005) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Alternative 6

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and more emphasis than Alternative 3-5 on resources contributing to the local and regional economies of Southeast Alaska.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation areas. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for the production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for the future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain contiguous old-growth habitat for old-growth associated species, and provide a moderate likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using uneven-aged and two-aged systems with an average management age of 100 years.

Apply a system of large, medium, and small old-growth reserves, or individual reserves, to the biogeographic provinces and other areas specified in Table 2-1.

Within each VCU where timber harvest is scheduled: harvest no more than 50 percent of the productive old growth during any 50-year period; retain a minimum of 33 percent of the VCU in an old-growth forest condition.

Apply riparian management option 2 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 3 to the rest.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Apply Forest-wide standards and guidelines for deer winter range.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (6)
Land Use Designation Allocations for Alternative 6[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,306,311
Enacted Municipal Watershed	9,713
Old-growth Habitat	441,989
Semi-remote Recreation	2,431,490
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	754,330
Modified Landscape	750,181
Timber production	3,276,232
Minerals	166,215

(1) When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (6)
Selected Dimensions of Alternative 6[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,408,000
Semi-primitive Motorized	1,641,000
Roaded Natural and Roaded Modified	1,892,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	3,955,923
Partial retention	3,004,871
Modification	416,157
Maximum Modification	3,646,920
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	1,024,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component **I**	61/250
Non-interchangeable component **II**	15/59
Total	76/309
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	11,437
Uneven-aged management	88
Precommercial thinning (acres)	1,575
Road Construction (miles)	124
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	76,960,000

(1) All figures are average annual amounts for the first decade (1996-2005) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
(2) For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Total may not add due to rounding.

Alternative 7

Theme

The theme and purpose of this alternative is to provide an economic timber supply from public lands to meet market demand in Southeast Alaska. Management of other resources will be done in an efficient manner consistent with the emphasis on timber supply, and while meeting environmental standards. Some areas with low timber volumes will be managed with an emphasis on wildlife, subsistence, recreation, scenery and other non-commodity values.

Goals

Karst and Caves

Protect caves, and maintain selected karst features.

Minerals

Emphasize the development of mineral resources in areas with known development potential. Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values.

Recreation and Tourism

Provide recreation and tourism opportunities consistent with the emphasis on timber production.

Scenery

Maintain visually appealing scenery in areas where timber production is not a goal. In areas where significant ground-disturbing activities will occur, allow extensively modified landscapes.

Timber

Manage the timber resource for the maximum production of sawtimber and related wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for the future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Provide for diversity of plant and animal communities based on the suitability and capability of specific land areas to meet overall multiple-use objectives.

Objectives

Manage suitable timber lands using even-aged systems with an average rotation age of 100 years.

Apply riparian management option 3 to all watersheds.

The beach and estuary fringe standards and guidelines are not applied.

Use the Forest-wide standards and guidelines for caves from the 1992 FEIS.

Recommend 4 new Research Natural Areas, 2 new Special Interest Areas, and 11 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 23 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (7)
Land Use Designation Allocations for Alternative 7[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	23,490
Special Interest Area	21,084
Remote Recreation	1,224,232
Enacted Municipal Watershed	9,713
Old-growth Habitat	0
Semi-remote Recreation	1,202,627
Land Use Designation II	719,000
Wild, Scenic, Recreational River	0
Experimental Forest	17,260
Scenic Viewshed	0
Modified Landscape	1,478,436
Timber production	6,301,423
Minerals	291,030

(1) When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (7)
Selected Dimensions of Alternative 7[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,386,000
Semi-primitive Motorized	1,587,000
Roaded Natural and Roaded Modified	1,946,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	1,994,765
Partial retention	1,288,071
Modification	1,010,389
Maximum Modification	6,725,256
River Recommendations (miles):	
Wild River	211
Scenic River	0
Recreational River	0
Suitable Timber Lands (acres)	1,575,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component **I**	126/520
Non-interchangeable component **II**	30/120
Total	156/640
Timber Harvest by System (acres):	
Even-aged (clearcut) management	20,297
Two-aged management	0
Uneven-aged management	0
Precommercial thinning (acres)	3,165
Road Construction (miles)	263
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	108,935,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Alternative 9 (No Action)

Theme

This is the "No Action" alternative which represents the management direction of the current Tongass Land Management Plan (as approved in 1979, comprehensively amended in 1986, and amended again in 1991 to reflect certain provisions of the Tongass Timber Reform Act of 1990). Under this alternative, the Tongass National Forest would continue to be managed under the current land allocations reflected in the Plan's four basic Land Use Designations (the LUD's and LUD variations previously described, as displayed on the enclosed map for Alternative 9), and related Plan direction. The related direction includes the Plan's Goals; Anticipated Outputs and an Allowable Sale Quantity; Standards and Guidelines (which are provided by the Alaska Regional Guide and currently applied Regional policies and guidance); Management Area direction (which includes Area-specific Management Direction/Emphasis statements; various scheduled management activities (which are now outdated); and some additional Standards and Guidelines); and requirements for Monitoring and Evaluating the on-going implementation of the Plan. This management direction is contained in the Plan (1986 Alaska Region Administrative Document Number 147 which amended and superseded the original 1979 Plan, as further amended in 1991), the 1991 TLMP map, and in the Alaska Regional Guide (1983 Alaska Region Administrative Document Number 126b) and Appendix B of its related Final Environmental Impact Statement. The land use opportunities provided by the current Plan's LUD allocations, as bounded by the related Plan direction, would continue to be available to Forest users under this alternative.

A total of 141 Management Areas were established by the current Plan. Each of these areas consists of one or more of the 867 Value Comparison Units (VCU's) the entire Forest was originally divided into for planning purposes. The VCU's are watersheds or small islands which averaged about 17,500 acres in size. The Management Areas, the VCU's they contain, and how the VCU's were allocated to the various LUD's are shown on the 1991 TLMP map.

In anticipation of protection measures that would be needed for certain wildlife, fish and visual resources when implementing the plan, a Retention Factor method was applied during the original planning process. Use of this method in calculating the Plan's 450 million board feet (average annual, net sawlog volume) Allowable Sale Quantity variously reduced the average of operable (and predominantly old-growth) forest land that might otherwise have been scheduled for timber harvest in each of the VCU's that were allocated to LUD's III and IV (under which commercial timber harvest is permitted). A total of 1.7 million acres of operable forest land were scheduled for harvest within VCU's allocated to LUD's III and IV. A total of 273,000 acres of operable forest land were retained to provide wildlife and fish habitat, and 244,000 acres were programmed for harvest over extended rotation periods for visual resource management purposes, as a result of applying the Retention Factor method.

This alternative also reflects the RPA Program resource objective for Timber Sale Offerings displayed in the Alaska Regional Guide.

Goals

The stated goals of the current Forest Plan follow. The current Forest Plan does not have a stated goal for Karst and Caves. However, current management practices at the project level are protecting caves and maintaining selected karst features.

Fish

The goal is to maintain and enhance the natural fisheries resources by managing some of the highest quality watersheds in ways which would not modify them significantly. In those where major management activities will take place, adequate protection of the aquatic environment will be provided. In addition, it is the intent to take advantage of as many identified fisheries enhancement opportunities as possible.

Minerals

The goal is to facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Recreation

The goal is to provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets. (Note: The Recreation and the Tourism goals are intended to provide appropriate recreation opportunities for both resident and non-resident recreation publics. The improvement of recreation facilities to accommodate increasing tourism would also be oriented to satisfy local recreation needs, for example.)

Tourism

The goal is to improve recreation facilities and attractions near communities for the use of visitors to Southeast Alaska, by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

Visual

The goal is to maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, projects will be designed to be compatible with the natural elements of the visual resource.

Timber Management

The goal is to make enough timber available from National Forest lands to maintain current levels of timber-related employment within the context of the total timber available from other land ownerships. (Note: As originally established in this Plan, current levels of employment are based on average timber industry conditions that were prevalent during the 1970 to 1976 period. The legislative history of the Alaska National Interest Lands Act of 1980 (ANILCA) indicates the Congressional decisions relating to the supply of timber from the Tongass National Forest related to the employment generated from timber harvested on the National Forest.)

Hydroelectric Power

The goal is to facilitate the development of hydroelectric power sites with identified high development potential by managing those sites, and their attendant transmission corridors, in ways which will allow development of these facilities with due consideration of the other various resources.

Road Corridors

The goal is to insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study (an on-going study by the Alaska Department of Transportation during the 1976-1979 planning period) be managed to allow their development with due consideration of the various resources.

Wildlife

The goal is to maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In those areas where major modifications will occur, those changes will be designed to have the least adverse effects possible on wildlife.

Objectives

Table 2-4 (9)
Land Use Designation Allocations for Alternative 9[1]

Land Use Designation	Acres Allocated
LUD I	5,671,680
National Monument Nonwilderness	170,200
Unallocated Released Lands	304,710
Subtotal	**6,146,590**
LUD II	2,437,880
Legislated	722,480
Unallocated Forest Additions	1,122,900
Subtotal	**4,283,260**
LUD III	2,304,320
Special	148,380
Subtotal	**2,452,700**
LUD IV	**3,824,450**

[1] These acreages are from the Land allocation Summary on the 1991 TLMP map and do not reflect the current acreages contained in the Revision data base, which are used in describing this alternative throughout the rest of this document. While not shown on the TLMP map as LUD's, the Forest also contains six existing Research Natural Areas, various Special Interest Areas, an Enacted Municipal Watershed, and two Experimental Forests.

Glossary

Table 2-5 (9)
Selected Dimensions of Alternative 9[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,394,000
Semi-primitive Motorized	1,599,000
Roaded Natural and Roaded Modified	1,924,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	5,160,505
Partial retention	1,090,184
Modification	354,184
Maximum Modification	4,413,637
River Recommendations (miles):	
Wild River	0
Scenic River	0
Recreational River	0
Suitable Timber Lands (acres)	1,390,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	108/447
Non-interchangeable component II	26/102
Total	134/549
Timber Harvest by System (acres):	
Even-aged (clearcut) management	17,428
Two-aged management	0
Uneven-aged management	0
Precommercial thinning (acres)	991
Road Construction (miles)	225
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	97,360,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands. For Alternative 9, many of the dimensions in this table have been created using the Revision database for purposes of alternative comparisons, and are not always reflective of what the Current Plan actually contains.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Glossary

Alternative 10

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska. This was the Revised Supplement Preferred Alternative.

Goals

Karst and Caves

Maintain and protect caves and karst ecosystems Forest-wide.

Minerals

Encourage environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and for valid existing rights in closed areas, while protecting other resource needs and values. Seek withdrawal of areas where mineral development is not allowed by a specific Land Use Designation.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways and major Forest roads, and popular recreation places. In other areas, where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner. Seek to provide a timber supply sufficient to meet the annual market demand for timber, and the market demand for the planning cycle.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain a system of old-growth habitat areas as part of a strategy to provide a moderately-high likelihood of insuring the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Objectives

Manage suitable timber lands using two-aged systems with an average management age of 100 years.

Apply riparian management option 2 to watersheds with the highest fisheries values (see Table 2-3); riparian management option 3 to the rest.

Apply a Forest-wide system of large, medium, and small old-growth reserves following the criteria in the Old-growth Habitat LUD.

Apply beach and estuary fringe standards and guidelines (500-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 25 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (10)
Land Use Designation Allocations for Alternative 10[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	173,582
Remote Recreation	2,310,239
Enacted Municipal Watershed	9,713
Old-growth Habitat	963,259
Semi-remote Recreation	2,461,558
Land Use Designation II	719,000
Wild, Scenic, Recreational River	90,505
Experimental Forest	17,260
Scenic Viewshed	572,232
Modified Landscape	675,812
Timber production	2,977,433
Minerals	166,215

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (10)
Selected Dimensions of Alternative 10[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,409,000
Semi-primitive Motorized	1,642,000
Roaded Natural and Roaded Modified	1,887,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	4,422,726
Partial retention	2,908,900
Modification	366,293
Maximum Modification	3,330,198
River Recommendations (miles):	
Wild River	287.5
Scenic River	86.5
Recreational River	57
Suitable Timber Lands (acres)	924,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	59/245
Non-interchangeable component II	14/55
Total	73/300
Timber Harvest by System (acres):	
Even-aged (clearcut) management	0
Two-aged management	11,168
Uneven-aged management	0
Precommercial thinning (acres)	1,575
Road Construction (miles)	121
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	75,905,000

[1] All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
[2] For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Alternative 11

Theme

The theme and purpose of this alternative is to provide a mix of National Forest uses and activities with an emphasis on fish and wildlife habitat protection and the karst and caves resource, and less emphasis on some resource uses contributing to the local and regional economies of Southeast Alaska. This is the FEIS Preferred Alternative.

Goals

Karst and Caves

Maintain and protect significant caves and karst ecosystems Forest-wide.

Minerals

Provide for environmentally sound mineral exploration, development and reclamation in areas open to mineral entry, and in areas with valid existing rights that are otherwise closed to mineral entry. Seek withdrawal of specific locations where mineral development may not meet Land Use Designation objectives.

Recreation and Tourism

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Scenery

Provide Forest visitors with visually appealing scenery, with emphasis on areas seen along the Alaska Marine Highway, State highways, major Forest roads, and popular recreation places. Recognize, that in other areas where landscapes are altered by management activities, the activity may dominate the characteristic landscape.

Timber

Manage the timber resource for production of sawtimber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, Long-term Sustained Yield basis and in an economically efficient manner.

Transportation and Utilities

Develop and manage roads and utility system opportunities to support resource management activities. Recognize the potential for future development of major Transportation and Utility Systems.

Wild and Scenic Rivers

Maintain the outstandingly remarkable values and the free-flowing conditions of rivers designated or recommended for designation as components of the National Wild and Scenic Rivers System.

Wildlife Habitat

Maintain the abundance and distribution of habitats, especially old-growth forests, to sustain viable populations in the planning area. Maintain habitat capability sufficient to produce wildlife populations that support the use of wildlife resources for sport, subsistence, and recreational activities.

Objectives

Manage suitable timber lands using even-aged and two-aged systems with an average management age of 100 years.

Apply riparian management option 2A to all watersheds to implement the recommendations of the Anadromous Fish Habitat Assessment (1995).

Apply a Forest-wide system of mapped large, medium, and small old-growth reserves following the criteria in the Old-growth Habitat LUD.

Use the full beach and estuary fringe standards and guidelines (1,000-foot beach corridor and 1,000-foot estuary corridor).

Forest-wide standards and guidelines for karst areas and caves are applied.

Recommend 6 new Research Natural Areas, 16 new Special Interest Areas, and 32 Wild, Scenic and Recreational Rivers.

Apply the Minerals LUD to 12 mineral activity tracts with high development potential.

Apply the Transportation and Utility Systems LUD to selected State-identified potential highways and utility transmission corridors.

Table 2-4 (11)
Land Use Designation Allocations for Alternative 11[1]

Land Use Designation	Acres Allocated
Wilderness	2,622,913
Wilderness National Monument	3,098,820
Nonwilderness National Monument	163,654
Research Natural Area	26,672
Special Interest Area	178,471
Remote Recreation	2,129,169
Enacted Municipal Watershed	9,713
Old-growth Habitat	1,130,069
Semi-remote Recreation	2,928,386
Land Use Designation II	719,000
Wild, Scenic, Recreational River	122,641
Experimental Forest	17,260
Scenic Viewshed	496,613
Modified Landscape	622,387
Timber production	2,580,821
Minerals	166,215

[1] When more than one Land Use Designation is applied to the same area (such as a Special Interest Area within Wilderness), only the acreage of the more-restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and Land Use Designation II acres are always shown. For the Minerals LUD, which is always an overlay, acreages are separately included. No acreages have been calculated for the Transportation and Utility Systems LUD.

Table 2-5 (11)
Selected Dimensions of Alternative 11[1]

Resource/Category	Output/Measure
Recreation Opportunity Spectrum Class: (Recreation Visitor Days)	
Primitive and Semi-primitive Non-motorized	1,412,000
Semi-primitive Motorized	1,646,000
Roaded Natural and Roaded Modified	1,885,000
Recreation Construction/Reconstruction:	
Trails (miles)	7
Developed Sites (persons at one time)	190
Visual Quality Objectives: (acres, excluding Wilderness)	
Retention	4,753,475
Partial retention	3,208,617
Modification	427,088
Maximum Modification	2,770,216
River Recommendations (miles):	
Wild River	364.5
Scenic River	87.5
Recreational River	89.0
Suitable Timber Lands (acres)	676,000
Allowable Sale Quantity: (million cubic feet/million board feet) [2]	
Non-interchangeable component I	53/219
Non-interchangeable component II	12/48
Total	65/267
Timber Harvest by System (acres):	
Even-aged (clearcut) management	6,654
Two-aged management	1,917
Uneven-aged management	0
Precommercial thinning (acres)	2,130
Road Construction (miles)	110
Fish/Wildlife Improvement Projects:	
Fish projects (number)	16
Non-structural wildlife projects (acres)	9,300
Structural wildlife projects (number)	1,190
Total Budget (dollars)	72,660,000

(1) All figures are average annual amounts for the first decade (1997-2006) except for Visual Quality Objectives, river recommendations, and tentatively suitable timber lands.
(2) For each category two equivalent figures are given: the first is volume expressed in million cubic feet, the second the same volume expressed in million board feet. All timber volumes are sawlog plus utility. Totals may not add due to rounding.

Comparison of Alternatives

This section will briefly present comparisons of the ten alternatives just described in detail, primarily focused on the public issues and based on the effects analysis in Chapter 3. The five focus issues, and additional issues from the 1991 SDEIS, will both be discussed. Table 2-6 summarizes the Land Use Designation allocations of the alternatives using LUD Group combinations. The four LUD Groups combine the individual LUD's in terms of similarities in management and/or potential effects, as described in the Introduction to Chapter 3. Table 2-7 includes some of the key outputs of the alternatives displayed in Tables 2-5(1-11). Both tables will be referred to in the following discussions. The reader is also referred back to Table 2-3, Alternative Component Options, which presents additional information about the alternatives in comparative form.

The 1980 RPA Program tentative resource objectives for the Tongass for the 1991-2000 time period are displayed in the Alaska Regional Guide. These tentative objectives have not been updated since the 1983 publication of the Guide. The relationships of the expected outputs of the alternatives to the main objectives are discussed below under their respective resource headings. The Forest's current Wilderness acreage exceeds the Program's Wilderness Management objective of 5,362,000 acres (see Table 2-6).

Table 2-6
Land Use Designation Group Comparisons (million acres)[1]

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	5.9	10.8	<0.1	0.2
2	5.9	5.8	1.7	3.5
3	5.9	6.8	1.3	3.0
4	5.9	5.8	1.7	3.5
5	5.9	6.2	1.5	3.3
6	5.9	6.2	1.5	3.3
7	5.9	3.2	1.5	6.3
9	5.9	4.9	2.3	3.8
10	5.9	6.8	1.3	3.0
11	5.9	7.3	1.1	2.6

[1] LUD Group combinations are described in the Introduction to Chapter 3 (Table 3-1). For Alternative 9, "Unallocated Released Lands" (Table 2-2(9)) are included with the Natural Setting group acres, and the acreages are based on the Revision database and not Table 2-2(9).

Wildlife Habitat and Wildlife Viability

The analysis of these issues in Chapter 3 includes both short-term and long-term considerations. Potential short-term effects focus on areas within the Tongass that are currently experiencing, or may experience within the next decade, substantial adverse effects due to losses of old-growth habitat, and where current levels of deer harvesting (hunting) may not be sustainable. Alternative 1 schedules no additional timber harvesting. Alternatives 3, 5, 6, 10 and 11 include old-growth reserve systems in all or most of the major geographic areas of concern, and Alternatives 4 and 5 would reduce potential effects by using extended timber harvest rotations. Alternatives 3, 4, 5 and 6 also maintain important deer winter range in areas where deer harvesting is high, to provide continued deer harvesting opportunities at current levels. Alternatives 2, 7 and 9 would be expected to exacerbate existing problems. (See Table 2-3 for alternative-specific wildlife habitat measures.) Subsistence use associated with deer hunting will be correspondingly affected.

Table 2-7
Selected alternative dimensions[(1)]

Resource/Category	1	2	3	4	5	6	7	9	10	11
	Alternative									
Recreation - ROS Opportunities (million RVD's)										
Primitive and Semi-primitive Non-motorized	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Semi-primitive Motorized	1.7	1.6	1.6	1.7	1.7	1.6	1.6	1.6	1.6	1.6
Roaded Natural and Roaded Modified	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Scenery - VQO's [(2)] (million acres):										
Retention	5.9	3.6	4.4	3.6	3.9	4.0	2.0	5.2	4.4	4.8
Partial retention	4.9	3.1	2.9	3.1	3.0	3.0	1.3	1.1	2.9	3.2
Modification	<0.1	0.5	0.4	0.5	0.4	0.4	1.0	0.4	0.4	0.4
Maximum Modification	0.2	3.9	3.3	3.9	3.7	3.6	6.7	4.4	3.3	2.8
Timber:										
Suitable Lands (million acres)	0.0	1.2	0.8	0.8	0.8	1.0	1.6	1.4	0.9	0.7
Sale Quantities (MMBF): [(3)]										
Non-interchangeable I	0	375	210	107	100	250	520	447	245	219
Non-interchangeable II	0	87	46	23	22	59	120	102	55	48
Allowable Sale Quantity	0	463	256	130	122	309	640	549	300	267
Silvicultural system (1,000 acres):										
Even-aged	0	14.7	0	0	0	0	20.3	17.4	0	6.7
Two-aged	0	0	9.4	6.3	4.6	11.4	0	0	11.2	1.9
Uneven-aged	0	0	<0.1	0	0	<0.1	0	0	0	0

[1] Abbreviations used: ROS = Recreation Opportunity Spectrum; RVD = Recreation Visitor Day; VQO = Visual Quality Objective; MMBF = million board feet. RVD's, sale quantities, and silvicultural system acreages are average annual amounts.
[2] Excluding Wilderness (5.7 million acres of Retention in all alternatives).
[3] All timber volumes are sawlog plus utility

In the long-term, the ability of several alternatives to maintain habitats adequate to sustain well distributed viable wildlife populations Forest-wide is a concern, as suggested by the ratings from six wildlife species panel assessments. (As noted in Chapter 3, however, these ratings embody uncertainty about wildlife and habitat interactions, and are much better used for alternative comparisons than actual - or quantifiable - measures of risk.) The alternatives tended to cluster in groups, with Alternatives 1, 4 and 5 generally having the least risk to viability, and Alternatives 2, 7 and 9 the greatest risk. In terms of relative likelihoods of maintaining conditions in the future that would sustain well distributed viable populations, Alternatives 2, 7 and 9 rated lowest, Alternatives 3 and 6 somewhere in-between, and Alternatives 1, 4 and 5 highest. These relative ratings were fairly consistent between species overall, and the rankings (from low risk to high risk) very similar to those given by the old-growth ecosystem panel, and arrived at in other analyses (see both the Biodiversity and Wildlife environmental consequences sections in Chapter 3). Due to existing altered or degraded habitats, and their likely persistence over time, none of the alternatives was considered free from some level of risk.

Alternatives 10 and 11 were not rated by the panels. Alternative 10 is estimated to have a similar relative likelihood of maintaining habitat to sustain viable populations as Alternative 6. Alternative 11 is estimated to have a higher likelihood than Alternative 3, putting it closer to Alternatives 4 and 5.

All alternatives exceed the RPA Program Wildlife Habitat Improvement objective of 1,200 acres per year. At least 8,200 acres of wildlife habitat improvement is proposed under each alternative.

Fish Habitat

Most alternatives include combinations of three "Riparian Options" designed to minimize to various degrees potential adverse effects to fish habitat. Alternative 11 uses a fourth option. Options 2 and 2A incorporate recommendations from the Anadromous Fish Habitat Assessment; Option 2A with somewhat lower risk than Option 2. Option 1 goes beyond these recommendations (lower risk), and Option 3 reflects the 1991 SDEIS proposals (higher risk). Alternative 3 applies Option 1 (the most protective) to key watersheds, and is the only alternative applying Option 2 to other watersheds. Alternative 11 applies Option 2A to all watersheds. Alternatives 1, 4, 5, 6 and 10 use Option 2 for key watersheds, Option 3 for the rest. Alternatives 2, 7 and 9 use either only Option 3 or only current direction (Alternative 9).

Beyond these riparian-area measures, risks to maintaining high-quality fish habitat come primarily from the amounts and methods of timber harvesting, and the associated amount of new roads constructed. These and other factors were considered by the Fish/Riparian panel. Their overall ranking of alternatives in terms of relative long-term risk to fish habitats Forest-wide, from lowest risk to highest, was: Alternatives 1, 5, 4, 3, 6, 2, 9 and 7. Alternative 10, not rated by the panel, is estimated to be similar in risk to Alternative 6. Alternative 11, also not rated, is estimated to fall somewhere between Alternatives 1 and 3.

Noticeable short-term effects to fish habitat are most likely to occur in watersheds where past and near-term future activities are concentrated. This is most likely in alternatives with the highest levels of permissible timber harvesting. These same alternatives project the greatest amounts of road construction over the next decade, and entry into more areas with steep slopes. Alternatives 2, 7 and 9 are distinctly higher in these categories, and also have the least-protective riparian measures. They thus have higher short-term potentials to adversely affect fisheries than the other alternatives. Alternative 1 has no additional timber harvesting or roads, and thus a very low risk. Alternatives 3, 4, 5, 6 and 10 all include at least Riparian Option 2 for key watersheds, helping to reduce short-term risks; Alternatives 6 and 10 have more timber harvest and roading and thus the higher risks within this group. Alternative 11, although projecting more timber harvest and roading than Alternatives 4 and 5, applies Riparian Option 2A to all watersheds and has a lower short-term risk than most alternatives in this group.

All of the alternatives exceed the RPA Program Anadromous Fish Improvement objective of 12,133,000 pounds per year. The estimated anadromous fish production of existing Cooperative Fisheries Enhancement Projects, which totals 17,702,200 pounds annually (see Fish section of chapter 3), already exceeds the Program objective, and additional fish projects are planned under each alternative.

Karst and Caves

All alternatives comply with the Federal Cave Resources Protection Act in protecting designated significant caves. However, the cave resources of the Tongass are a part of an extensive limestone landscape type known as karst, which has complex relationships to water flows and forested lands. Fully protecting the cave resource requires a wider recognition of these karst areas. Special Karst and

Caves Forest-wide standards and guidelines are applied in Alternatives 1, 3, 4, 5, 6, 10 and 11, and these alternatives are most likely to protect sensitive karst areas and the cave resource (still largely unexplored). Alternatives 2, 7 and 9 have less protection, and also greater amounts of timber harvesting, and pose a higher risk to karst areas and caves.

Timber Harvest and Alternatives to Clearcutting

Projected timber harvest levels, as inferred from the allowable sale quantities of the alternatives, range from 0 million board feet (MMBF) in Alternative 1 to 640 MMBF in Alternative 7. (These and the following are all average annual amounts for the first decade. See Table 2-7.) The allowable sale quantities (which are not targets, but ceilings and how much timber may be sold) are divided into two non-interchangeable components (NIC's) based on harvest economics and available technology. The NIC I portion is the amount considered likely to be economically viable over the next decade. It can be compared to the historic average harvest (340 MMBF per year average between 1980 and 1995 approximates NIC I, contrasted to an ASQ of 450 MMBF (net sawlog) for the same period). Alternatives 2, 7 and 9 have a NIC I sale quantity higher than this amount (Table 2-5), and would be most likely to allow the timber industry in Southeast Alaska to operate at or above historic levels. Alternatives 6 and 10 are somewhat below this average, but probably have sufficient NIC I volumes to meet long-term timber sale contract requirements and supply a viable independent timber sale program. Alternatives 3 and 11 are marginal in this regard. Alternatives 4 and 5 would probably not provide sufficient volume to meet long-term contract requirements, but could supply a viable independent sale program in the absence of such a contract. Alternative 1 has no timber harvest scheduled.

Alternatives 7 and 9 meet or exceed the 1983 RPA Program Timber Sale Offering objective of 450 MMBF per year (net sawlog). All other alternatives fall short of this objective.

Three alternative silvicultural systems were available as options for timber harvest in the forest plan alternatives: even-aged management (clearcutting), two-aged management, and uneven-aged management. (See Table 2-3.) Two harvest rotation ages were also available: an average 100-year rotation ("short" rotation), and an average 200-year rotation ("extended" rotation). The combination of even-aged management with 100-year rotations is the practice used currently, and forms the primary harvest system selected for Alternatives 2, 7, 9 and 11 (in 11 in combination with two-aged systems). Other combinations would be considered the "alternatives" to clearcutting.

The Timber section of Chapter 3 discusses the pros and cons of the different harvest systems, and describes the reasons for currently and historically using even-aged management, which has been very successful in regrowing forests across the Tongass. For Southeast Alaska there are many unknowns surrounding the silvicultural alternatives to clearcutting and this translates into considerable uncertainty over their long-term success and effectiveness. This is rather a moot point for uneven-aged management, however, since whether given the choice between it and the two-aged method (Alternatives 4, 5 and 6), or relying on it as the only method (Alternative 1), the computer planning model never selects it, uneven-aged management being generally uneconomic to use. Only in Alternatives 3 and 6 is a small amount of uneven-aged harvest scheduled (from areas where even-aged is not allowed).

Two-aged systems are used in Alternatives 3, 4, 5, 6, 10 and 11; in Alternatives 3, 6 and 10 using 100-year rotations, in Alternatives 4 and 5 using 200-year rotations, and in Alternative 11 in combination with even-aged systems and using 100-year rotations (see also Table 2-3). The differences in acres scheduled for harvest and sale quantities among these combinations can be seen in Table 2-7. Using two-aged rather than even-aged management with a 100-year rotation results in about 20 percent less timber volume scheduled for harvest (comparing Alternatives 2 and 6 and adjusting for the difference in suitable timber lands available). Using a 200-year rotation instead of 100 years, with all else being equal (comparing Alternative 5 and 6), results in a drop of over 60 percent in harvest volume. Besides the reduced timber volumes from two-aged harvest, the ultimate success of this method is not assured, nor have the anticipated benefits to wildlife and diversity been tested. The use of this method instead of clearcutting did not appear to influence the wildlife-related panel assessment ratings.

Socioeconomic Considerations

The analysis of social and economic effects includes an examination of regional (Southeast Alaska) industry and employment impacts, and a more qualitative look at potential effects to each of Southeast Alaska's 30+ communities (including effects on the availability of subsistence resources). The regional analysis concluded that only two employment sectors - timber and recreation/tourism - would show direct or indirect effects from Tongass management over the next decade. There is a fairly direct, linear relationship between the Allowable Sale Quantity of an alternative and the timber jobs that would result from the harvest of that quantity - down to a certain point. For alternatives with sale quantities - either ASQ or the NIC I portion of ASQ (these terms are explained earlier in this chapter) - insufficient to keep a known mill operation in business, offering sales below that amount would not necessarily provide employment. Alternatives 7, 9 and 2 all have allowable sale quantities adequate to support an increase in Tongass timber-related employment over the next decade. Alternatives 6 and 10 show a slight decrease, and the other alternatives progressively more of a decrease (Alternative 3, followed by 11, 4 and 5, followed by 1).

Employment in the recreation and tourism sectors (considered together in the analysis) increases moderately, and about the same amount, under all alternatives during the first decade.

Recreation and Tourism

Table 2-7 displays first-decade annual Recreation Visitor Day capacity under the alternatives. The differences result from changes in Recreation Opportunity Spectrum classes, which will occur slowly over several decades, and thus appear relatively minor for the first decade. On a longer-term basis, Alternatives 7 and 9 would result in a greater shift towards the roaded types of opportunities than the other alternatives.

None of the alternatives meet the RPA Program objectives for Dispersed recreation Use (2,174,000 RVD's per year) or Developed recreation Use (5,920,000 RVD's per year). Application of the Recreation Opportunity Spectrum system in the revision process has shown the Forest has the capacity for accommodating only about two-thirds of these usage levels (see Table 2-7).

LUD group allocations (Table 2-6) are another way to generally identify recreation opportunities. Outside of Wilderness (which is the same for all alternatives), "roadless" recreation availability can be equated to acres within the Natural Setting LUD group. Alternative 1 has a considerably larger acreage in this category than the other alternatives (10.8 million). Alternative 11 has over 7 million acres, Alternatives 3, 5, 6 and 10 all have over 6 million acres, and Alternatives 2 and 4 have 5.8 million. Alternatives 7 and 9 each have less than 5 million acres, with Alternative 7 the lowest at 3.2 million. "Roaded" recreation opportunities in the Moderate and Intensive Development groups are offered in the reverse of this order.

For the analysis of recreation and tourism, various types of "recreation places" - areas popular for specific types of recreation and for tourism - have been identified. In most cases, relatively undeveloped or natural settings for these places are preferred. Forest-wide, for all types of recreation places, Alternative 1 has the most recreation place acres in Natural Setting LUD's, followed by Alternatives 3, 10 and 11, then Alternatives 5 and 6, and then 2 and 4, all with fairly comparable recognition of recreation places. Alternatives 7 and 9 have the fewest recreation place acres in natural settings. Tourism recreation places are recognized in generally the same order and relative amount.

Scenery

Recognition of scenic quality through application of Visual Quality Objectives is indicated Forest-wide in Table 2-7. Outside of Wilderness, the Retention and Partial Retention categories would be considered capable of maintaining natural or natural-appearing scenery. Acres in these combined categories are highest in Alternative 1. Alternatives 3, 6, 10 and 11 each have 7 million or more acres, closely followed by Alternatives 2, 4 and 5, then Alternative 9. Alternative 7 has considerably fewer acres in retention and partial retention objectives.

A list of "visual priority routes and use areas" has been developed to help recognize the areas most important for scenic values (by being most often seen by recreationists, local residents, tourists and travelers, etc.). Apart from Alternative 1 (which, with no additional timber harvest or road construction, has essentially no future alterations affecting scenic quality), Alternatives 2-6, 10 and 11 all include the majority of these routes and areas either in natural setting LUD's, or in the Scenic Viewshed and Modified Landscape LUD's, although portions of some are assigned to Timber Production. Many are included in Alternative 9 in the LUD II and LUD III categories, but many are also allocated to LUD IV. Alternative 7 did not allocate LUD's based on these routes or areas, and did not use the Scenic Viewshed LUD.

Chapter 3

Environment and Effects

Introduction

This chapter combines the "Affected Environment" and "Environmental Consequences" discussions required by the National Environmental Policy Act (NEPA) implementing regulations (40 CFR 1500-1508). Each resource is first described by its current condition, uses, supply, and demand or expected use along with an explanation of how each resource is measured and evaluated. The descriptions are limited to providing the background information necessary for understanding how Forest Plan alternatives may affect the resource. Methodology and scientific accuracy is discussed for most resources.

Analyzing Effects

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with implementation of each alternative. All significant or potentially significant effects, including direct, indirect and cumulative effects, are disclosed. Effects are quantified, where possible, although qualitative discussions are also included. The means by which any identified potential adverse effects will be reduced or mitigated are also described.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future. Cumulative effects result from the incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Potential adverse environmental effects which cannot be avoided are discussed. Unavoidable adverse effects are those resulting from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced or mitigated by limiting the extent or duration of effects. Mitigation measures within standards and guidelines are specified for project activities to be implemented under the Forest Plan. These are discussed throughout this chapter, and are presented in detail in the Land and Resource Management Plan.

Short-term uses, and their effects, are those that occur annually or within the first ten years of Forest Plan implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond. Long-term and cumulative effects may be projected out 100 years or more as needed to fully analyze the potential consequences for particular resources.

Irreversible and irretrievable resource commitments are normally not made at the programmatic level of a Forest Plan. Irreversible commitments are decisions affecting nonrenewable resources such as soils, minerals, plant and animal species, and heritage resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. While the application of Land Use Designations (LUD's) allowing land-altering activities can indicate the potential for such commitments, the actual commitment to develop, use or affect non-renewable resources is made at the project level. The gradual decline in old-growth habitat may be considered an irreversible commitment.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of LUD's that do not allow timber harvest to areas containing suitable and accessible timber lands. For the time over which such allocations are made, the opportunity to obtain timber from those areas is foregone, thus irretrievable. Irreversible and irretrievable commitments are not identified, as such, in the discussions.

For estimating the effects of alternatives at the programmatic Forest Plan level, the assumption is made that the kinds of resource management activities <u>allowed</u> under the LUD's will in fact occur to the extent necessary to achieve the goals and objectives of each alternative. However, the actual location, design and extent of such activities is not known at this time; that is a project-by-project decision. Thus, in many cases the discussions refer to the <u>potential</u> for effects to occur, realizing that in many cases these are only estimates. The effects analysis is useful in comparing and evaluating alternatives, but should not be applied per se to any specific location within the Forest.

In analyzing and evaluating the potential effects from timber harvest activities, keep in mind that the LUD's allowing different levels of timber harvest apply to broad land areas. These areas typically include both suitable and unsuitable timber lands. Within any given area allocated to one of these LUD's, the actual acres harvested will be less than the total acres. Each alternative map in the map packet displays the available lands within the Land Use Designations where timber harvest may occur. Which suitable acres are harvested is once again a project-level decision.

A strong effort has been made throughout the Revision EIS process to obtain and use the best available information to evaluate and compare the effects of alternatives. NEPA implementing regulations (40 CFR 1502.22) state that when "there is incomplete or unavailable information, the agency shall always make clear that such information is lacking." This is done, in the sections called "Methodology and Scientific Accuracy" which appear by resource section throughout Chapter 3, in other portions of Chapter 3, and in the "Information Needs" appendix to the Forest Plan. The NEPA requirement goes on to say that if the incomplete information "is essential to a reasoned choice among alternatives" then considerations such as the cost of obtaining it apply. We are always seeking new and better information, and attempting to improve our techniques for evaluating it; and some examples are discussed in the following paragraphs. We don't know of any *missing* information that could truly be termed "essential" to a reasoned decision about the alternatives. This FEIS and its planning record provide the Forest Supervisors and Regional Forester with the "essential" information needed to make a reasoned choice.

Chapter 1 discussed the reasons for preparing a Revised Supplement prior to this FEIS, and the five focus issues. Two facets of this process have been instrumental in providing new information for use in analyzing the environmental consequences of the alternatives. The first was the preparation of a number of science assessments and resource analyses, many of them summarized and referenced throughout the Chapter 3 discussions. These provided information for evaluating aspects of fish, karst and caves, timber, soils, wetlands (discussed under Water), old-growth forests (discussed under Biodiversity), wildlife, and the social and economic environments. (All are included in the References section.)

The other facet of the Revised Supplement process particularly important for this chapter was the use of several "panel assessments" to provide independent analyses related to the effects of the alternatives on particular resources or environmental components. Results of these panels, as far as they are still applicable to the FEIS alternatives, are used in the discussions of environmental consequences in the sections on Biodiversity, Fish, Wildlife, and Communities (socio-economic effects and subsistence effects). Details specific to each panel are discussed in these sections, and a more detailed summary of each panel is included in the planning record (see References). A brief discussion of the general panel process (common to most panels) is included here.

Panel Assessment Process

Most panels were designed to provide information on the relative risk that implementation of each alternative would pose to the continued persistence across the landscape of the species or resource in question. The evaluations were not precise analyses of likelihoods of particular conditions, but rather professional judgments made by knowledgeable experts about possible future outcomes. Each panel included several scientists specializing in the species or resource being evaluated, a facilitator, a scribe, a local resource expert, and a silent observer. After presentations of local resource and planning information, panel members individually rated each alternative based on several possible outcomes (these varied by panel, and are described along with the panel results) prior to any discussion. Following these initial evaluations, the panel engaged in facilitated discussions of their ratings. These were intended to clarify the assignment of particular likelihood points, identify differing interpretations of available information, and point out knowledge gaps and how lack of information was handled by the evaluators. There was no attempt to force consensus; however, panelists were free to reassign likelihood points based on what they learned from the discussions.

A "likelihood" approach was used for assessing the level of risk. For each alternative, a total of 100 "likelihood points" were assigned across the array of possible outcomes (usually four or five outcomes were available). Assigning all 100 points to a single outcome would express "complete certainty" in that particular outcome. Uncertainty is expressed by spreading points across the outcomes. These outcomes are not probabilities in the classic sense of frequencies; rather, they represent degrees of belief, based on best professional judgment, expressed with a probability-like scale. The outcomes are most appropriately used for comparing the relative degree of risk projected for each alternative, and are not to be considered as a measurement of the absolute level of risk for any alternative.

For their assessments, the panels had preliminary versions of Alternatives 1-9 as they were subsequently presented in the Revised Supplement. One of these, Alternative 8, has not been carried forward for detailed study in the FEIS, and has been omitted from the reports of the panel results. Two other alternatives considered in the FEIS, Alternatives 10 and 11, were not available to the panels and they are not included in reporting panel results. As appropriate, these alternatives have been discussed in relation to the other alternatives in describing or summarizing overall panel ratings. It is not likely that the 5-10 percent reductions in allowable sale quantities (ASQs) for most alternatives between Revised Supplement and FEIS (discussed in Chapter 2) would have made any difference in the panel ratings. Most of the panels were not provided with preliminary ASQ information, anyway.

Land Use Designation Groupings

For many resources, the effects, and the differences in effects by alternative, are best identified through the Land Use Designation allocations. While each LUD has a different purpose and management emphasis, many are similar in the kinds of effects they would potentially create. Based on this concept, and in order to simplify the identification of effects, the Land Use Designations have been grouped into four categories: Wilderness, Natural Setting, Moderate Development, and Intensive Development.

Table 3-1 displays the Land Use Designation groupings. Each alternative map also uses these groupings to show the LUD allocations, and LUD's are color-coded by group. Alternative 9, the current forest plan, uses the existing LUD's, which are different than those of Alternatives 1-7, 10 and 11 (as discussed in Chapter 2); however, for comparative purposes, Alternative 9 LUD's I-IV correspond to the four LUD groups as follows: LUD I = Wilderness; LUD II = Natural Setting; LUD III = Modified Development; LUD IV = Intensive Development.

Table 3-1
Land Use Designation Groupings Used to Discuss Effects

LUD Group	Land Use Designation
Wilderness	Wilderness
	Wilderness National Monument
	Non-wilderness National Monument
Natural Setting	Research Natural Area
	Remote Recreation
	Special Interest Area
	Old-growth Habitat
	Enacted Municipal Watershed
	LUD II
	Semi-Remote Recreation
	Wild River
	Scenic River
	Recreation River
Moderate Development	Experimental Forest
	Scenic Viewshed
	Modified Landscape
Intensive Development	Timber production
	Minerals

Land Divisions

The land area of the Tongass National Forest has been divided up in several different ways to describe the different resources and how they are affected by Forest Plan alternatives. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. Several of these divisions are described briefly here (more complete descriptions appear elsewhere in the document, as noted).

Geographic Provinces. These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features. Geographic provinces are used in the Research Natural Area, and Wild and Scenic River, sections. See Research Natural Areas for a description of each province.

Biogeographic provinces. These are areas within which certain kinds of plants and animals tend to occur together. They are defined by a combination of similarity in species, patterns of distribution of species, and natural characteristics or barriers. Twenty-one biogeographic provinces occur on the Tongass. They are used in the Biodiversity and Wildlife sections.

Administrative Areas. The Tongass National Forest, for management purposes, is divided into three Administrative Areas. They correspond roughly to the north, central and southern portions of the Forest. Several resources, including fish, old-growth forests, recreation, roadless areas, wildlife, and timber, use these divisions for describing effects. Administrative areas were described in Chapter 1.

Management Areas. The current (1979, as amended) Tongass Forest Plan divides the Forest into 141 Management Areas, each with area-specific direction and activity schedules. The Forest Plan revision did not use these areas for those purposes. The Tongass Timber Reform Act directed that "proportionality" (see Chapter 1, and the timber section of this chapter) be analyzed using the 141 Management Areas. The 141 areas are, therefore, preserved, and are used to ensure that the proportionality requirement is met.

Value Comparison Units. These are distinct geographic areas, roughly analogous to watersheds, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. Value Comparison Units (VCU's) were used for the 1979 Forest Plan, and have since been updated. The Forest currently has 926 VCU's averaging 18,000 acres in size. They are used to describe the locations of specific resources on the Forest.

Wildlife Analysis Areas. These are land divisions used by the Alaska Department of Fish and Game. Approximately 190 apply to the Tongass National Forest. They are used in the Subsistence and Wildlife sections.

The Tongass National Forest has developed a computerized geographic information system (GIS) for the revision of the Tongass Plan. This system makes it possible to do spatial analysis of alternatives and effects, and to rapidly display resource information in map format. The GIS is a large data base, containing information on many of the resources of the Forest. Much of the data consists of map "layers," each representing a particular resource or attribute (such as vegetative species, soil types or recreation places). Numerical data can also be stored, displayed and analyzed. The GIS data base is usually referred to as the "Revision data base" when referenced in this chapter.

General Forest Description

A brief description of the physical, biological and socioeconomic settings of the Tongass National Forest is now given. Chapter 1 and the alternative maps include a location map.

Physical Setting

The mainland and many of the islands of Southeast Alaska are mountainous, often rising abruptly from sea level to several thousand feet. Elevations of forested areas extend up to approximately 3,000 feet in the southern sections of the Forest, and up to 2,500 feet further north. The mountain valleys provide reservoirs for huge ice fields and glaciers, located primarily on the mainland.

More than one million years ago, all but the highest mountain peaks in Southeast Alaska were covered by ice. The great erosional powers of these vast expanses of ice molded and shaped the landscape as the glaciers moved downhill under their own weight, carving the bedrock below them. When the ice receded and uncovered the land, the more resistant mineral-rich rocks remained, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. This modification by glaciers gives Southeast Alaska's landscape its unique character.

The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains provide the factors necessary to produce abundant rainfall. The annual precipitation of Southeast Alaska averages more than 100 inches throughout. Precipitation is highest in the southern areas, and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall annually, perpetuating the existing ice fields and glaciers. Storms and moderate to heavy precipitation occur year-round, but most commonly from September through November. The abundant moisture feeds numerous streams, rivers, and lakes which dot the landscape.

Southeast Alaska has a maritime climate, resulting from the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from the mid-40's to the mid-60's in the summer, and from the high teens to the low-40's in the winter. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true.

Biological Setting

The coastal forest of Southeast Alaska is part of the cool, temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the forest is composed of old-growth conifers, primarily western hemlock and Sitka spruce, with a scattering of mountain hemlock, western redcedar (in the south) and Alaska yellow-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by logging and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas.

Blueberries, huckleberry, Sitka alder, Devil's club, and salal are common shrubs in the forest. The forest floor is composed of plants such as deerheart, dogwood, single delight and skunk cabbage. Because of the high rainfall and resulting high humidity, mosses grow in great profusion on the ground, on fallen logs, on the lower branches of trees, and in forest openings.

Grass-sedge meadows usually lie at low elevations, often along the coast. Stands of willows border many of the stream channels. Muskeg (bog plant) communities, dominated by sphagnum mosses and sedges, occur throughout the Forest.

The alpine zone usually lies above 2,500 to 3,000 feet. It occupies the area above the coastal forest and is separated from the forest by a subalpine or transition zone. Resident plants have adapted to snowpack and wind abrasion by evolving low-growth forms. Low, mat-forming vegetation covers most of the area, with cushion-like plants occupying crevices on exposed rock outcrops and talus slopes.

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals, including game and non-game animals such as brown and black bear, Sitka black-tailed deer, moose, wolf, mountain goat, beaver, otter and marten. The coastline provides ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Forest.

Socioeconomic Setting

Southeast Alaska's communities and individuals make up a variety of cultures. The abundant resources of the forests and waters have provided food, shelter, and livelihood for to its peoples for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment and developed a rich culture. The numerous waterways allowed for mobility which aided in expanding trade and gathering food.

In the 1700's, Russian exploration began in Alaska. The fur trade, primarily sea otter pelts, was the main force driving colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in its North American colony. Alaska was sold to the United States in 1867.

Colonization continued under United States ownership, and new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast Alaska. During that same period the discovery of gold brought thousands of miners to the area, and many were followed by their families. The most important of the early discoveries occurred in Juneau. In the early 1900's, the Depression brought a decline in mining employment, and the impact of World War II resulted in the closures of the last remaining mines.

The timber resource was used by the earliest inhabitants in a variety of ways. The Russians harvested timber for building ships and structures, but commercial timber harvest was not developed until the 1900's. In the earlier part of the century small timber mills operated in a few communities, and during the 1950's two large-scale pulp mills were developed in Ketchikan and Sitka, and the timber industry became a major economic component of Southeast Alaska's economy.

In the 1950's Alaska focused its attention on statehood, and on January 3, 1959 became our 49th state. This resulted in an increase in government employment, and, coupled with the growth of the timber industry, a gradual shift towards a more diversified economy, with less dependence on non-renewable resources.

Most of the population of Southeast Alaska is concentrated in a few communities, the largest being Juneau, Ketchikan, Sitka and Petersburg. The same industries most important to Southeast Alaska's history: fishing, mining and timber production, are still prominent in most of the urban communities. Tourism, which has increased in recent years, provides another important source of income, as do government, education and transportation. There are also many small, rural communities which depend primarily on fishing, timber production and subsistence uses.

Physical and Biological Environment

Air

Affected Environment

The air quality of the Tongass National Forest is generally good. The prevalent airflow from the Pacific Ocean, the small amount of industrial development in Southeast Alaska, the absence of large population centers, and environmental regulations all contribute to maintaining clean air. Forest activities have historically had little direct effect on air quality.

Regional air quality and sources of air pollution in Southeast Alaska are described in "Air Quality Monitoring on the Tongass National Forest: Methods and Baselines Using Lichens" (USDA, 1994). This study found that the Tongass National Forest generally has diverse and healthy lichen communities. Some adverse effects to lichens may exist near the Sitka pulp mill (no longer operating). Additional monitoring was recommended to verify these preliminary results.

Regional Air Quality

Juneau's Mendenhall Valley is the only area in Southeast Alaska that is known to exceed National Ambient Air Quality Standards (NAAQS). The Alaska Department of Environmental Conservation (ADEC) has designated Mendenhall Valley as a nonattainment area for particulate matter due to wood smoke and road dust. About 5,000 acres of Tongass National Forest land is within this nonattainment area boundary. Mendenhall Valley is anticipated to attain the existing national standards in the near future due to control measures such as a wood smoke control program and extensive road paving.

ADEC has conducted ambient air monitoring in other locations in Southeast Alaska, such as Ketchikan. These studies indicate these areas are within national standards for the pollutants monitored. The Environmental Protection Agency (EPA) is currently considering revising the NAAQS for particulate matter and ozone. It is uncertain how revised standards may affect the situation on the Tongass.

Sources of Air Pollution

Approximately 20 stationary sources of air pollution in Southeast Alaska require air quality control permits. Most of these facilities are diesel power plants, asphalt plants, or incinerators; the remainder are the Ketchikan pulp mill, mining facilities, and other facilities. Some of these sources only operate intermittently (e.g., back-up power plants may only operate during power failures or during peak demand periods, and asphalt plants may operate seasonally), and others may be operating at less than full capacity (e.g., the Kensington and AJ mines). Ketchikan Pulp Corporation plans to close its Ketchikan pulp mill in 1997.

Other sources of air pollution in Southeast Alaska include mobile sources (such as cars, trucks, boats, cruise ships, airplanes, and helicopters) and area sources (such as home furnaces, wood stoves, and open burning). Under certain weather conditions, wildfires in Canada can affect air quality and visibility (i.e., regional haze) in parts of Southeast Alaska.

Air

Environmental Consequences

Direct and Indirect Effects

The expected direct effects on air quality from forest management activities are temporary and limited in nature, resulting from dust and vehicular emissions from logging operations, public travel on Forest roads, permitted uses such as community incinerators and tour boat operations, mineral development, and smoke from a limited prescribed fire program. No significant adverse effects on air quality are anticipated from these activities under any of the alternatives.

Indirect effects on air quality can result from large cruise ship emissions, and the use of trees harvested from the Tongass National Forest, such as in the operation of industrial processing sites (primarily the Ketchikan pulp mill) and firewood burning. These indirect effects on air quality can be aesthetically displeasing or have potential health risks to both humans and the forest.

EPA and ADEC have regulatory responsibility, under the Clean Air Act, for air quality related to these kinds of sources. The enforcement of the applicable regulations by these agencies is anticipated to keep any potential adverse effects within the standards for air quality; therefore, no significant indirect effects from the uses of the Tongass National Forest should occur.

Biodiversity

Affected Environment

The conservation of biological diversity- or "biodiversity" - is of national and global concern. Biodiversity may be defined as the variety of all of the plant and animal communities and species within an area, and associated ecological processes (Keystone 1991). Biological diversity encompasses the variety of genetic stocks, plant and animal species and subspecies, ecosystems, and the ecological processes through which individual organisms interact with one another and their environments. The National Forest Management Act (NFMA) requires consideration of biological diversity for the area covered by each forest plan.

It is important to remember that biodiversity does not necessarily equate to “diversity” in an absolute sense. Biological diversity is defined and understood in terms of the natural and historical numbers and distributions of plants and animals, habitats and communities. For instance, in an old-growth forest ecosystem, much of the biodiversity is found within stands of old growth: variations in tree heights and species, differences in understory species, the presence of small openings within a stand, etc. This is the natural habitat for many of the animals living there, and defines the biological diversity important for their survival. Creating a greater amount of younger aged stands of trees may increase the absolute diversity of tree stands, but it may reduce the natural diversity of the ecosystem by creating more young stands than naturally or historically occur. It also reduces the amount of diverse, usable habitats for the species conditioned to old-growth forests and the biological diversity inherent in old growth.

The conservation of biological diversity commonly requires a dual strategy addressing both individual species as well as entire ecosystems (Marcot et al. 1994). The traditional species-by-species approach is important for featured or management indicator species, sensitive or rare species, and for recovery of federally-designated threatened or endangered species. Additionally and perhaps more important, a more comprehensive strategy focused on higher levels of biological organization and ecosystems may be necessary to conserve rare or declining habitats such as old-growth forests, plant and animal communities and ecosystems, as well as the entire complement of associated biota and ecological processes (Noss 1991, Scott et al. 1991, Franklin 1993).

For the Tongass, habitat needs for sustaining viable populations of individual species are addressed by guidelines for specific species or species groups. This is the "fine filter" approach to biological conservation, discussed in the Fish, Wildlife, and Threatened, Endangered and Sensitive species, sections of this chapter.

The ecosystem most at risk by resource management of the Tongass is the old-growth forest ecosystem. The biological diversity associated with these forests is only beginning to be recognized and described. For instance, Franklin (1993) estimated that invertebrate biota, creatures essential to ecosystem function through such processes as nitrogen fixation and decomposition, may represent over 90 percent of the species diversity of old-growth forests in the Pacific Northwest. The most conceivable way to address conservation of these and other elements of biodiversity is by using an ecosystem- or landscape-based strategy (see also Noss 1991 and Scott et al. 1991). Thus in this section, the old-growth ecosystem will be the primary focus for the analysis of biological diversity. This constitutes the "coarse filter" approach to biological conservation (Hunter 1991, Wilcove 1993).

For the effects analysis presented later, it will be assumed that if a functional and inter-connected old-growth ecosystem is maintained across the Forest, then the closely associated components and ecological processes will also be maintained.

The 1991 SDEIS discussed biodiversity in terms of nine "elements," including ecological provinces and processes, plant and animal species numbers and distributions, and habitat fragmentation. These elements and the information presented for each are still valid, but a somewhat different organization of that information can be made to better link the concepts of biological diversity with those of ecosystems, and important new information is also available. This approach used in the Revised Supplement is continued for this FEIS. Also, as in the Revised Supplement, the old-growth forest resource is discussed here as a primary component at issue for biodiversity.

Biological diversity within any ecosystem, from a regionally-defined ecosystem such as the Southeast Alaska temperate rain forest down to a watershed, riparian area, or individual stand of trees, can be described in terms of three components: composition, structure, and function. Composition refers to the numbers and types of species, plant communities, and smaller ecosystems within an area. Structure refers to the arrangement of these communities or ecosystems across a landscape, and how they are connected; to variations in tree heights and diameters within a stand or between stands; etc. Function refers to the interactions and influences between plant and animal species within an area - how each species uses its environment - and to natural processes of change or disturbance (wind, aging, etc.). Table 3-2 lists these components and some scales at which they can be described. It also places the biological diversity elements used in the 1991 SDEIS within one of these components.

Composition

Worldwide, temperate rain forests once covered an estimated 90 million acres of North America, southern Chile, New Zealand, Tasmania, and along the eastern Black Sea. Approximately 56 percent of this forest biome remains undeveloped today (Hagenstein 1993). The Tongass National Forest contains 14 percent of the world's acreage of temperate rain forest, and 29 percent of the remaining unlogged acreage (Weigand 1990). These figures are the basis of some of the national and international attention that is focused on the Tongass (Kiester and Eckhardt 1994).

The Tongass National Forest is part of the temperate rainforest ecosystem which extends along the Pacific Coast and includes the northern California redwoods to the Sitka spruce of south central coastal Alaska. The climate is cool and maritime, with abundant winter rainfall and much summer cloudiness and fog. Conifer forests of the Tongass are dominated by hemlock, spruce, and cedar The climate of Southeast Alaska is significant in forest development, since the year-round precipitation means that regrowth (or "regeneration") is not limited by the availability of moisture. Over 50 vertebrate subspecies are endemic (native) to the temperate rainforest; many animal subspecies in Southeast Alaska are unique to one or more islands, and other more common species exhibit unique island-dependent patterns in distribution.

The types of plant communities and plant associations in an area are the result of ecological processes. In Southeast Alaska, these processes have resulted in conifer forests which are ecologically unique in North America. These forests have been classified into one ecosystem, Southeast Alaska coastal old growth, and further

Table 3-2
Biodiversity components and scales [(1)] and the 1991 SDEIS biodiversity elements

Component	Scale	Biodiversity "Element" (from 1991 SDEIS)
Composition	Landscape Types Communities Ecosystems Species Population	Ecological Provinces Plant associations and conditions Plant and Vertebrate Species Numbers Extinctions, Introductions, Vulnerability Species Abundance and Distribution Management Indicator Species
Structure	Landscape Patterns Habitats Genetic	Habitat Fragmentation
Function	Landscape Processes and Disturbances Land Use Trends Interspecific Actions Life Histories	Ecological Processes

[1] Based on Noss 1990

into 10 forest cover types and 57 plant associations. This coastal old-growth forest ecosystem is discussed following the discussion of biogeographic provinces. A finer classification into cover types and plant associations has been done for the Tongass, and will provide important information for project-level planning. A Forest-wide, quantitative inventory at these finer spatial scales is not yet available.

In 1986, Admiralty Island National Monument was designated as a Biosphere Reserve by the U.S. Man and Biosphere Program through the United Nations Scientific, Educational, and Cultural Organization (UNESCO). This designation combines Admiralty Island with Glacier Bay National Park to represent the northern temperate rainforest biome within the global system of Biosphere Reserves. The Man and Biosphere Program is based on the concept that it is possible to achieve a sustainable balance between the conservation of biological diversity, economic development, and maintenance of associated cultural values. The Biosphere Reserve provides a means for integrating conservation, research and monitoring, education and training, and involving local populations in conservation and development issues, in an area of outstanding ecological, scientific, and educational importance.

Biogeographic provinces

The Tongass itself can be subdivided on an ecosystem basis. The broadest division is that of the biogeographic, or ecological, province. These large-scale provinces are characterized by four traits:

1. species composition in each province is more similar than between adjacent provinces,
2. patterns in distribution are similar for many kinds of organisms; for example, fish, amphibians, mammals, birds, and plants,
3. historical events such as glaciation, uplifting of lands, and changes in sea level are important both to the nature of a province and to the barriers that distinguish each province,

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4. climatic conditions and physiographic characteristics are generally more similar within provinces.

Twenty-one "ecological provinces" covering the Tongass National Forest have been identified. They are listed below with summary descriptions. Figure 3-1 shows their location, with the numbers corresponding to this list. From now on, these will be termed "biogeographic provinces," since that term better indicates the diversity of environmental features used to establish this landscape stratification.

1. **Yakutat Forelands Province.** A very young, nearly flat landscape with extensive flooding and active isostatic rebound (uplifting of the ground after glaciers recede). Most surfaces vary from 200 to 1,500 years old. Dune formation and succession are ongoing processes due to glacial rebound and wave action. Plant community patterns reflect a diverse mosaic of naturally-occurring older and young forests, shrublands, bogs, and meadows. Sitka spruce, alder, and cottonwood are abundant on well drained, recently deglaciated and active fluvial surfaces.

2. **Yakutat/Glacier Bay Upland Province.** The climate varies from very wet hypermaritime along the coast to very wet maritime inland. Mountains to over 10,000 feet rising abruptly from sea level, extensive active glaciers, and fiords dominate this landscape. Sitka spruce, alder, and cottonwood are abundant at lower elevations; alpine and lichen over rock plant communities dominate the land from 2,000 to over 10,000 feet elevation.

3. **East Chichagof Island Province.** This province is drier and colder than the outer coast of Chichagof Island; the winter snow pack is generally greater. Chichagof Island is deeply dissected into three peninsulas which may be functioning biologically more like separate islands. Vegetation in this province represents a modal condition similar to the Admiralty Island Province.

4. **West Chichagof Island Province.** This province is dominated by a very wet hypermaritime climate and exposure to outer coastal storms. Hundreds of small islands dot the coast. Topography is gentle when compared to the mountains of Baranof Island and the coastline is highly irregular. The Sitka spruce/Pacific reedgrass plant association is abundant along the outermost coastal fringe; otherwise, vegetation is similar to the other northern islands.

5. **East Baranof Island Province.** This province is colder than West Baranof or eastern Chichagof Island. Mountain glaciers occur along the divide between east and west Baranof. Topography is rugged and steep to saltwater, with little flat land. Plant associations on Eastern Baranof are similar to much of the mainland due to the steep topography and cold environment. Spruce, devil's club, salmonberry forest associations are common on avalanche and steep erosional slopes; alpine and rock/lichen plant communities are abundant.

6. **West Baranof Island Province.** This province is similar to the West Chichagof Island province with the exception of southern Baranof where precipitation exceeds 250 inches per year. Topographically, Baranof Island is the most rugged of all the islands in Southeast Alaska. The southern half of this province is highly dissected by steep-sided fiords; the outer coast is dotted with hundreds of small islands. All forest plant associations except those in the Western redcedar series and those found around large mainland rivers occur in this province. Kruzof Island has some unique vegetation communities which have not been classified.

7. **Admiralty Island Province.** This province represents a modal environment, with relatively gentle topography and moderate rainfall. Winter conditions are moderated by the surrounding marine environment. Winds from Chatham and Icy Straits, Lynn Canal, and off the mainland are often severe. All forest plant associations except those in the Western redcedar series, those found around large mainland rivers, and those occurring only on outer coastal areas occur in this province. Forest productivity is high; fresh and saltwater marshes in the numerous bays and inlets, and alpine and bog communities, are abundant.

8. **Lynn Canal Province.** Rain shadows and the dominating influence of the continental climate make this the driest and seasonally warmest province in Southeast Alaska. Precipitation is generally less than 60 inches per year. The topography is rugged and glaciated. The southern portion of the Chilkat Peninsula is more similar to the Eastern Chichagof Island Province. Western and mountain hemlock, and Sitka spruce, plant associations are common. Alpine tundra and extensive rock/lichen communities dominate much of the land from 2,000 to over 8,000 feet.

9. **Northern Coast Range Province.** This province has little maritime influence. Topography is rugged and glaciated. The Taku and Whiting Rivers extend into Canada. Yellow-cedar plant associations occur in this province.

10. **Kupreanof/Mitkof Islands Province.** The climate is cooler and the winter snow pack greater than on the islands to the south. The eastern edge of this province is strongly influenced by wind-born loess (silt) coming from the Stikine River and the mainland. All forest plant associations except those in the Western redcedar series and those occurring only on outer coastal areas occur in this province. This province contains the highest percentage of muskeg wetlands within the Tongass.

11. **Kuiu Island Province.** Kuiu Island is deeply dissected creating several prominent peninsulas. The topography is gentle compared to neighboring Baranof Island or the mainland. The climate is cooler and winter snow pack greater than on islands to the south, yet milder than the mainland or islands nearer the mainland. The western portion of Kuiu Island is subject to severe windstorms from both the ocean and Chatham Strait. Most forested plant associations occur here, but those found in outer coastal environments dominate.

12. **Central Coast Range Province.** This province is warmer than the northern coast range province. The topography is similar, but overall less precipitous. The Stikine River system is located in the center of this province and has a major continental influence, providing a migration corridor for plant and animal species. Plant associations found along saltwater are similar to those occurring elsewhere in northern Southeast Alaska except for those near the mouth of the Stikine River. Here, unique plant associations subject to high loess-carrying winds can be found.

13. **Etolin Island and Vicinity Province.** Similar to the Kupreanof/Mitkof Islands Province, this province is also subject to continental influence from the mainland and the Stikine River. Glacial flour is present in the marine environment in the northern part of this province nearly year round. All forest plant associations except those occurring only on outer coast areas are present.

14. **North Central Prince of Wales Island Province.** Topography is relatively gentle; limestone is common; and precipitation is relatively low due to interception by lands to the south and southwest. All forest plant associations except those found around the mainland river systems occur in this province; overall forest productivity is high. Karst topography and numerous caves are present.

15. **Revilla Island/Cleveland Peninsula Province.** Climate is variable with warm and wet conditions predominating on land nearest the outer coast, much colder conditions near the mainland. Revilla, Gravina, and Annette Islands are influenced by human activities and populations, whereas the Cleveland Peninsula and Duke Island are generally in a natural condition. Revilla Island has many exceptional estuaries, and muskeg ponds are common on Duke Island, attracting many wintering and migratory birds.

16. **Southern Outer Islands Province.** These islands are isolated and are subject to strong oceanic influences. Temperatures are moderate year round; the topography is low-lying and gentle. These islands are relatively rich in endemic vertebrate, including dusky shrew, long-tailed vole, and ermine. Major coastal seabird colonies are present.

17. **Dall Island and Vicinity Province.** These islands are subject to strong oceanic influences. Temperatures are moderate year around; the topography is rugged and dissected, with abundant limestone outcrops. Dall Island appears to be a glacial refugia but inventories of plants and animals are limited. Major coastal seabird colonies are present on Dall Island.

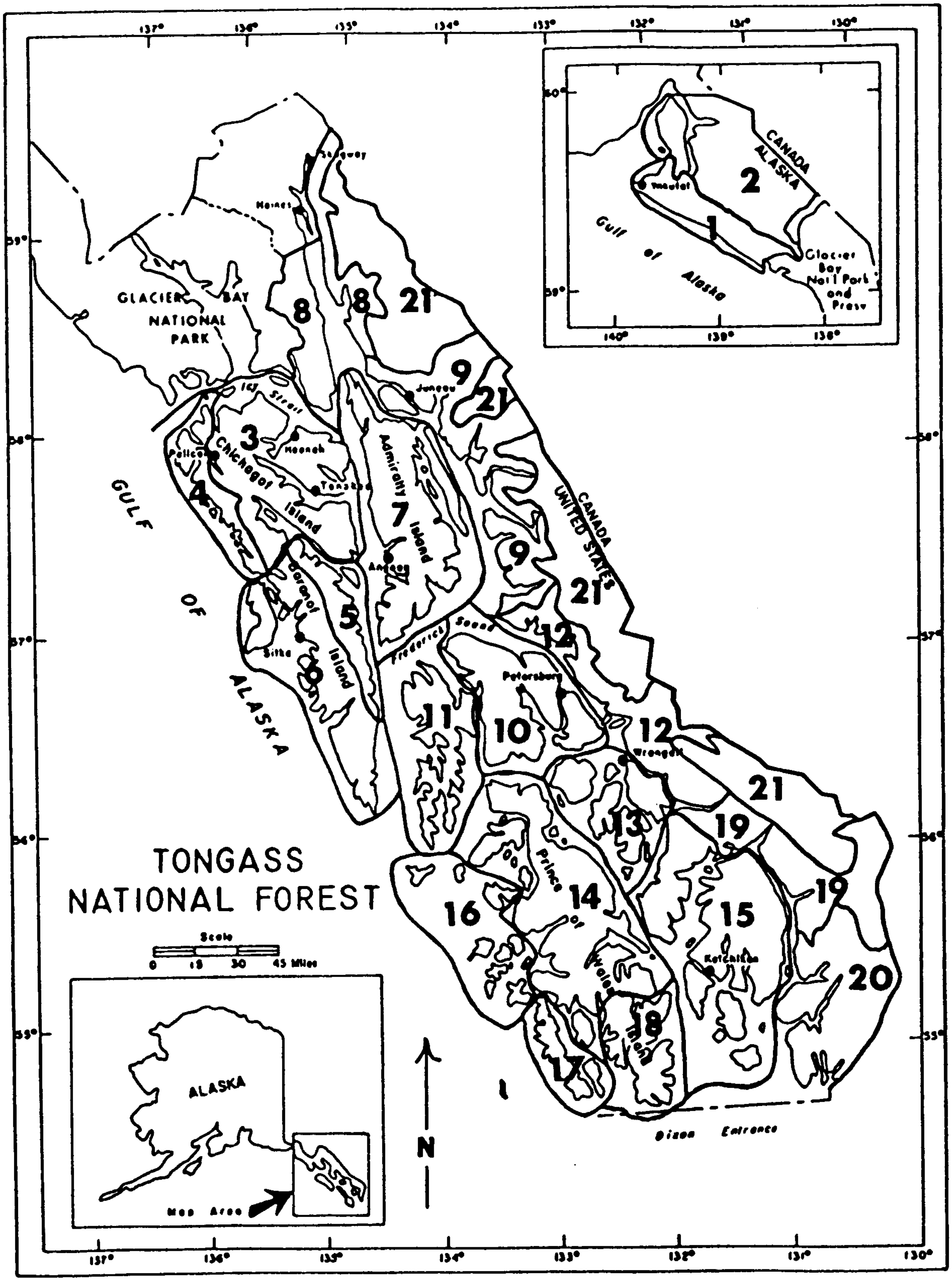
18. **South Prince of Wales Island Province.** The climate is warm and wet; deep snow is rare, or highly transient. The topography is steep and rugged and the coastline is highly dissected. The vegetation in this province is strongly influenced by southeasterly storms; mixed conifer and western hemlock-redcedar plant associations dominate.

19. **North Misty Fiords Province.** This province has considerable topographic relief, and compared to South Misty Fiords a colder, mainland-type climate with many glaciers. Vegetation occurs in long, narrow strips along the valleys and lower slopes of fiords. Much of the vegetation is muskeg, with cottonwoods in some of the river bottoms and subalpine fir along the Canadian border.

20. **South Misty Fiords Province.** South Misty Fiords is typical of the other mainland provinces, and the warmest. Topographic relief is lower in comparison with North Misty. Forest plant associations are more diverse than the other coastal provinces, and the vegetation is less fragmented by rock and ice than in North Misty Fiords. The southwestern portion of this province is rolling, nearly continuous muskeg with conifer forests in the bottoms and flats. This province is the northern limit of Pacific silver fir, yew, and honeysuckle.

21. **Ice Fields Province.** Permanent ice fields, active glaciers (some advancing and some receding), and nunataks (mountain peaks between glaciers) dominate this province.

Figure 3-1
Biogeographic Provinces of Southeast Alaska



Old-growth Forest

Old-growth forests are ecosystems distinguished by old and large trees and related structural attributes. Old growth encompasses the later stages of stand development, which typically differ from earlier stages in a variety of ways: larger tree sizes, and more variation in size and spacing; large dead standing or fallen trees; broken or deformed tops, bole and root decay; multiple canopy layers; and canopy gaps and understory patchiness. The rates of change in composition and structure are slow compared to younger forests. Different stages or classes of old growth are recognizable in many forest types.

The old-growth forests of the Tongass are distinctively heterogeneous. At the landscape scale, the diversity of landforms and drainage patterns influences vegetative cover: peatlands (or muskeg) are characteristic of poorly-drained soils, conifer forests of well-drained soils, and sparse "scrub" forest of intermediate areas. At a smaller scale, however, similar vegetative patterns are common, with small patches of poorly-drained, non-forested areas found within old-growth forest, for instance, or a large stand of trees on riparian soils within a larger area of peatland. These and other kinds of heterogeneity are important features of old-growth forest habitat diversity.

Sporadic, low- to moderate-severity disturbances are an integral part of the internal dynamics of old-growth forests. Wind is the most common disturbance element in Southeast Alaska, and canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.

There are a number of ways to characterize the old growth resource of the Tongass. In a very general way old-growth forests can be divided into a productive and an unproductive component, based on the ability of specific areas to grow trees of a certain size (sometimes called "commercial timber"). Productive old growth shares many values: for wood products, as important wildlife habitat, for scenic quality and recreation settings, and to maintain water quality and fish habitat. The Tongass contains approximately 8.65 million acres of old-growth conifer forests (as of 1995), of which 5.06 million are productive and 3.59 million acres are unproductive. There are also about 9,000 acres of non-conifer (cottonwood) old-growth forest. Old-growth conifer forest types include hemlock (western and mountain hemlock), spruce, hemlock/spruce, and cedar (cedar/hemlock stands are included in the hemlock type).

Estimates of the amount and distribution of the old-growth forests of the Tongass are based on timber inventory information. The timber inventory used 150 years as a breakpoint age for separating young growth from old growth; over 95 percent of the trees sampled in uncut timber stands were greater than 150 years. Most of these stands were well beyond 150 years and were also classed as uneven-aged stands. The development of old-growth characteristics begins at approximately 250 years. There is no timber inventory age category for trees greater than 300 years.

The then-current timber inventory was used in the 1991 SDEIS to divide productive old-growth forest into four volume classes (also called strata classes). Recent examination of the timber inventory has questioned the accuracy of this fine a breakdown, and the strata classes were re-defined in the Revised Supplement. Statistical analysis indicates that three classes of productive old-growth forest can be distinguished using the existing timber inventory with additional information on soils and slope - the relative measure still being the size and number of trees an area is able to grow (usually expressed as timber volume). Soils are divided into two groups, hydric and non-hydric. The soils inventory consists of "soil mapping

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units," with hydric soils being those units containing greater than 50 percent wetland soils. (For further discussion on timber volume strata see the Timber section). The three classes of productive old growth are:

High Volume strata. Areas within timber inventory volume classes 5, 6 and 7 on non-hydric soils, and on hydric soils with slopes greater than 55 percent.

Medium Volume strata. Areas within timber inventory volume classes 5, 6 and 7 on hydric soils with slopes less than or equal to 55 percent; and areas within timber inventory volume class 4 that are either on non-hydric soils, or are on hydric soils with slopes greater than 55 percent.

Low Volume strata. Areas within timber inventory volume class 4 on hydric soils with slopes less than or equal to 55 percent.

Some general and approximated characteristics of these three productive old-growth classes, and of "unproductive" or other old-growth forest, follow. All classes of productive old growth are capable of growing trees at a rate of more than 20 cubic feet per acre per year. A volume class breakdown of the 1.7 million acres of productive old growth within designated Wilderness is not available.

High Volume Old-growth Forest. These areas have an average timber volume of 35 thousand board feet (MBF) per acre. The average height of co-dominant trees is greater than 100 feet. Canopy cover is 65-95 percent, with western hemlock and/or Sitka spruce dominating most sites. Stands are typically uneven-aged with small gaps in the overhead canopy. Understory production is moderate, but snow interception is high, making forage (for deer) more readily available during winter. Vaccinium is the dominant shrub; herb cover is 20-30 percent, and fern cover is 15-30 percent. Winter thermal cover for wildlife is good. Outside designated Wilderness the Tongass has about 1.4 million acres in this class.

Medium Volume Old-growth Forest. In these areas the average volume is 25 MBF per acre. Compared to the higher volume class, these stands have shorter trees (70-100 feet) and a more open canopy (40-75 percent). Western hemlock and/or Sitka spruce still dominate, but cedars can be a significant component in more southerly areas, and mountain hemlock at higher elevations. The stands are uneven-aged, with numerous gaps in the overhead canopy. The more open canopy results in a more abundant understory, but it is subject to burial by snow in the winter. Vaccinium is more abundant on these sites. Ferns are less common, forbs generally more so. Winter thermal cover for wildlife is moderate. Outside designated Wilderness the Tongass has about 1.4 million acres in this class.

Low Volume Old-growth Forest. The average volume is 16 MBF per acre. The overstory is relatively open, with 20-50 percent canopy closure, and tree height is typically less than 60 feet. Western hemlock and cedars predominate. The understory is very brushy, dominated by tall thickets of Vaccinium and Menzesia which tend to diminish the production of herbs, ferns, half-shrubs and forbs. Lichens are relatively abundant. Thermal cover for wildlife is poor. Outside designated Wilderness the Tongass has about 0.6 million acres in this class.

Other forest lands. These are classified as unproductive forest in the timber inventory. These lands have at least 10 percent tree cover, but are not capable of producing 20 cubic feet per acre per year. Many of these stands are consistent with old-growth definitions, but the trees are typically small and stunted (under 40 feet in height) and the canopy is open (10-40 percent cover). Hemlock, cedar, and lodgepole pine are the most common trees; Vaccinium and Menzesia the most common shrubs. Near wet bogs, or muskegs, heath family plants and grasses assume increasing dominance. Thermal cover for wildlife is poor. The Tongass has about 3.6 million acres in this class.

Landscape Position. The old-growth forest resource can also be characterized by landscape "position," or the location of the old growth within a landscape. These are also important compositional components for biodiversity. Five landscape positions are described below. For “beach and estuary fringe,” and “riparian,” these are areas adjacent to beaches and estuaries, or along a stream or lake. The widths used are general approximations of the average extent of these areas, and include management considerations as well as ecological criteria.

Beach and Estuary Fringe. Old-growth forest within approximately 1,000 feet of beach shoreline and estuaries (this is a change from the SDEIS, which provided only a 500-foot beach fringe).

Riparian. A minimum 100-foot-wide zone along both sides of all inventoried streams, excluding the beach fringe. Some stream channel types have a 150-foot-wide zone along both sides, and some zones may extend farther depending on the width of the riparian soils.

Upland less than 800 feet in elevation. All upland old growth below 800 feet, excluding the beach and estuary fringe and riparian zones.

Upland from 800 to 1,500 feet in elevation. All upland old growth between 800 and 1,500 feet, excluding the beach and estuary fringe and riparian zones.

Subalpine/Alpine. All upland old growth over 1,500 feet in elevation, excluding the beach and estuary fringe and riparian zones.

The acreages of the productive and unproductive components of old growth were divided between these five landscape positions as shown in Table 3-3. Note how the percentage of the productive old-growth forest component is higher at the lower elevations, especially in the beach and estuary fringe where it is 75 percent, and in riparian areas, where it is 62 percent. Forest-wide, productive old growth is 54 percent of total old growth.

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Table 3-3
Conifer old-growth acres of the Tongass within five landscape positions (in 1996)

Landscape Position[1]	Productive Old-growth	Unproductive Old-growth	Total Old-growth
Beach/Estuary Fringe	751,858	255,996	1,007,854
Riparian corridor	625,802	390,824	1,016,626
<800 ft	1,843,971	1,350,157	3,194,128
800-1,500 ft	1,288,037	916,395	2,204,432
>1,500 ft	533,904	1,320,083	1,873,986
Total	**5,063,571**	**4,233,455**	**9,297,026**

[1] See text for definitions. For this table the beach fringe is an average of 1,000 feet in width.

Two of the above landscape elements, beach and estuary fringe, and riparian, have special importance as components of old-growth forests, providing unique wildlife habitats, serving as wildlife travel corridors, and providing a forest interface with marine or riverine influences that may distinguish them as separate ecosystems within the larger old-growth forest ecosystem. Riparian areas (also discussed under Fish and Water) are important for fisheries in providing the source of Large Woody Debris that creates pools for rearing habitat, and in controlling stream temperatures and the amount of sediment reaching a stream. Riparian areas provide habitat for terrestrial species associated with aquatic environments (amphibians, for instance, or mammals such as river otter and beaver), and for terrestrial species for which fish from streams are important food (brown and black bears). Riparian areas often contain plant species which can live only where water is available year-round. Riparian soils often support large spruce trees and some of the most highly-productive stands of old growth.

The beach fringe is the forested area adjacent to salt-water shorelines. It is thought to be important as a wildlife travel corridor, as a transition zone between interior forest and salt water influences, and as a unique habitat (or micro-climate) in itself. The beach fringe provides important horizontal or low-elevation connectivity between watersheds, many of which otherwise have very steep sides and/or non-forested ridgetops. In conjunction with riparian areas, which provide connectivity within watersheds, the beach fringe is a component of the major travel corridor system used by many resident wildlife species. The beach fringe is also thought to provide important avian migratory habitat, particularly for neo-tropical migrants.

Protection of the long-term integrity of the beach fringe habitat is a management concern that is addressed by the Beach and Estuary Fringe Forest-wide Standard and Guideline. The beach fringe is an area of approximately 1,000 feet slope distance inland from mean high tide along all marine coastline. The management objective is to maintain the structural and functional integrity of the beach fringe zone to sustain the multiple use values.

Habitat capability models developed for management indicator species indicate that the highest habitat suitability value was assigned to productive old growth forests within the 500’ beach fringe zone for the bald eagle, marten, and river otter (Suring 1993). The beach fringe was rated second only to the 1,000’ estuary fringe for brown and black bears in overall habitat quality, and higher deer habitat values generally occur in high-volume old growth below 800’ elevation, much of which occurs in the beach zone with a moderated maritime-influenced microclimate. A revised marten habitat capability model rated the beach fringe old growth forests highest among all habitat components (Flynn, 1995).

There are indications that the value of the beach zone habitat may extend beyond the original 500'. Gende et al. (1996) reported reduced bald eagle nesting densities and success in landscapes adjacent to clearcuts and recommended a beach buffer zone of at least 1,000'. The 1,000' beach fringe is also used very frequently by radio-marked goshawks (Iverson *et al.* 1996). The importance of a wider beach fringe zone has long been recognized and is a component of the Retention Factor Method (TLMP 1979 as amended); specifically, 1,000' beach fringe for brown/black bear, 600' for furbearers, and 1/4 mile inland from the beach for deer winter range. Lande (1994) specifically recommended 2,000' wide no-harvest corridors with an additional 1,000' buffer of light intensity management.

The 1,000 foot beach fringe serves many functions: providing more effective landscape linkages between habitat reserves, protecting long-term bald eagle habitat capability, buffering the primary beach fringe zone from windthrow (Hodges 1982, Harris 1989), maintaining a functional interior forest condition within the entire primary beach fringe (Concannon 1995), sustaining habitat for goshawks, and indirectly contributing to overall landscape management of lands between habitat reserves.

Forest-wide Distribution. These and other simple ways of characterizing the current condition of the biogeographic provinces can serve as baselines for estimated future changes under the Forest Plan alternatives. Table 3-4 displays the total, and current productive old-growth forest, acres within each of the 21 biogeographic provinces. It also shows, as a percentage of the original (1954) amount, how much of the productive old growth was harvested for timber products between 1954 and 1995 (on National Forest lands). About 400,000 of the 1954 estimated amount of 5,440,000 acres of productive old growth have been harvested since 1954 (about 7 percent of the total).

Table 3-4 also displays the proportion of high volume old-growth in each biogeographic province that averages nearly 42% of all productive old-growth forest. It also shows the amount of high volume old-growth at occurring at elevations less than 500 feet. Table 3-4 also shows the amount of private, state, and municipal lands in each province. Most of these non-federal lands are available for timber harvest and many have been heavily developed which cumulatively impacts old-growth forest resources (see Timber).

Across the Tongass, timber harvest has been concentrated in the higher volume classes (harvested stands have averaged 39,000 board feet per acre). In contrast to the approximately 93 percent of productive old growth remaining, a smaller percentage, about 85 percent, of the higher volume acres remains unharvested. To a lesser extent, timber harvest has also been concentrated at the lower elevations: 79 percent of the higher volume old-growth timber lands below 500 feet in elevation remain. Timber harvest has occurred in a spatially clumped fashion across the Tongass, with activity concentrated on islands like Prince of Wales, Northeast Chichagof, and Zarembo. Very little activity has occurred on islands and parts of the mainland within the 19 Wildernesses and 12 legislated LUD II areas.

Fourteen of the 21 biogeographic provinces currently have more than 50 percent of their area in old-growth forest, and for all but two of these the productive old-growth forest component accounts for the majority of the old growth. Sixteen provinces each currently have over 100,000 acres of productive old growth, and three (Admiralty, North Prince of Wales, and Revilla/Cleveland) each have over 500,000

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acres. Five provinces: East Chichagof, East Baranof, Etolin, North Prince of Wales, and Southern Outer Islands, have had ten percent or more of their original (1954) productive old growth harvested (i.e., it is no longer old growth); of these, North Prince of Wales is considerably higher at 24 percent. In most cases this harvest is a relatively small percentage of total province acres (for instance, the roughly 12,000 acres harvested in East Baranof are about 3 percent of that province's 395,000 acres); in one case, North Central Prince of Wales, harvest (through 1995) is 14 percent of total province acres.

Table 3-4
Distribution of Acres of Private, State, and City Lands and Conifer Old-growth Types by the 21 Biogeographic provinces.

	Geographic Unit	Total Land	Private, City & State Ownership	% Private City & State Ownership	Productive Old-growth	High Volume Old-growth	High Volume Old-growth <500' Elev.	Percent[1] Old-growth Harvested	Other forest lands
1	Yakutat Forelands [2]	339,470	32,294	10	47,720	27,881	27,561	6	56,746
2	Yakutat Uplands [2]	918,943	681	0	24,136	11,448	9,648	4	18,864
3	East Chicagof Is	1,131,878	67,532	6	409,659	155,323	64,092	9	272,166
4	West Chicagof Is	287,581	2,345	0	72,274	18,984	10,922	0	113,697
5	East Baranof Is	395,140	2,201	0	97,888	31,768	15,351	10	101,237
6	West Baranof Is	798,802	23,566	3	218,763	56,691	30,159	6	245,798
7	Admiralty Is	1,086,102	35,278	3	591,407	337,194	14,0141	0	272,548
8	Lynn Canal	671,709	20,897	3	155,577	62,363	23,844	0	123,692
9	North Coast Range	1,111,129	96,554	9	324,305	131,789	42,325	0	176,556
10	Kupreanof/Mitkof Is	843,439	81,549	10	318,928	104,893	39,653	8	342,836
11	Kuiu Is	494,345	920	0	302,451	173,022	89,415	7	132,999
12	Central Coast Range	739,566	10,108	1	245,065	105,020	44,801	2	181,687
13	Etolin Island	519,254	16,325	3	229,765	82,216	31,778	12	201,354
14	North Central POW	1,489,549	255,630	17	531,261	220,131	96,175	24	413,367
15	Revilla Is/Cleveland Pen.	1,347,906	173,535	13	520,989	254,814	78,756	6	476,166
16	Southern Outer Islands	223,959	8,681	4	115,487	50,784	26,413	10	70,277
17	Dall Island and Vicinity	199,109	83,222	42	68,326	33,925	16,111	0	31,993
18	South Prince of Wales	394,907	30,363	8	161,981	74,361	34,446	1	156,657
19	North Misty Fiords	977,955	3,900	0	198,824	77,162	27,233	0	288,578
20	South Misty Fiords	906,884	681	0	312,945	111,452	49,872	0	371,442
21	Ice Fields [2]	3,007,014	980	0	115,821	37,798	9,600	3	184,795
	Forest-wide	**17,884,641**	**947,242**	**5**	**5,063,571**	**2,159,020**	**908,295**	**7**	**4,233,455**

1 Percentage of the original (1954) productive old-growth harvest between 1954 and 1995.
2 For these provinces the oldest tree stands are used; they may not contain all the characteristics associated with old-growth stands.

The remaining aspects of the compositional component of biodiversity are described elsewhere in this FEIS. These include the abundance and distribution of animal and plant species, the management indicator species, and species vulnerability. See in particular Threatened, Endangered, and Sensitive species; and Wildlife (viability and species-specific discussions).

Structure

Structure, at the landscape scale, refers to how many of the compositional elements just discussed are distributed across the landscape or forest. Some of these distributional aspects have been discussed or suggested, such as the relationship between elevation and productive vs. non-productive old-growth forests. Beyond that, distribution is difficult to describe narratively: the “Land and Timber Type” map in the map packet, and the map of the old-growth block inventory, give a better picture. In relation to wildlife habitats, distribution is a key element of the viability analyses for wildlife and fish.

Fragmentation

Fragmentation is an element of biological diversity that describes the natural condition of habitats in terms of old-growth patch size and distribution, and the effects of management on these natural conditions (see also the Wildlife section herein). Timber harvest tends to increase forest fragmentation and the amount of forest edge. The Tongass National Forest is naturally highly fragmented at the landscape scale due to the numerous islands and dramatic topographic relief. At the stand scale, the forest is also highly fragmented due to a diverse and fine-scale mosaic of forest and land types. The edges between different forest types, and between forested and non-forested areas, can affect the environment close to the edge. For example, forest edges tend to be warmer in the summer and cooler in the winter than interior forests (Franklin 1993). Some species increase in abundance close to an edge while others decrease in abundance. Species associated with interior forests but not with forest edges are of concern since timber harvest tends to decrease the amount of interior forest.

For the Tongass, edge is defined as the forested area within a distance of 2-3 tree lengths (an average of 300 feet) from an opening. This is based primarily on definable differences in micro climate (Concannon 1995). Interior old growth is thus that portion of a contiguous old-growth patch or block more than 300 feet inside the edge or perimeter of the block. Interior old growth tends to have different characteristics than the old-growth forest at the edge of a block, due to light interception by surrounding trees, buffering from the effects of wind, and the general absence of transitional plant species. Interior old growth provides wildlife with habitats protected from predator species that primarily use openings and the adjacent edges of forested areas.

The amount of interior forest depends on the shape of the stands and the abundance of openings. The relative amount of edge and interior forest in an area provides an index to the shape of the old-growth timber stands. The higher the ratio of edge to interior forest, the more linear or dendritic (i.e., branched or fingered in shape) are the stands. Prior to 1950, approximately 2.6 million of the 5.5 million acres of productive old-growth forest were within 300' of a forest edge of one type or another (e.g. beach, muskeg, lake), leaving about 2.9 million acres of interior old-growth forest. Timber harvest over the last 45 years has reduced the amount of interior forest to approximately 2.3 million acres. (It is merely a coincidence that the acreage reduction in interior old-growth is roughly equal to the acres harvested over the same time period. The harvest of blocks of old-growth forest containing interior old-growth will typically reduce the interior at a greater rate than the harvest, since remaining stands that had been interior may no longer be so - the remainder of the block may be too small or too narrow. However, not all past harvesting was done in interior old-growth stands. See Old-growth Assessment Panel Summary, 1996.)

Old-growth patches sometimes serve as the only habitat in a landscape for many lichens, fungi, bryophytes, plants, and small-bodied animals, all of which contribute to the biodiversity and productivity of the forest ecosystem. These patches may be critical for species that are locally endemic, occur only in very specific conditions of forest structure or soil, or have limited dispersal capabilities.

Residual green trees and dead wood in harvested areas function as a bridge between past and future forests. Green trees serve several ecological functions: they are available for snag recruitment, contribute to multi-storied canopies, provide shade and suitable habitat for many organisms, and serve as refugia and centers of dispersal. Patches of green trees of various sizes, ages, and species will promote species diversity of fungi, lichens, plants, and arthropods. Complex canopy structure is beneficial for some lichens, and provides snow interception. Large green trees, snags, and coarse woody debris are important for many animals.

Function

Physical and related ecological processes create the environmental conditions which shape plant and animal communities. Significant natural processes on the Tongass National Forest include:

The amount and pattern of rainfall. (See Water, and the previous descriptions of the biogeographic provinces.)

The effects of glaciation and time of recession of glaciers. The distribution and age of the natural vegetation communities is partly the result of glacial advances and recession. The distribution of some animal species among the islands and the mainland is also attributed to the effect of glaciers.

The lack of natural fire. Fire has not been a major factor in shaping the vegetative conditions of the Tongass.

The influence of wind. Wind has been a widespread natural disturbance factor, shaping forested vegetation on the Tongass. Wind is a constant "small scale" disturbance force throughout most of the Forest, blowing down individual or small groups of trees and thereby creating small openings in forest stands. Wind can also be a "large scale" force at specific times and places; large blocks of trees (sometimes hundreds of acres) can be blown down in violent localized wind storms. Nowacki and Kramer (1995) discusses these natural events in relation to silvicultural methods.

These small-scale and large-scale influences of wind and other disturbance agents (such as landslides, soil slumping, erosion, insects and diseases, and avalanches) directly affect the way forests regenerate. Within-stand disturbances at the small scale are common. These result in "gap phase" regeneration: by creating small gaps in the forest canopy, sunlight is able to penetrate and stimulate new growth (a process called micro-cyclic succession). In the absence of major disturbances, an entire stand will eventually undergo gap phase regeneration, and at any one time will be in multiple stages of succession. Thus, trees of all ages will occur in a shifting but steady-state mosaic, with the death of old trees balanced by the growth of young ones. (This and the following are summarized from "The forest ecosystem and its management," Chapter 1 of the Conservation Assessment for Northern Goshawk in Southeast Alaska, Iverson *et al.* 1996).

Large-scale disturbances result in the replacement of an entire stand. Stand development following such disturbance occurs in four stages:

Stand Initiation. After the disturbance new individuals begin to grow immediately, from sprouting and seeds, and continue to appear for several years. Shrubs, herbs, and conifers grow together for up to 20 years, with hemlock and spruce gradually dominating the overstory. After 25-35 years, this overstory closes in, and nearly all the shrubs and herbs disappear.

Stem Exclusion. In this stage new individuals or species do not appear, but existing individuals compete for growing space, some growing larger and becoming dominant, others dying. Surviving trees form a closed canopy, light penetration to the forest floor is poor, and the understory lacks vegetative abundance or diversity. This stage can persist for over 100 years.

Understory Reinitiation. After about 150 years, as the canopy begins to thin, shade-tolerant shrubs, then evergreen herbs, begin to grow in the understory; conifers also regenerate but grow very slowly. The mature, even-aged forest stand reaches its peak in terms of timber volume, after which tree growth rates decline, tree deaths increase, openings are created, and the overstory becomes vertically stratified (with trees of different heights). However, the all-aged, multi-layered characteristics of old growth have not yet developed.

Old growth. Overstory trees begin to die from a number of causes (wind, insects, etc.), and some understory trees begin to reach the overstory. The stand now has a diversity of tree heights, widths, and ages, and a multi-layered canopy with irregular canopy gaps. Large standing and fallen dead trees are present. The understory is diverse in species. The stand age at which old-growth characteristics predominate varies with local conditions; the minimum age is thought to be 150 to 260 years. Dominant trees in Southeast Alaska old-growth stands generally exceed 250 years in age.

Biodiversity

Environmental Consequences

Direct, Indirect, and Cumulative Effects

The previous discussions in this section emphasized old-growth forests as the key to describing and understanding the biological diversity of Southeast Alaska and the Tongass National Forest. These old-growth forests, covering about one-half of the 17-million acres of the Tongass, are the primary habitat for the majority of the terrestrial wildlife species. Thus in discussing the potential consequences to biological diversity of the alternatives, old-growth forests as wildlife habitat, and as an ecosystem with uniquely-defined characteristics, will be the major focus. The Wildlife and Fish sections, including results of several panel assessments, address the habitat aspect (and include considerations of abundance, distribution, vulnerability, and so on). The discussion here focuses on general effects to the composition, structure, and functions of the old-growth forest ecosystem, including results of the old-growth ecosystem panel assessment.

Another major reason for focusing on potential effects to the old-growth resource is that most changes to the physical and biological environments of the Tongass resulting from the Forest Plan alternatives will occur in old-growth forest. The majority of potential alterations to vegetation are a direct result of timber harvest and associated road construction, and under any alternative harvest is limited to old growth for at least another six decades. While road construction may occur in all vegetation types (see also the sections on Soils and Water), timber harvest is limited to the productive old-growth forest component. In this context it can be said that the old-growth forest ecosystem is the one most "at risk" from continued Tongass National Forest timber management.

Table 3-5 gives a general overview of anticipated changes to the old-growth forest resource over time. This table displays, by Biogeographic Province, the maximum amount of productive old-growth that is estimated to be in a harvested condition after 10 and 100 years under each alternative. This is expressed as a percent of the estimated amount of productive old-growth forest that existed in 1954 (see discussion of Table 3-4 above). Information from this table is used below to evaluate potential short-term effects to biodiversity, and for comparing to panel assessment results (long-term effects) at the end of this environmental consequences section.

High volume old-growth is a special concern since past timber harvest has been concentrated in these stands. Table 3-6 displays the amount of original (1954) high volume old-growth remaining in 2095 by each province and among alternatives. Alternatives 11, 4 and 5 will retain the greatest amount (76 percent) of the original old-growth of those alternatives that schedule any timber harvest. Only 62 and 66 percent of the high volume old-growth will be retained in Alternatives 7 and 9, respectively.

Short-term Effects. The affected environment discussion noted that the current cumulative amount of timber harvest of productive old-growth forests in the biogeographic provinces, expressed as a percentage of the total productive old growth within the province in 1954, varies considerably. For example, five provinces have had more than 10 percent of their productive old-growth forests logged since 1954, with one (North Central Prince of Wales Island) as high as 24 percent. The amount of the 1954 productive old-growth forest no longer in an old-growth condition can serve as a general indicator of the potential loss of several biodiversity aspects, including structural (within-stand) diversity, connectivity (unfragmented, continuous old-growth blocks), and age and species composition (including understory species). At some point the natural and historical composition and distribution of plant and animal species within an ecosystem or landscape may be altered to the extent that biodiversity (as previously defined) is not likely to be maintained across a biogeographic province, or the Forest. There is no particular number, percent or other measure that identifies this "point."

Table 3-5
Productive old-growth forest planned for harvest by Biogeographic Province by alternative

		Alternatives and Percent Cumulative Harvest After Decades 1 and 10																					
	Current[2]	1		2		3		4		5		6		7		9		10		11	
Unit	**(1995)**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**	**1**	**10**
1	6	6	6	6	13	6	7	6	8	6	8	6	12	6	13	6	23	6	13	6	7
2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
3	10	10	10	12	33	12	24	11	29	11	29	12	30	13	37	13	36	12	28	11	21
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
5	11	11	11	14	32	12	20	11	28	11	28	12	32	14	38	14	39	13	24	12	22
6	7	7	7	9	16	7	10	7	16	7	18	8	15	8	15	8	16	8	11	7	10
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	3	3	3	4	12	3	5	3	9	3	9	4	11	4	12	4	11	3	6	3	7
9	<1	<1	<1	4	16	1	10	1	8	<1	8	4	15	5	24	4	19	1	14	2	8
10	9	9	9	12	40	10	35	10	38	10	36	14	37	12	48	12	41	11	36	11	8
11	8	8	8	11	34	12	29	10	31	10	31	11	32	11	41	12	37	12	33	11	23
12	2	2	2	5	11	5	9	4	10	4	10	4	11	7	19	6	13	5	10	5	12
13	13	13	13	16	35	14	29	14	31	14	32	14	33	19	49	16	37	14	32	14	28
14	24	24	24	27	49	25	40	24	45	24	41	25	41	27	56	27	54	25	42	25	37
15	6	6	6	9	25	9	19	7	24	7	23	9	24	12	36	9	28	9	21	7	16
16	11	11	11	14	24	12	18	12	22	12	22	12	22	14	31	15	33	12	19	12	18
17	1	1	1	2	9	1	4	1	6	1	4	2	6	8	47	9	53	2	4	1	3
18	1	1	1	6	27	5	16	4	23	4	23	7	26	7	39	7	36	6	19	4	16
19	1	1	1	1	2	1	2	1	2	1	2	1	2	1	3	1	2	1	2	1	2
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	3	3	3	5	9	4	7	3	8	3	7	4	8	5	10	5	9	4	8	4	8

[1] All figures represent the cumulative harvest of productive old-growth forest to the end of the period specified (present cumulative harvest, and at the end of one decade and ten decades of alternative Forest Plan implementation), expressed as a percent of 1954 productive old-growth. (Estimated acreages of old-growth harvest are contained in the Planning Record.)
[2] From Table 3-4.

Table 3-6
Proportion of 1954 High Volume Old-growth remaining at 1995 and 2095 by Alternative.

		High Volume Old-growth		Remaining High-volume Old-growth in year 2095[1] by Alternative									
	Geographic Unit	**1954 (Acres)**	**1995 (Acres)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
1	Yakutat Forelands (2)	27,881	27,881	100	87	98	96	96	89	88	70	88	97
2	Yakutat Uplands (2)	11,448	11,448	100	100	100	100	100	100	100	100	100	100
3	East Chicagof Is	198,177	155,323	78	55	65	64	65	59	51	51	61	69
4	West Chicagof Is	18,984	18,984	100	100	100	100	100	100	100	95	100	100
5	East Baranof Is	42,674	31,768	74	53	64	62	59	55	47	44	62	61
6	West Baranof Is	71,361	56,691	79	68	77	71	72	69	70	69	75	76
7	Admiralty Is	337,194	337,194	100	100	100	100	100	100	100	100	100	100
8	Lynn Canal	63,743	62,363	98	81	94	92	92	84	78	83	89	93
9	North Coast Range	131,789	131,789	100	80	87	89	88	81	67	76	82	89
10	Kupreanof/Mitkof Is	134,140	104,893	78	47	52	64	66	50	37	46	50	56
11	Kuiu Is	196,889	173,022	88	61	66	69	69	63	53	57	62	70
12	Central Coast Range	110,839	105,020	95	85	86	88	87	85	69	80	86	87
13	Etolin Island	112,611	82,216	73	51	58	60	60	52	35	49	54	59
14	North Central POW	386,185	220,131	57	35	43	44	46	43	29	31	41	47
15	Revilla Is/Cleveland Pen.	286,977	254,814	89	73	76	81	81	73	62	70	75	80
16	Southern Outer Islands	64,079	50,784	79	64	72	69	69	66	57	58	71	70
17	Dall Island and Vicinity	34,285	33,925	99	90	96	96	97	95	46	41	97	96
18	South Prince of Wales	76,145	74,361	98	70	82	80	81	71	60	62	80	81
19	North Misty Fiords	78,282	77,162	99	96	96	98	98	96	96	96	96	97
20	South Misty Fiords	111,452	111,452	100	100	100	100	100	100	100	100	100	100
21	Ice Fields (2)	41,869	37,798	90	84	85	86	85	84	83	84	86	85
	Forest-wide	**2,537,006**	**2,159,020**	**85**	**69**	**75**	**76**	**76**	**71**	**62**	**66**	**73**	**76**

1 Percentage of original (1954) productive old-growth.
2 For these provinces the oldest tree stands are used; they may not contain all the characteristics associated with old-growth stands.

Table 3-7 includes those biogeographic provinces listed in Table 3-5 which have the highest current percent harvest of productive old growth, and displays what the cumulative percentages would be after one decade. The highest ten provinces are listed, and range in current harvest percent from 24 down to 6 percent; all other provinces have 4 percent or less currently in a harvested condition. The general assumption here is that provinces with higher current harvest percentages are more susceptible to significant loses of biodiversity features associated with productive old-growth forests, and that continued harvest within these provinces will increase this susceptibility.

Alternative 1 has no increases, nor does province 1 under any alternative. Alternative 2, 6, 7, 9 and 10 show increases in nine provinces, and Alternatives 3 and 11 in eight, thus increasing the potential to adversely affect biodiversity province-wide in the majority of these “higher-risk” biogeographic provinces. Alternatives 2, 7 and 9 generally have the greater increases. Alternatives 4 and 5 have the least effect (after Alternative 1), and are almost identical, but still show slight increase in most provinces. Across the alternatives, provinces 13 (Etolin Island and Vicinity) and 16 (Southern Outer Islands) generally show the greatest increases in percents harvested, with province 13 at 14-19 percent and province 16 at 12-15 percent. North Central Prince of Wales remains the most affected on a percentage basis, increasing to 25-27 percent in 7 alternatives.

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Table 3-7
Old-growth harvest in selected biogeographic provinces, first decade by alternative [1]

Biogeo-graphic Province	Current Harvest Percent	Percent in Harvested Condition After Decade One Alternative [2]								
		2	3	4	5	6	7	9	10	11
14	24	27	25	24	24	25	27	27	25	25
13	13	16	14	14	14	14	19	16	14	14
16	11	14	12	12	12	12	14	15	12	12
5	11	14	12	11	11	12	14	14	13	12
3	10	12	12	11	11	12	13	13	12	11
10	9	12	10	10	10	14	12	12	11	11
11	8	11	12	10	10	11	11	12	12	11
6	7	9	7	7	7	8	8	8	8	7
15	6	9	9	7	7	9	12	9	9	7
1	6	6	6	6	6	6	6	6	6	6

[1] See Table 3-5. All figures are percents of 1954 productive old growth. Provinces are listed in descending order by current harvest percent.
[2] All percents for alternatives represent cumulative old-growth harvest at the end of decade one (2006). Alternative 1 results in no change to the present percentages, and is not included in the column comparisons; however, the "Current Harvest" column can be taken to also represent Alternative 1 at the end of the first decade.

To summarize this brief analysis of potential short-term adverse effects to biodiversity at the biogeographic province level, Alternative 1 has essentially no effect. Alternatives 4 and 5 have relatively minor effects, showing slight increases in potential adverse effects in some provinces and none in others. These two alternatives use two-aged management and extended timber rotations, and thus harvest old growth at a slower rate. Alternatives 2, 9 and 7 (roughly in that order) increase the percentages of the existing more-harvested provinces the most. These three alternatives, all of which rely on short timber rotations and even-aged management, and none of which have a designed system of old-growth reserves, have the highest potentials to create biodiversity concerns within biogeographic provinces over the next decade.

Five "landscape positions" were delineated in the affected environment discussions. Two of these, estuaries and the beach fringe, and riparian areas, were noted as having special importance as components of old-growth forests: in providing unique wildlife habitats, for functioning as wildlife travel corridors, and for providing a forest interface with marine or riverine influences. These and other attributes may distinguish these areas as separate ecosystems within the larger old-growth forest ecosystem. For each of the two areas, options are available under the alternatives for applying specific management requirements: four riparian area options under the Riparian Forest-wide standards and guidelines, and three options for beach fringe widths and management under the Beach and Estuary Fringe forest-wide standards and guidelines (as discussed in Chapter 2).

Riparian options 3, 2, 2A and 1 are progressively more protective of the riparian resource, in that order (see Fish section of this chapter for the analysis of effects to riparian and fish habitats. Effects are not limited to activities such as timber harvest occurring only within the defined riparian or streamside zone, but can often result from activities within a watershed but outside a defined width.). A less-protective fifth "option" is not to use the Riparian standards and guidelines, but follow all current direction, including Tongass Timber Reform Act buffer requirements. This latter approach is found in Alternative 9. For the other alternatives, Alternatives 1, 4, 5, 6 and 10 use option 2 for the highest quality watersheds, option 3 for the rest. Alternatives 2 and 7 use option 3 for all watersheds. Alternative 3 applies option 1 to the highest quality watersheds, option 2 to the rest, and Alternative 11 uses option 2A Forest-wide.

The Beach and Estuary Fringe standards and guidelines are not used in Alternatives 7 and 9. Most other alternatives include a 1,000-foot estuary no-harvest zone, and a 500-foot beach fringe no-harvest zone. (Alternative 9 also provides for protection of estuaries through direction contained in the Alaska Regional Guide.) Additionally, in Alternatives 1, 3, 4, 5, and 6, an additional 500-foot beach fringe zone is included in which only limited uneven-aged timber harvesting is allowed. Alternative 11 uses an undivided 1,000-foot beach fringe.

Alternatives 1, 3, 4, 5, 6 and 11 thus provide recognition of both the primary and extended beach fringe, and make this a component of an explicit landscape conservation strategy. In general, these alternatives also have higher relative likelihoods of maintaining viable well-distributed wildlife populations, and sustain greater amounts of deer winter range (see Wildlife section). Only the primary beach fringe is applied in Alternatives 2, 7 and 10, thus providing less protection to the beach zone. Alternative 9 does not apply either the primary or extended beach zone but instead relies on the Retention Factor Method to protect a portion of these areas. Alternatives 2, 7 and 9 generally have the lowest relative likelihoods of maintaining viable wildlife populations, and the absence of either primary or extended beach fringe protection contributes to these lower likelihoods.

Panel Assessment

Information was provided for the old-growth ecosystem panel assessment using a modification of the biogeographic provinces, in order to better delineate individual large islands and contiguous areas with significant amounts of old-growth forest. This information was presented in the Revised Supplement along with the panel assessment results, but was not used otherwise and is not repeated here. The use of a modified set of “provinces” was confusing for many readers, and the information is not necessary for interpreting the panel assessment results.

Panel Assessment Process

Assessments of the relative likelihood of maintaining a functional and interconnected old-growth ecosystem were performed for nine alternatives by a four-person panel of experts. These assessments focused on the primary producers of the old-growth ecosystem (the vegetation), and the processes and functions (physical, chemical, and biological, including disturbances) associated with the quality and dynamics of those primary producers. The effects of the alternatives on late-successional forest ecosystems were evaluated in terms of degrees (Outcomes 1 through 4) of ecosystem quantity and quality (abundance, diversity, processes, functions, and connectivity).

Information used to assess the effects of the alternatives on old growth included estimates of the abundance of old growth in 1954 and 1995, and estimates of possible changes by the year 2095. Maps were available to the panel displaying the spatial distribution of existing Congressionally designated reserves, old-growth timber lands, other forest lands, and non-federal ownership; and displaying potential areas of timber harvest for each alternative.

The rating of old-growth ecosystems was based on three attributes that characterize the quality and quantity of components of the ecosystem. These attributes correspond to the three components of biodiversity discussed in the affected environment portion of this section: composition, structure, and function. The attributes are:

1. **Abundance and ecological diversity ("composition").** The acreage and variety of plant communities and environments.

2. **Processes and functions ("function").** The ecological actions that lead to the development or maintenance of ecosystems, and the values of the ecosystem for species and populations.

3. **Connectivity ("structure").** The extent to which the landscape pattern of the ecosystem provides for biological flows that sustain animal and plant populations.

Abundance and Ecological Diversity. Abundance of old-growth communities and ecosystems refers to the total acreage of forest that meets structural, functional, or minimum-age criteria, based on ecological conditions and definitions of each province. Ecological diversity is also indicated by the distribution of old-growth communities on the landscape, and the interrelationships among the variety of geographic, climatic, elevational, topographic, and soil distributions.

The four possible outcomes that characterize different levels of abundance and ecological diversity of old-growth forest communities and ecosystems used by the panel are:

Outcome #1. Old growth is equal to or greater than the long-term (100-year) average, and is well distributed across environmental gradients, provinces, and vegetation community types.

Outcome #2. Old growth is somewhat less than the long-term average in some provinces and forest types. There is representation of all major forest types but with underrepresentation in some types (may be within range of variability).

Outcome #3. Old growth is below the long-term average in most forest types. Examples of a few old-growth types are eliminated.

Outcome #4. Old growth is well below the long-term average in all provinces. Examples of several old-growth types eliminated in some provinces.

Process and Function. Processes refer to the ecological changes or actions that lead to the development and maintenance of old-growth ecosystems at all spatial and temporal scales. Examples include: (1) tree establishment, maturation, and death, (2) gap formation and filling, (3) understory development, (4) small- and large-scale disturbances such as landslides and wind, (5) decomposition, (6) nitrogen fixation, (7) canopy interception of energy and matter, and (8) energy and matter transfers between the forest and atmosphere.

Functions, as used in this assessment, refer to ecological values of the late-successional ecosystem or its components that maintain or contribute to the maintenance of populations of species that used these ecosystems, and that contribute to the diversity and productivity of other ecosystems. Examples of ecosystem functions include: (1) habitat for organisms, (2) climatic buffering, (3) soil development, and (4) the maintenance of soil productivity through inputs of coarse woody debris, nitrogen fixation, spread of biotic and abiotic disturbance through landscapes, and nutrient cycles (production, storage, utilization, and decomposition).

The four possible outcomes that characterize different levels of ecological processes, and functions of old-growth forest communities and ecosystems, used by the panel are:

> **Outcome #1.** Full range of disturbance processes. Stand structure/dynamics and landscape/structure/dynamics/age structures occur across all provinces.
>
> **Outcome #2.** Moderately wide range of disturbance processes. Old-growth process and function for species dependent on large unaltered landscapes are limited. Old-growth process and structure dependent on a wide range of ages is moderately limited.
>
> **Outcome #3.** Old growth process/structure/function limited in many provinces. Many landscapes and stands too small/young to sustain old growth process/structure/function or stand structure does not develop.
>
> **Outcome #4.** Old growth process/structure/function is extremely limited or absent in some provinces.

Connectivity. Connectivity is a measure of the extent to which the landscape pattern of the old-growth ecosystem provides for biological and ecological flows to sustain old-growth associated animal and plant species across the Tongass and Southeast Alaska. Connectivity does not necessarily mean that old-growth areas need to be physically joined in space, since many associated animal species can move (or be carried) across areas that are not in old-growth ecosystem conditions. Landscape features affecting connectivity of old-growth ecosystems are: (1) distances between old-growth areas, and (2) forest conditions in the areas between the old-growth areas. Given the island nature of Southeast Alaska, connectivity is more strongly related to within-island conditions than between islands.

The four possible outcomes that characterize different levels of ecological connectivity of old-growth forest communities and ecosystems used for the panel are:

> **Outcome #1.** Connectivity is as strong as prior to large-scale timber harvest.
>
> **Outcome #2.** Connectivity is strong, characterized by moderate distances between old-growth areas. Timber harvest areas contain high levels of old-growth elements and riparian corridors.
>
> **Outcome #3.** Connectivity is moderate, characterized by moderately-wide distances between old-growth areas and the elements of old growth in timber harvest areas (retention patches, riparian corridors, etc.).
>
> **Outcome #4.** Connectivity is weak. Wide distances and limited presence of connectivity elements in timber harvest areas.

To provide a benchmark against which to measure change, old-growth abundance was compared to its abundance in 1954, prior to large scale timber harvest. This abundance varies by province and ownership.

Overall Old-growth Descriptions. Overall outcomes for the old-growth ecosystem as a whole were obtained by combining the three individual attribute outcomes. The likelihoods of achieving overall outcomes are the averages of the likelihoods of individual attribute outcomes.

Panel Assessment Results and Additional Effects Analysis

Alternative 8 from the Revised Supplement, which is not considered for detailed analysis in this FEIS, has been removed from the presentation of panel assessment results. Alternatives 10 and 11, which were not available to the panels, are included in the discussion with general estimates of where they are felt likely to have occurred in the panel ratings, if the panels had rated them.

Assumptions or opinions held by one or more panel members that are likely to have influenced their ratings included the following:

1. Old-growth reserves by themselves are not adequate. Need more residual trees left in clearcuts such as two-aged management as proposed in Alternatives 3, 4, 5 and 6 to maintain lichens, fungi, and other species. This an important consideration for connectivity, structure, function, and processes.

2. Alternatives with longer rotations were rated higher because more old-growth was left longer.

3. The panel had concerns about the future representation of higher-volume yellow-cedar stands and the higher-volume hemlock stands in areas that did not have reserves.

4. The panel had a concern that there was no longer a representation of the very large riparian spruce stands on the Tongass.

5. The panel did not endorse alternative silviculture as better than reserves and did not have high confidence in either, since these are only working hypotheses.

6. Disease is important in terms of old-growth function, and is a component missing in younger stands. Mistletoe is lost in younger stands. Two-aged management and longer rotations help to conserve these features.

7. In managed landscapes, expect an increase in processes associated with wind disturbances along edges of cutting units and a decrease in wind disturbances within young stands. Two-aged harvesting will allow soil mixing within units, but if the more wind-firm trees are left the rate of stand-level disturbance will be reduced.

8. Large old trees with large root systems will churn more soil than smaller trees. Soil churning may retard the evolution of a productive stand to muskeg.

9. Wider beach fringe and riparian reserves enhance connectivity. They provide vertical and horizontal corridors.

10. Smaller harvest units can lead to more connectivity, but will increase fragmentation.

11. Mitigation measures for connectivity (corridors) are good ideas, but need to be tested to see if they work.

12. May not need 500-year-old trees to maintain connectivity, but the structure they provide is needed.

13. Old-growth "other forest lands" provide corridors for many species.

14. Species appear to be present where there is habitat for them, so isolation and fragmentation may not be a problem for many species. Given the fragmented nature of Southeast Alaska, species that are well adapted to fragmented landscapes (such as those having the ability to disperse) are the ones that tend to be found here.

Panel Results. Average panelist scores for each old-growth assessment element (attribute) are shown in Table 3-8. Even Alternative 1, which has the highest degree of old-growth protection, did not receive the majority of points in Outcome I. This is attributed to past timber harvest levels on non-federal lands (such as on Dall Island), and localized intensive timber harvest on National Forest lands (such as on North Prince of Wales Island).

Alternatives 1, 3, 4, 5 and 6 consistently rated higher than Alternatives 2, 7 and 9. Features of alternatives rating relatively high include: 1) longer rotations, 2) additional old-growth reserves, 3) two-aged timber harvest systems, and 4) expanded beach and riparian areas. Alternatives 1 and 5 had the highest scores.

In a very general sense, Alternatives 10 and 11 would likely be rated closer to, or within, the first group (Alternatives 1 and 3-6) than within the second. Both provide a Forest-wide system of old-growth reserves, in Alternative 10 in conjunction with two-aged management, and in Alternative 11 along with expanded beach and riparian areas.

Alternative 2 (1992 Alternative P) was rated relatively low because it does not include alternative silviculture at the stand level, and does not provide reserves other than existing Congressionally designated areas at the landscape level. Short rotations and standard clearcut harvesting mean a low level of biological legacy within young growth stands and a corresponding decrease in connectivity between reserves. Existing reserves were deemed to be too clumped in distribution and were absent in some areas (such as Zarembo Island). These same considerations hold for Alternative 7.

The relatively low likelihood rating for Outcome I for most alternatives reflects, in part, a lack of sufficient or conclusive information about: (1) provinces and functions of late-successional and old-growth ecosystems; (2) the nature, role, and importance of landscape-level ecological processes, including disturbance; (3) the role and relationship of species diversity and ecosystem functions such as productivity, nutrient cycling, and decomposition; and (4) the effects of climate change. In addition, scientific uncertainty led to differences in opinions among panel members about particular outcomes.

Table 3-8
Average Old-growth Ecosystem Panel Ratings [1]

	Alternative							
Outcome	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**
Abundance and Diversity								
I	28	3	13	10	20	14	4	0
II	65	25	55	63	61	48	20	31
III	8	68	30	23	18	36	55	51
IV	0	5	3	6	1	3	21	18
Process and Function								
I	65	5	23	31	43	23	0	0
II	30	28	35	53	46	49	10	15
III	5	50	33	15	10	25	38	36
IV	0	18	10	1	1	4	53	49
Connectivity								
I	33	1	5	10	20	16	0	0
II	63	18	40	55	64	58	5	9
III	5	55	49	35	16	23	45	46
IV	0	26	6	0	0	4	50	45

[1] Averages of the individual panelist's ratings.

Long-term Effects. One way to more easily compare the alternatives based on these sets of ratings is to look at the definitions of each set of outcomes previously described. They are summarized here for convenience:

1. Abundance and Diversity: In Outcomes I and II all major forest types are represented, although with some underrepresentation in Outcome II; whereas in Outcomes III and IV, a minimum of a few types are eliminated.

2. Process and Function: Outcomes I and II have a full range, or moderately wide range, of processes, with some limitations on large unaltered landscapes and age distribution in Outcome II. In Outcome III, processes, structure and function are limited in many provinces and landscapes, and in Outcome IV extremely limited or absent.

3. Connectivity: In Outcomes I and II connectivity remains strong, whereas in Outcome III it is moderate and in Outcome IV weak.

Considering Abundance and Diversity, Alternatives 1, 3, 4 and 5 have the majority of points assigned to Outcome II, and thus provide the highest relative likelihoods of having all forest types represented, though with some under representation. Alternatives 2, 7 and 9 on the other hand have the majority of their points in Outcome III, and provide the highest relative likelihoods that some forest types could be eliminated. Alternative 6 is somewhere in between.

Considering Process and Function, Alternative 1, with the majority of its points in Outcome I, is most likely to maintain a full range of processes over time. Alternatives 4, 5 and 6 have a preponderance of points in Outcomes I and II, with a majority or near majority in Outcome II, indicating a relative likelihood of maintaining a wide range of processes with some limitations. Alternative 3 is noticeably spread out between outcomes, indicating no clear likelihood one way or the other. The other alternatives (2, 7 and 9) display higher relative likelihoods that processes and functions will be limited (Alternative 2) or extremely limited (Alternatives 7 and 9) in the long term.

Finally, considering Connectivity, this attribute is indicated as more likely to remain strong (Outcomes I or II) under Alternatives 1, 4, 5 and 6, moderate to strong (Outcomes II or III) in Alternative 3, and weak to moderate (Outcomes III or IV) in Alternatives 2, 7 and 9.

To some extent the three sets of ratings in Table 3-8 are based on similar information and criteria: the amount of high volume old-growth remaining; the total amount of old-growth forest projected to be harvested by alternative; and the specific harvest practices, reserve allocations, and standards and guidelines of each alternative. Although there are differences, there is also considerable overlap between the ratings for the three attributes. This is one reason for the seemingly similar patterns across alternatives for the three sets of ratings, and suggests that averaging the three scores by alternative will give a reasonable summary of the three, and a comparable overall subjective measure of the relative likelihoods of risk to old-growth ecosystems over time. These average scores are displayed in Table 3-9. A ranking of alternatives by using these composite scores can be made, based on the preponderance of points for each alternative. This ranking (lowest relative likelihood of risk to highest) is: Alternatives 1, 5, 4, 6, 3, 2, 9 and 7.

No estimate of panel scores is being made for Alternatives 10 and 11. However, they can be interpolated into the above ranking based on their similarities to other alternatives, and on the total productive old-growth projected for harvest. Alternative 10 uses an identical reserve system as Alternative 3, but does not use the extended beach fringe or as high a level of riparian protection. It would likely fall between Alternatives 3 and 2. Alternative 11 is similar to Alternative 3 in most of the relevant features, with more acreage in the old-growth reserves. It emphasizes even-aged rather than two-aged management. It has a slightly higher harvest level than Alternative 3, but over time (after 100 years) harvests less of the existing productive old-growth by utilizing more second-growth harvesting. It probably would rank better then Alternative 3, and closer to Alternatives 4 or 5.

Table 3-9
Old-growth ecosystem: composite panel scores by alternative (1)

	Alternative							
	1	2	3	4	5	6	7	9
Old-growth Ecosystem Composite Scores								
Outcome I	42	3	14	17	28	18	1	0
Outcome II	53	24	43	57	57	51	12	18
Outcome III	6	57	37	24	15	28	46	44
Outcome IV	0	16	6	2	1	4	41	37
Average Weighted Outcome	2.1	3.6	3.0	2.7	2.4	2.8	4.1	4.0

[1] Average of the three corresponding scores in Table 3-7. The correlation coefficient between areas of old-growth planned for harvest and average weighted outcome is 0.94.

Comparing these long-term discussions and rankings with those from the short-term effects discussed earlier, Alternatives 1, 5 and 4, generally in that order, appear at the lesser-adverse-effects end of the spectrum, and Alternatives 7, 9 and 2 (in that order, 7 having the most effects) at the greater-adverse-effects end. Alternatives 1, 4 and 5 are those that rely on uneven-aged management with extended rotations, and have a fairly full complement of wildlife-oriented measures (most of which tend to maintain more old-growth forest habitats and features). Alternatives 7, 9 and 2 all rely on even-aged management with shorter rotations, have fewer wildlife-oriented measures, and provide no designed system of old-growth reserves. Alternatives 3 and 6, which add old-growth reserves either Forest-wide or to selected provinces to Alternative 2, and which have full (though different) compliments of habitat protection measures, generally rank between Alternative 2 and Alternatives 4 and 5. Based on the earlier discussions, Alternative 10 would occur somewhere in this middle group along with Alternatives 3 and 6. Alternative 11 would be closer to the lower effects end, and more similar to Alternatives 4 and 5.

One other way of portraying long-term effects potential is to extend the biogeographic province analysis done earlier for short-term effects into the long term, using the tenth-decade columns from Table 3-5. These numbers represent the percentages of cumulative productive old-growth harvested within each province through the hypothetical tenth-decade of Forest Plan implementation under each alternative. For comparative purposes, each alternative has been examined for the ten provinces showing the highest cumulative percents, and then ranked by comparing the range of those percents. (For Alternative 1, the current percents were used, since it has no measurable additional effects.) Table 3-10 shows the results.

In some ways the rankings are comparable to those previously arrived at, but with one interesting difference. The alternative at the extreme ends (1 at the low end, 2, 9 and 7 at the high) remain in the same place, but the other six alternatives shift around relative to each other. The three alternatives with Forest-wide reserve systems, after 100 years, tend to maintain a greater amount of old-growth forest by province than do these with limited reserves and/or extended rotations. There are two principal reasons for this: the Forest-wide reserve systems place an upper limit on lands available for timber harvest within each biogeographic province; and alternatives with average 100-year (shorter) rotations begin the harvest of second-growth forest during this 100 year period, reducing the need to harvest as many (new) acres of the remaining old growth. In addition, Alternative 11, which uses a different spatial layout of reserves than Alternatives 3 and 10, was designed in part to recognize and account for current conditions within each province, and to better maintain future old-growth forest in provinces where past harvest has been high.

Table 3-10
Ranking of alternatives based on long-term potential effects to biodiversity at the level of biogeographic provinces [1]

Ranking: Least to Most Reductions in Biodiversity	Alternative	Range of Ten Highest Cumulative Percents
1	1	6-24
2	11	12-37
3	3	10-40
4	10	14-42
5	6	15-41
6	5	18-41
7	4	16-45
8	2	16-49
9	9	28-54
10	7	31-56

[1] Based on tenth-decade figures from Table 3-5.

Glossary

Experimental Forests

Affected Environment

Current Situation

Experimental forests provide areas for conducting manipulative research that serves as a basis for forest management. Natural resources in experimental forests are used or altered under controlled scientific studies. The Tongass currently has two experimental forests, Young Bay and Maybeso. Their locations are indicated on the alternative maps.

Maybeso

Established in the early 1950's as a part of an intensive research program to document the effects of large-scale clearcutting on hydrology, fisheries, and timber productivity, the Maybeso Experimental Forest (10,600 acres) is located on a large steep-sided alluvial valley with a south to southeast-facing aspect near the central-eastern coast of Prince of Wales Island in southern Southeast Alaska. By the early 1960's most of the experimental area had been harvested. Permanent research plots were established and monitored to study hillslope erosion, movement of Large Woody Debris in and through streams, forest regeneration, and silvicultural responses to precommercial thinning. Most of these plots are still monitored.

Since nearly all of the commercial timber on the Maybeso Experimental Forest has been harvested, there are limited opportunities to design new experiments on anything but very young second growth. Only a limited variety of vegetation and timber types are now available within the area.

Young Bay

The Young Bay Experimental Forest (6,660 acres) is located just south of Juneau on northern Admiralty Island. Originally selected for long-term hydrologic and fisheries monitoring with a paired comparison between streams, this site was used extensively for fisheries and hydrology research in the 1960's and 1970's. Construction at the site includes artificial stream channels, labs, housing for field personnel, and installation of permanent weather monitoring stations.

The Young Bay Experimental Forest has an extensive terrace or bench underlain by poorly-drained marine silt (the Gastineau Formation) which extends across its lower slopes between sea level and an elevation of 100 feet. As a result of this formation, part of the forest is open and relatively unproductive, which is atypical of those normally managed for timber production in Southeast Alaska. Fifty-nine percent of the area is productive old growth, of which 2,882 acres are tentatively suitable to consider for research manipulation for timber production. Young Bay exhibits little forest vegetation-type diversity making its use for other studies difficult. High winds often limit winter access. There are no roads, and, to date, no experimental vegetation treatments have occurred.

Prior to the Tongass Timber Reform Act, lands to the east of the Young Bay Experimental Forest were allocated to LUD III. The Tongass Timber Reform Act has now designated these lands as the "Young Lake Addition" to be managed as part of the Admiralty National Monument and Kootznoowoo Wilderness.

Proposals and Methodology

No new experimental forests are being proposed for the Tongass Forest Plan Revision. Because of the Tongass Timber Reform Act legislation or other resource conflicts, Shaheen Creek, Trap Bay, Staney Creek and Chicken Creek watersheds, previously identified as possible experimental forests in the 1990 DEIS, are no longer appropriate for consideration.

Forestry Science Lab (FSL) personnel in Juneau and Forest Service Staff on the three Administrative Areas have proposed and evaluated these and several other sites on the Forest for possible new experimental forests. No new sites have been found which would provide for long-term experimental forest-type research that would not conflict with existing resource uses and/or other demands. At this time, no new experimental forests are being proposed.

Young Bay has also been considered for delisting as an experimental forest. This area has limited research opportunity, and limited applicability to other areas of the Forest. Manipulative research may not be compatible with the adjacent Monument/Wilderness addition.

Experimental Forests

Environmental Consequences

Direct, Indirect and Cumulative Effects

No new experimental forest proposals occur in any of the alternatives. The nondesignation of areas to the Experimental Forest Land Use Designation, if followed by subsequent alteration of their conditions over the planning period, would result in a reduction or alteration in research opportunities. The Forest Plan provides standards and guidelines to mitigate undesirable adjacency effects and to maintain research opportunities within existing Experimental Forests.

Maybeso Experimental Forest

The Maybeso Experimental Forest on the Ketchikan Area will remain allocated to and managed as an experimental forest in all alternatives. Since there are limited opportunities to design new experiments within this area, little or no adverse research-induced effects are anticipated during the life of the Forest Plan. Minor natural changes in conditions could occur.

Under all alternatives, the Karta Wilderness protects the northern boundary from development influence. Most alternatives would allow some degree of management activity on the other three sides, however, none of the activity is anticipated to have any effect on the permanent research plots within the experimental forest. There are no known conflicts with the private land interests adjacent to the southeast side of the experimental forest boundary.

Young Bay Experimental Forest

The Young Bay Experimental Forest on the Chatham Area is allocated to the Experimental Forest LUD in all alternatives except Alternative 1. Alternative 1 recommends de-listing the area as an Experimental Forest. The primary reason to maintain Young Bay as an Experimental Forest, is to maintain options in light of the Alaska Region's Ecosystem Management Strategy. Potential research could include alternative silvicultural systems and/or manipulating vegetation to create desired wildlife habitat conditions.

If or when such research activities were undertaken, any silvicultural activity is likely to use a helicopter yarding method with no road construction, and would be likely to focus on alternatives to clearcutting. Vegetative manipulation for desired wildlife habitat conditions would likely result in small openings or single tree selection harvesting, again using a helicopter with no roads. In either case, the direct, indirect, and cumulative effects on other resources are anticipated to be minimal.

Fire Management

Affected Environment

Background

The occurrence of wildfires within the Tongass National Forest has been historically low, due largely to the annual rainfall in Southeast Alaska which averages over 100 inches. National Fire Data Library records show an average of 14 fires per year for the 30-year period 1958-1988. The majority of these are considerably less then one acre and the average size of all fires is less than seven acres.

Recreational fires that are left unattended comprise about 92 percent of fire occurrences in Southeast Alaska. These tend to spread very slowly and burn deeply; unsuppressed, they can result in some resource losses. Most other fires are equipment fires caused by contractor or other equipment activities. These fires are commonly associated with heavy concentrations of dead, woody logging debris (such as slash piles), and tend to be larger than recreational fires. Equipment fires, because of their potential to grow larger, generally require more fire suppression forces. In recent years, the prescribed fire program on the Tongass National Forest has increased. Prescribed burning programs use fire as a tool in accomplishing silvicultural and wildlife resource management objectives.

Current Situation

No direction for fire management is included in the 1979 Forest Plan. Regional fire management direction has been to attack and suppress all wildfires as quickly as possible regardless of vegetation type, burning conditions, fuel loading (the amount of fuel per area), or land management objectives. This direction has evolved into one that stresses cost-efficient suppression based on objectives for the appropriate suppression action, and is supported by an Escaped Fire Situation Analysis.

State and private lands lie within or adjacent to National Forest lands. Through cooperative fire protection agreements based on economics and the “closest forces concept,” the Forest Service has assumed all initial attack responsibilities for forested lands in Southeast Alaska. This agreement and other Regional fire direction is contained in the Alaska Interagency Fire Management Plan (May 1988), which is incorporated by reference into the revised Forest Plan.

Future Trends

As recreational use of the Tongass grows, so will the incidence of fire within recreational sites. Historically, these fires have caused site-specific damage to confined areas, but are insignificant on a Forest-wide basis. This trend is expected to continue into the future with perhaps a slight increase in acreage burned.

Prescribed fire can potentially play an important role as a tool in managing forest ecosystems, although its use will continue to be constrained by the cost and difficulty of accessing areas, by smoke management policies, and by air quality requirements. If vegetation management and wildlife enhancement projects increase in the future, the need for prescribed burning or slash treatment may also increase.

The greatest impact to the Forest’s fire management program will be if budgets decrease, resulting in a corresponding decrease in the number of people with wildfire responsibilities. There will be continued emphasis on training and equipping qualified people, and the need to train people from all disciplines for initial attack and suppression assistance will increase. Emphasis on cooperative firefighting agreements will continue to be very important.

Glossary

Fire Management

Environmental Consequences

Direct and Indirect Effects

Fire has not been an important agent of change in Southeast Alaska and is not expected to be in the foreseeable future. Forest fuels and fire occurrence are two aspects of the fire environment potentially sensitive to the management activities proposed by alternatives. The accumulation of forest fuels in harvest areas will vary by alternative, generally in direct relation to the volume harvested. Although present, the risk of large equipment-caused fires is relatively low. All alternatives project increases in recreational uses, and thus anticipate some increase in recreation-related fires.

All of the alternatives provide for the suppression of wildfires to protect Forest resources and the property and lives of adjacent landowners. As the knowledge of the use and effects of prescribed burning increases, so may its use. However, no specific acreage of prescribed fire is projected for any alternative. Prescribed fire will be evaluated at the project level prior to use. The use of prescribed fire could result in reductions in the cumulative fuel loading of the Forest over time.

Forest Fuels

Forest fuels consist of vegetative material, living or dead, that can burn during a fire. Although fuels accumulate and decay at natural rates in the forest ecosystem, the logging slash left after timber harvest and road construction accelerates the natural process of accumulation and generates the greatest impact on forest fuels. Limbs, tops, and cull logs hamper reforestation efforts, increase overall forest flammability, and have the potential to generate high intensity fires that are difficult to control.

Because the amount and arrangement of fuels are important variables in the Forest environment, the reduction of fire hazard is balanced with other resource concerns. The presence and distribution of woody debris provides habitat for animals and insects. For example, fallen logs provide important habitat for small mammals such as marten. Dead and down vegetative material also contributes to nutrient recycling, part of the ecological cycle. To provide shade and organic matter for new seedlings, a specified amount of cull logs and debris are essential after harvest. Research shows that decaying logs promote fungi that aid in decomposition of organic material and subsequent reforestation.

The Tongass has a limited forest fuels management program. When fuels are treated, prescribed burning is the most common fuel treatment used; however, the annual acreage treated is low in comparison to the number of acres harvested annually. Because the Tongass relies on natural reseeding and growth for the reforestation of most harvested areas, fuel reduction is not necessary. Prescribed burning may also be used to improve wildlife habitat. The higher the levels of timber activity and road construction, the greater the potential to increase the fuel loading in timber harvest areas.

Fire Occurrence

Fire occurrence can be expected to vary among alternatives due to the proposed amounts of prescribed burning, timber harvest and recreation use. Because timber harvest units generally have large amounts of fuel, fires in logging slash have the potential to burn with high intensity and severity. Although prescribed fires are conducted under specified conditions with an approved burning plan, slash burns can escape control. Unexpected changes in weather conditions, particularly erratic, strong winds, pose additional risks during the mopup phase of prescribed burning. Escaped prescribed burns can be difficult to control and can cause damage to adjacent timber and reproduction.

The road construction, timber harvest, and timber improvement industrial operations may increase the risk fire starts. Ignition sources are increased as workers operate saws, combustion engines, and cable harvest systems. Fires resulting from industrial operations have the potential to cause extensive damage to cut timber, residual stands, and expensive logging equipment. The prevention of industrial operation fires is a major portion of wildfire prevention under each alternative.

While an increase in dispersed recreational use of the Forest will increase the risk of human-caused fires, increased use of the Forest also contributes to early detection and, in some cases, suppression of small fires by recreational users. Fires associated with industrial operations are generally accessible, but recreational use fires are often started in areas without roaded access. Difficulty of access increases the cost and response time for fire suppression equipment and personnel.

Mitigation

Forest Service timber sale contracts specify the measures, additional people, and equipment required for the prevention, early detection, and suppression of fires within a project area. Intensified fire prevention contacts are used to increase public awareness. Prescribed fire activities are planned to control the intensity and duration of the fire, thus minimizing adverse effects to vegetation and soils. Low- to moderate-intensity fires are used to protect the duff layer and maintain soil nutrients. Also, to reduce effects on air quality, burning is scheduled for times when conditions permit dispersion away from smoke-sensitive areas. All Forest Service burning is done in compliance with Alaska Department of Environmental Conservation open burning regulations.

In designated Wilderness, natural fire occurrence is extremely low. Currently, any wildfire that starts in Wilderness or National Monument Wilderness is attacked using the suppression response prescribed for that Land Use Designation. Prescribed natural fire may be allowed in Wilderness only if it is adequately addressed in the Wilderness Plan for a given area and the implementation is adequately addressed in the Fire Management Action Plan. Due to frequent summer rainfall and the infrequent electrical storms, the Tongass National Forest does not have a prescribed natural fire program.

Fish

Affected Environment

Fish and the aquatic resources on the Tongass National Forest provide major subsistence, commercial, sport fisheries, and traditional and cultural values. Abundant rainfall, streams with glacial origins, and watersheds with high stream densities provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high quality water, is a focal point of public, State and Federal natural resource agencies, as well as user groups, Native organizations and individuals.

Fish are a major component of the biodiversity of Southeast Alaska. The annual spawning migrations of anadromous fish are necessary for the function of many plant and animal communities. Wilson and Halupka, in their discussion of anadromous fish as keystone species, list 36 birds and mammals which consume salmon or salmon eggs in Southeast Alaska (1995). Animals such as black and brown bear and bald eagle are known to have significant dependence on spawning salmon, or their carcasses, for over-winter survival. Concentrations of bald eagles and gulls (sp.) feeding on spawning hooligan suggest these fish are an important source of food which is available during early spring, before salmon runs begin.

The Forest includes approximately 45,000 miles of known streams, more than any other in the National Forest system, and 20,900 lakes and ponds totaling 278,000 acres. Anadromous fish habitat includes 10,800 stream miles and 4,100 lakes and ponds, and another 12,200 stream miles and 4,700 lakes and ponds provide non-anadromous fish habitat. Most of the Forest's streams and rivers empty into bays or estuaries which are important during some life stages of anadromous species as well as for many saltwater fish species. Thirty-seven freshwater and anadromous fish species are found in the freshwaters of Southeastern Alaska. Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor, 1979). Although these are marine dwellers, some may be affected by upland management activities, such as timber harvest related log transfer and storage facilities. Species which may be particularly sensitive to upland management include the king (*Parotithodes sp*.), dungeness (*Cancer magister*), and tanner crabs (*Chionocoetes bairdi*), and butter clams (*Saxidomes giganteus*). The principle fish species harvested for sport, subsistence or commercial uses are shown in Table 3-11.

Subsistence and commercial harvest of fish provide a way of life and a major source of food for many Southeast Alaska residents. Sport fishing is a favorite activity of residents and visitors. Hatcheries, and the enhancement of wild fish, among other aquaculture projects, contribute to resource availability and abundance. The Alaska Department of Fish and Game is responsible for regulating the amounts of fish harvested. Subsistence fish harvest is discussed in the Subsistence section of this chapter.

Commercial fish harvest in the waters of Southeast Alaska can fluctuate widely from year to year. For example, salmon harvest in Southeast Alaska averaged approximately 50 million fish between 1935 and 1940, then declined steadily to less than 20 million fish in about 1950. From 1950 to 1975 harvests were generally low, falling below 6 million fish in 1975. Since 1975 there has been an increasing trend, reaching 60 million in 1985, and setting a record of about 76 million fish in 1994. Fluctuations in commercial harvest trends may be partly attributable to changes in ocean productivity. The productivity of marine waters in the Gulf of Alaska, and the survival of salmon and steelhead trout, are both highly variable and cyclic. Since the mid-1970's, favorable ocean currents have resulted in high productivity and, consequently, high marine survival of salmon (AFHA, 1995).

Table 3-11
Commonly harvested sport, subsistence and commercial fish

Species [1]	Sport	Subsistence	Commercial
Pink salmon (*Oncorhynchus gorbuscha*)	X	X	X
Chum salmon (*Oncorhynchus keta*)	X	X	X
Coho salmon (*Oncorhynchus kisutch*)	X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	X	X	X
King salmon (*Oncorhynchus tshawytscha*)	X	X	X
Cutthroat trout (*Oncorhynchus clarki*)	X		
Rainbow trout & steelhead (*Oncorhynchus mykiss*)	X	X	
Dolly Varden char (*Salvelinus malma*)	X		
Eulachon smelt (*Thaleichthys pacificus*)		X	

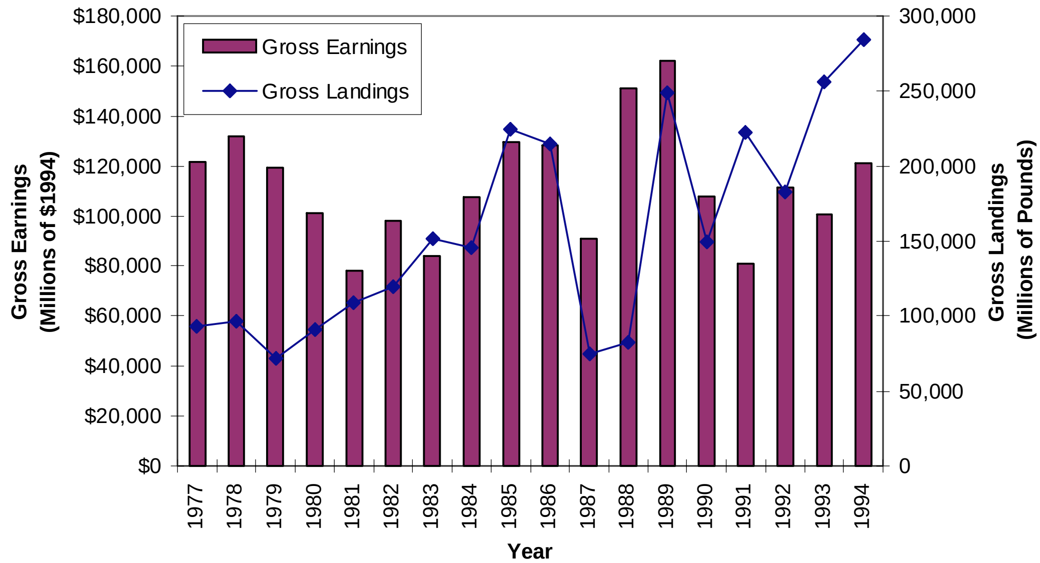
[1] Alternate names commonly used for the same species are: pink or humpback; chum or dog; coho or silver; sockeye or red; king or chinook; and eulachon or hooligan or candlestick.

From salmon produced in Southeast Alaska, the annual commercial salmon harvest (1977-1994) averages over 173 million pounds with earnings of over $112 million (1994$). The harvesting and processing of salmon provides over 5,000 direct jobs, or the equivalent hours of 3,500 full time jobs (year round positions) in Southeast Alaska. In 1994, over 227 million pounds of salmon were harvested worth over $96 million in Southeast Alaska (Figure 3-2).

In 1994, 2,337 limited entry permits were fished. These permits are issued to individuals, but represent small businesses employing up to 10 people each. The average value of limited entry permits have increased by a factor of 3.5 since 1977. For some salmon fisheries the value of a permit has increased by a factor of 6 since 1977.

Harvests of salmon have been at record or near record levels in Southeast Alaska for the past few years. These increases are thought to be primarily associated more with favorable oceanic conditions rather than any change in freshwater habitats. Since the early 1980s oceanic productivity for salmon has improved due to a number of factors. For instance, coho salmon smolt (juvenile salmon migrating to the sea) to adult (salmon returning from the sea) survival long term average is about five percent. Recent coho smolt to adult survival, has approached 30 percent in some Southeast Alaska locations due to more favorable ocean conditions. Increases in hatchery-produced salmon have contributed to the recent increased commercial harvest. For example, up to 50 percent of the commercial chum salmon harvest in Southeast Alaska is from hatchery production.

Figure 3-2
Commercial Harvest and Value of Salmon Produced from Southeast Alaska (1977-1994)



Hatchery juvenile salmon releases have increased significantly since 1980. Releases in 1980 totaled approximately 20 million juvenile. In 1991 over 500 million juveniles were released to contribute, as adults, to the common property fishery. From 1980 through 1994 the increase in juvenile salmonids released resulted in an approximate 125 fold increase in the number of hatchery planted salmon which were harvested in the common property fishery. Commercial harvest of hatchery planted salmon increased from a low of 57,000 fish to a high of 7,243,500 fish (Figure 3-2).

Approximately 85 percent of Southeast Alaska's sport fishing occurs in the vicinity of the Tongass National Forest. Sport fish use has increased with a generally steady trend over the past two decades, almost doubling since the late 1970's. This sport angling use is important to the economy of Southeast Alaska. Healthy salmon habitats and large returns of adult salmon are vital to the growing recreational fisheries in Southeast Alaska. For 1984-1993, the number of anglers fishing has increased 62 percent while the number of Fish User Days (FUDs) on the Tongass National Forest have increased 44 percent. One FUD is equivalent to 12 hours of fishing.

FUDs fished on the Tongass National Forest totaled 116,000 in 1991, 125,700 in 1992, and 122,600 in 1993. Based on a 1991 economic analysis (using 1988 data), anglers in the region spent on average of $433 (1994$) per FUD, or over $50 million in 1991, $54 million in 1992, and $53 million in 1993. These dollar figures represent both resident and non-resident expenditures made in Southeast Alaska for fishing activities. Travel costs to Southeast Alaska are not included in this analysis.

Saltwater charter fishing service providers are one of the fastest growing business sectors in Southeast Alaska. The total number of charter registrations increased 20 percent from 1993 to 1994 (607 in 1993; 727 in 1994). About 88 percent of registered charter boat owners are Alaska residents, while nonresidents comprise about 12 percent. Charter fishing service providers are based throughout Southeast Alaska communities. Distribution of charter registrations (Table 3-12) indicates the importance of these businesses to the economy of the region.

Table 3-12
Registered Charter Operators by Southeast Alaska Communities (1994)

Community	Charter Registrations	Community	Charter Registrations
Ketchikan	141	Angoon	23
Prince of Wales	90	Hoonah	12
Yes Bay	21	Pelican	5
Petersburg	34	Tenakee Springs	4
Wrangell	35	Juneau	103
Sitka	160	Haines	11
Elfin Cove	19	Skagway	4
Glacier Bay	3	Yakutat	15
Gustavus	21		

Freshwater fishing guide registrations under permit by the Forest Service (1992=130; 1993=146; 1994=136) indicate yet an additional business enterprise dependent on fishery resources of the region, especially wild stocks on the Tongass National Forest. About 90 percent of the registered freshwater fishing guides are Alaska residents.

Fish Habitat Enhancement

During the last 15 years increased emphasis has been placed on the enhancement of fish habitat on the Tongass National Forest. From 1980 to 1995 the USDA Forest Service has invested approximately $8 million (direct project costs, does not include planning, overhead, monitoring and maintenance) in the fisheries enhancement program resulting in 176 fisheries habitat enhancement projects on the Tongass National Forest (Table 3-13). An additional $3.9 million was contributed by cooperators in the enhancement program. At full potential production these projects are expected to contribute 17.7 million pounds of salmon annually to the harvest in Southeast Alaska. The annual value of this potential harvest is estimated to be $10,674,000. Return on investment averages about 6:1 for the overall fish habitat enhancement program on the Tongass.

The majority of the fish habitat enhancement projects implemented on the Tongass National Forest are cooperative projects involving multiple agencies and organizations Three groups coordinate fish enhancement and development activities in Southeast Alaska: the Northern and Southern Southeast Regional Planning Teams, and the Yakutat Salmon Planning Group. “Comprehensive Salmon Plans” have been developed for the three areas: Northern Southeast, Southern Southeast, and Yakutat. The Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, facilitates the activities of the coordinating groups. Many organizations are involved with aquaculture projects, including the State of Alaska, private non-profit aquaculture organizations, Regional Aquaculture Associations, the USDA Forest Service, and additional cooperators. The costs of the projects are shared in a variety of ways which vary project by project depending on such factors as: budget levels and priorities, availability of personnel and equipment, fish brood stock availability at various hatcheries, and proximity of other projects to the proposed project location.

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Coordination and commitment is necessary at all levels of all agencies and organizations participating in the projects, to ensure success of the projects and contribute to the continued production and health of the salmon stocks in Southeast Alaska. Allowing for fish enhancement projects in wilderness areas, as permitted by ANILCA, has been an issue in the past.

The anticipated salmon production from fish habitat enhancement projects on the Tongass National Forest is calculated based on site specific habitat conditions and an analysis of limiting factors for salmon production. The test for these habitat production estimates consists of monitoring conducted on individual projects and the subsequent feedback of the monitoring results into the project planning process.

Table 3-13
Tongass National Forest Cooperative Fisheries Enhancement Projects Completed During 1980-95

Enhancement Activity	Number of Projects	Estimated Production of Fish (M Lbs./year)	Estimated Value (M $/year)	Cost Federal (M $)	Cost Partners (M $)
Fishways	42	6,749.1	2,896.1	4,403.3	210.3
Falls Modification	13	166.9	126.3	167.4	4.0
Spawning Channels	9	450.5	238.6	374.0	111.5
Debris Removal	10	76.0	46.4	19.0	0.0
Lake Fertilization	9	7,306.6	5,605.1	1,456.2	1,938.0
Lake Stocking	8	1,242.0	757.6	521.1	1,170.3
Stream Stocking	22	519.1	368.1	168.6	236.6
Rearing Ponds	18	17.1	10.6	87.6	1.7
Incubation Boxes	5	1,091.9	572.7	67.0	131.2
LWD Management	28	83.6	52.8	633.6	30.0
Fish Weir	12	NA	NA	21.0	120.0
TOTAL	**176**	**17,702.2**	**10,674.3**	**7,918.8**	**3,953.6**

Project totals represent the number of activities completed at different locations. Repetitive annual investments at the same site (that is, fertilizer applied to each lake annually) are not shown, although the costs of the repetitive treatments have been included in the cost totals.

Estimated production of fish is based on full utilization of habitat capability. The time it will take to reach full production varies with the species, application of bioenhancement techniques and fisheries management strategies regulating the fish stocks returning to the projects. Total production is calculated to represent the fish available for subsistence, sport and commercial harvest.

Values displayed are minimum estimates of the value of the fish produced by enhancement activities. The dollar value of any given fish is generally greater when harvested in a sport or subsistence fishery than when harvested in a commercial fishery. Value per pound of fish is the average price paid to the commercial fisher over a 15 year period, expressed in 1991 dollars.

Costs shown in the table are direct project costs (i.e., construction) and do not include indirect costs such as program planning.

The cost column for **partners** includes the combined investments of the Alaska Department of Fish and Game and Regional Aquaculture Associations. Individual cooperative investment information for the majority of the projects involving these organizations were not available.

Fisheries Habitat Enhancement Opportunities

Fish habitat improvement is emphasized in all alternatives. An enhancement program, of about half the size of the of the past ten years, is proposed in all alternatives. A summary of enhancement activities during the last ten-year period was included in Table 3-13.

There are 158 potential projects identified for implementation during the next ten years of implementation of the revised Forest Plan (Table 3-14). Most of the potential projects have not been through the environmental analyses or on-site review required to determine project feasibility. Total costs including project planning and implementation, maintenance and monitoring of these projects are estimated to be 30.7 million dollars.

Table 3-14
Number of Potential Enhancement Projects by Type

Project Type	Single Year	Multi-Year	Total
Small Instream Structures	22	9	31
Structural Fish Passage	24	2	26
Falls Modification	11	3	14
Barren Lake Stocking	1	4	5
Cooperative Fish Stocking	2	9	11
Incubation Boxes	2	3	5
Lake Fertilization	0	5	5
Weir/stock assessment	7	10	17
Spawning Channels	2		2
Ponds & Off Channel Rearing	3		3
Riparian Rehabilitation	30	9	39
Total Projects	104	54	158

Notes: Multi-year projects are usually implemented in successive years but only counted as one activity. Fertilization of a particular lake is an example of a single project which may be repeated for several years in order to achieve the desired objective of restoring a natural run of salmon to the lake.
The majority of the small instream structural projects, including projects such as Large Woody Debris and gabion placement, mitigate past logging activities. These projects may be considered as rehabilitation rather than enhancement. Riparian rehabilitation projects will be coordinated with watershed restoration projects.

All projects which are determined to be feasible, following environmental analysis, and on site review, may be scheduled for implementation. Priorities for project completion is coordinated through the cooperative salmon enhancement planning process. The final implementation schedule will be dependent upon a variety of factors including budget availability, cost/benefit ratios and partnership opportunities. An additional factor for consideration is the timing and location of other forest management activities. Some activities, such as road construction for timber harvest purposes, are important for the successful implementation of some fisheries projects.

Implementation of all potential fisheries enhancement projects on the Tongass during the next decade is estimated to total 864.7 million pounds of salmon through the first five decades. Fish would be available to subsistence, sport and commercial harvesters. The aggregated value of this harvest is projected to be 661.1 million dollars during this same period.

In all public scoping, a common advocacy of the public has been the maintenance or improvement of fish habitat values. Demand from the public for subsistence,

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commercial and sport harvested fish remains very high. Demand for subsistence fish is discussed in the Subsistence section of this chapter, while commercial and sport fish demand are reviewed in this section. Commercial fish demand is calculated based on goals set by Regional Salmon Planning Teams for annual fish production for several species. Some of the “year 2000” goals were set almost 15 years ago, and have not been updated. Estimated potential fish harvests are between 58 and 86 percent of the year 2000 goals, although the actual annual harvests vary considerably and sometimes exceed either potential harvest or the harvest goals. National Forest habitats are estimated to contribute approximately 80 percent of the fisheries in Southeast Alaska. A comparison of current 5-year average harvest and the goals for fish production in Southeast Alaska indicates that Tongass National Forest-related harvest is nearing the target set by the Regional Salmon Planning Teams for coho salmon, and ranges between 26 percent and 42 percent below the targets for the other species of salmon.

Sport fishing demand is calculated using a linear progression based on sport fishing increases from 1979 through 1993 and projecting the same rate of increase through 2005. Using these figures, in the next 10 years, sport fishing could increase 34 percent. Recent Southeast Alaska information indicates that while the number of resident anglers has declined slightly since 1991, numbers of non-resident anglers increased from about 40,000 to 80,000 from 1991 to 1994.

Fish Management Indicator Species

National Forest Management Act regulations direct the use of Management Indicator Species (MIS) in forest planning to help display the effects of forest management. MIS are species whose population changes are believed to indicate the effects of land management activities. Through the use of MIS, the total number of species that occur within a planning area is reduced to a manageable set of species that represents, collectively, the complex of habitats, species, and associated management concerns.

For the Forest Plan revision, pink salmon, coho salmon, Dolly Varden char, and cutthroat trout were selected as MIS. Pink salmon were selected to represent anadromous fish which are limited in their freshwater life-period by spawning gravel quality and quantity; coho salmon to represent anadromous fish that are generally limited in their freshwater life-period by stream and lake rearing area; Dolly Varden char because of their amiquitious distribution in freshwater habitats; and cutthroat trout because of their dependency on small freshwater stream systems which are most susceptible to effects from management activities. These MIS fish species are included in the Fish/Riparian Panel Assessment discussed later in this section.

Fish habitats. With over 45,000 miles of streams and 275,000 acres of ponds and lakes, the Forest provides abundant fish habitat. The habitat has been inventoried and classified, and estimates made of fish production.

Channel Inventory. Perennial streams on the Forest have been channel-type inventoried. (For a description of each channel type, see *A Channel type Users Guide for the Tongass National Forest*, Alaska Region Publication R10-TP-26, April 1992.) Individual channel types have fairly consistent physical and biological characteristics (Marion, et al., 1987). The channel types provide a system to estimate the amount and quality of fish habitat and can be used to predict their physical response and sensitivity to different management activities. Channel types have been categorized into distinctly different groups, called “stream process groups.” The process groups are described in Appendix D of the Forest Plan.

Stream class Inventory. Channel typed streams have also been categorized by stream class, a classification primarily associated with fish use. Class I streams are anadromous and high value resident fish streams, Class II streams are other resident fish streams, and Class III streams are managed for water quality and where appropriate, downstream aquatic resources. (See the glossary for more complete definitions.)

Table 3-15 displays, by Administrative Area of the Tongass, the estimated miles of streams, their process group and stream class.

Stream classes describe stream values, such as whether anadromous or resident fish inhabit a particular stream. Process groups describe the interrelationship between watershed runoff, landform relief, geology, and glacial or tidal influences on fluvial erosion or depositional processes. Process groups are used for assigning the Riparian standards and guidelines.

In 1993 the Forest Service implemented a strategy, termed PACFISH, for the management of salmon and steelhead habitats on National Forests in Alaska, California, Idaho, Oregon and Washington. This strategy was in response to diminishing runs of many Pacific salmon throughout much of their range, except Alaska. Studies indicated fish habitat in areas which have experienced heavy timber harvests exhibited reduced stream complexity, including over-widening of stream channels, loss of pool habitat and in some cases increases in occurrence of bedrock which indicates stream channel degradation. Loss of fish habitat occurred in spite of increasingly restrictive application of Best Management Practices. PACFISH was never implemented in Alaska, however an assessment of salmon habitat (the Anadromous Fisheries Habitat Assessment) was later completed.

The Anadromous Fisheries Habitat Assessment

During 1994 an Alaska Anadromous Fisheries Habitat Assessment (AFHA, 1995) was conducted, as directed by the 1994 Congressional Appropriations Conference Committee Report. The purpose of this assessment was to evaluate the effectiveness of current procedures in protecting anadromous fish habitat and to determine if any additional protection measures were needed. The assessment involved more than 50 scientists and managers, and included a review of more than 1,540 publications, a field review by a group of experts in disciplines related to the health of fish habitat, an analysis of three watersheds by teams of professional fish and watershed specialists and a peer review of the report prior to release. The AFHA report concluded that current measures, and their implementation (defined as activities implemented on the ground since TTRA passage in 1990), were not fully effective in preventing habitat degradation or protecting salmon and steelhead stocks over the long term. A primary concern was lack of protection for headwater streams (usually small streams high up in the watershed).

Table 3-15
Miles of Streams by Process group, Area and Stream class[1]

Stream Process group	Class	Chatham	Stikine	Ketchikan	Total
Alluvial fan	I	271	58	174	504
	II	565	100	171	835
	III	67	69	89	225
Estuarine	I	275	218	152	645
	II	0	0	0	0
	III	0	0	1	1
Flood plain	I	1,886	768	1,371	4,025
	II	58	151	45	254
	III	0	14	10	24
Glacial Outwash	I	446	239	216	901
	II	79	84	7	170
	III	62	48	8	118
High Gradient Contained	I	17	112	181	310
	II	2,738	955	3,549	7,242
	III	7,510	66,663	13,677	27,850
Large Contained	I	215	166	265	646
	II	15	31	3	49
	III	0	0	1	1
Moderate Gradient Contained	I	574	478	1,293	2,344
	II	341	217	211	769
	III	2	41	88	125
Moderate Gradient Mixed Control	I	676	1,292	1,911	3,878
	II	328	343	201	872
	III	1	19	58	78
Palustrine	I	595	395	64	1,633
	II	35	69	55	160
	III	0	6	25	31
Administrative Area Totals	I	4,954	3,726	6,205	14,885
	II	4,159	1,949	4,243	10,351
	III	7,643	6,860	13,950	28,453
Forest Total (miles)	**All streams**	**16,755**	**12,535**	**24,398**	**53,689**

Source: Revision Data Base Q3012E, November 1992.

[1] Miles are adjusted for estimates of channels missed in the inventories. Additional unmappable streams are present, but undetectable, except with complete on-the-ground surveys. These streams cannot be mapped within the tolerances of the channel type inventory. Numbers may not add up precisely because of rounding. See Appendix D of the Forest Plan for a description of the Stream Process groups and the glossary for a definition of stream classes.

The assessment included many recommendations to make timber harvest more compatible with the maintenance of high-quality fish habitat. Among these were:

- implement watershed analyses
- increased protection over the minimum required for headwater areas;
- enlarging streamside buffers in flood plains and confined alluvial channels;
- establishing quantitative objectives for evaluating fish habitat capability;
- increasing monitoring of fish habitat protection procedures;
- evaluate and improve the Best Management Practices.

The Fish Habitat Analysis Team (FHAT), which conducted the on-the-ground analysis for AFHA, made further recommendations for improving management in riparian areas (FHAT, 1994). These sets of recommendations were considered in

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developing options for the proposed Riparian standards and guidelines and included in Riparian Options 1 and 2 (described briefly in Chapter 2 and included in Appendix I).

Other concerns expressed by the field reviewers were:

- Stream buffers generally should be wider than 100 feet, be consistent with site specific topography, and be designed to be windfirm.
- Timber harvest and roading activities on potentially unstable slopes should be reduced or eliminated.
- Road construction techniques need more attention, particularly where roads cross wetlands. The location of cross drainage's and passage requirements for fish were noted to sometimes be problems.
- Sediment routed to streams can be reduced by addressing culvert blockage problems, and structure and road prism failure problems, with higher levels of road maintenance or more road closures (following harvest activities).
- Greater use of specialists in timber planning and providing more training for them, should reduce risks to fish habitat.

Fish

Environmental Consequences

The 1991 SDEIS estimated the potential effects of management alternatives on three management indicator species, coho salmon, pink salmon and Dolly Varden char. Habitat models were used to estimate potential effects on those management indicator species.

The coho salmon and Dolly Varden char model was largely driven by the quantity and quality of pool habitat, including the presence of pool forming Large Woody Debris. The model predicted available rearing habitat for these fish and has proven useful during fish pass project development in evaluating potential rearing habitat above fish barriers. The model is, however, untested, and its reliability for determining potential effects of timber harvest on coho salmon and Dolly Varden char is not known. Because the model has not been validated it was not used in this analysis.

The development of a pink salmon model, which considers the effects of sediment on pink salmon spawning success, has not been completed.

Direct, Indirect and Cumulative Effects

Two separate, fisheries related, assessments have been completed since the 1991 SDEIS. The Anadromous Fish Habitat Assessment was discussed above, and contributed to the development of the riparian management options used in developing alternatives. The Fish/Riparian Assessment Panel, completed in 1995, serves as the basis for the first part of the following discussion of environmental consequences. Additional discussions focus on unstable soils, roads, and the riparian options.

Fish/Riparian Panel Assessment Elements

The panel process is described in general in the Introduction to this chapter. The Fish/Riparian Assessment panel included four fisheries scientists and two physical scientists (hydrology and geomorphology).

Alternative 8, one of the Revised Supplement alternatives rated by the panelists, has not been carried forward for detailed study in the FEIS and is not included in the following discussions. Alternatives 10 and 11 were not available to the panels. They are discussed in the "Additional Effects Analysis" following the discussions of the panel assessment results.

The fisheries scientists rated five possible outcomes for each of eight species of fish, including both resident and anadromous life strategies for two of the species. The fish considered in the assessment were:

- sockeye salmon (*Oncorhynchus nerka*)
- chinook salmon (*Oncorhynchus tshawytscha*)
- pink salmon (*Oncorhynchus gorbuscha*)
- chum salmon *(Oncorhynchus keta)*
- coho salmon (*Oncorhynchus kisutch)*
- steelhead trout (*Oncorhynchus gairdneri)*
- cutthroat trout - anadromous (*Oncorhynchus clarki*)
- cutthroat trout - resident *(Oncorhynchus clarki*)
- Dolly Varden char - anadromous *(Salvelinus malma)*

- Dolly Varden char - resident *(Salvelinus malma)*

The outcomes used by the fisheries scientists to predict habitat conditions, for purposes of relative comparison of Forest plan alternatives, were:

Outcome I. New management activities will not cause additional degradation of freshwater habitat for the species. Productive habitat will be well distributed across the Forest, or the historic range of the species within the Forest. Habitats that are currently degraded will recover or be moving toward recovery after 100 years.

Outcome II. New management activities will result in minor additional degradation of freshwater habitat for the species. Productive habitat will be adequately distributed across the Tongass National Forest, or the historic range of the species within the Forest. Most habitats that are currently degraded will recover or be moving toward recovery after 100 years.

Outcome III. New management activities will result in moderate additional degradation of freshwater habitat for the species. Distribution of productive habitat across the Tongass National Forest, or the historic range of the species within the Forest, will contain some gaps where the species will not occur or where populations will be severely reduced. Many habitats that are currently degraded will not recover or be moving toward recovery after 100 years.

Outcome IV. New management activities will result in major additional degradation of freshwater habitat for the species. Distribution of productive habitat across the Tongass National Forest, or the historic range of the species within the Forest, will contain large gaps where the species will not occur or where populations will be severely reduced. Most habitats that are currently degraded will not recover or be moving toward recovery after 100 years.

Outcome V. New management activities will result in severe additional degradation of freshwater habitat for the species. The species will be extirpated or populations will be decimated over much of its historic range on the Tongass National Forest. Habitats that are currently degraded will not recover or be moving toward recovery after 100 years.

The physical scientists rated five possible outcomes for the potential effects of land use alternatives on the natural conditions of streams. Natural conditions were defined in terms of the following attributes:

- Large Woody Debris (pieces/1,000 m^2 greater than 10 cm in diameter and 1 m long).
- percent pool area
- stream width-to-depth ratio
- pools per reach
- residual pool depth
- stream bed grain size distribution.

The physical scientists predicted channel conditions using the following outcomes:

Outcome I: Riparian objectives will be met throughout the Tongass National Forest. There will be little or no additional degradation from existing conditions due to new management activities. Areas currently not meeting riparian objectives will recover or be moving toward recovery in 100 years.

Outcome II: Riparian objectives will be met throughout most of the Tongass National Forest. There will be minor additional degradation from existing conditions due to new management activities. Most areas currently not meeting riparian objectives will recover or be moving toward recovery in 100 years.

Outcome III: Riparian objectives will be met on much of the Tongass National Forest, but there will be a substantial area where they are not met. There will be moderate additional degradation from existing conditions due to new management activities. Many areas currently not meeting riparian objectives will not recover or be moving toward recovery in 100 years.

Outcome IV: Riparian objectives will be met on a small part of the Tongass National Forest, but they will not be met over the majority of the Forest. There will be major additional degradation from existing conditions due to new management activities. Most areas currently not meeting riparian objectives will not recover or be moving toward recovery in 100 years.

Outcome V: Riparian objectives will be met on a very small part of the Tongass National Forest. Almost all areas will not meet riparian objectives. There will be severe additional degradation from existing conditions due to new management activities. Areas currently not meeting riparian objectives will not recover or be moving toward recovery in 100 years.

The Fish/Riparian panel used two time periods for assessing outcomes. The primary focus was on the longer-term (100 years), as stated in the outcome descriptions. A 10-year assessment was also made. The 100-year assessment is discussed first; the tables include both the scores.

The assessment panel outcome conclusions and comments fall into the two main categories: fish and stream channel morphology. Fish, for the purposes of this discussion, are divided into three sub-categories: chinook, sockeye, and an other category of "stream spawning fish" in which coho, pink and chum salmon, steelhead and cutthroat trout and Dolly Varden char are included. This subdivision is used to assist in summarizing the panel findings and does not imply that each of the fish species in the combined category are necessarily equal in all assessment findings.

Chinook Salmon. Chinook salmon typically spawn and rear in large river systems, which are often transboundary (flowing out of Canada into Alaska). The panelists believed most of the large river systems had little or no management activities taking place in their watersheds; and because of the watershed's large sizes, management activities that do occur would have little impact. Chinook salmon were assigned the highest number of points, of all species, for Outcome I across all alternatives, indicating that chinook would be least affected by management actions (see Table 3-16).

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Table 3-16
Average 10 Year and 100 Year Outcomes for chinook salmon by Alternative

Alternatives	Outcomes I		II		III		IV		V	
	10	100	10	100	10	100	10	100	10	100
1	94	94	7	7	0	0	0	0	0	0
2	88	88	8	9	4	4	0	0	0	0
3	90	89	9	10	1	1	0	0	0	0
4	90	89	9	10	1	1	0	0	0	0
5	90	89	9	10	1	1	0	0	0	0
6	88	88	11	9	1	4	0	0	0	0
7	86	85	13	11	1	4	0	0	0	0
9	88	88	11	9	1	4	0	0	0	0

Note that because these are averages they may not sum to 100 points.

Sockeye Salmon. Sockeye salmon typically spawn and rear in lakes. A few sockeye salmon populations spawn and rear in streams; some migrate upon emergence from the gravel to rear in salt or brackish water. Because of the sockeye salmon's preference for lake habitat, panel members assigned higher proportions of the likelihood points, across all alternatives, to outcomes **I** and **II**, than they did for stream-rearing fish (see Table 3-17). The panel felt that lake habitats, because of the protection afforded them in all alternatives (no commercial timber harvest within the riparian area or 100 feet, which ever is greatest, and only uneven-aged management within the next 400 feet) and because of their natural resiliency to impacts, would be less affected by management activities. Likelihood scores assigned to Outcomes **II** through V recognize some detrimental affects could occur due to management activities with the greatest potential effects in Alternatives 7 and 9. The panelists singled out sediment from roads as the most likely cause of detrimental effects.

Table 3-17
Average 10 Year and 100 Year Outcomes for sockeye salmon by Alternative

Alternatives	Outcomes I		II		III		IV		V	
	10	100	10	100	10	100	10	100	10	100
1	90	92	10	8	0	0	0	0	0	0
2	43	50	15	22	40	25	3	3	0	0
3	70	72	20	22	10	7	0	0	0	0
4	70	72	23	20	8	8	0	0	0	0
5	73	73	23	22	5	5	0	0	0	0
6	45	52	18	23	38	22	3	3	0	0
7	43	48	15	22	38	23	5	5	0	2
9	43	50	15	20	38	25	5	3	0	2

Note that because these are averages they may not sum to 100 points.

Combined Stream Spawning Fish. A combined group of fish includes coho, pink and chum salmon, steelhead trout, cutthroat trout (resident and anadromous) and Dolly Varden char (resident and anadromous). Typically these fish use streams or rivers for spawning, and their fry, upon emergence, rear in the stream habitat for one or more years (resident Cutthroat trout and Dolly Varden char depend on freshwater systems, including streams, throughout their life-cycle); or, as with chum and pink salmon, migrate to salt or brackish waters to rear. The panelists expressed a general opinion that the relative risk to each of these species could be influenced by the proportion of their life cycle spent in the freshwater ecosystem. Since resident cutthroat trout and resident Dolly Varden char are dependent on freshwater ecosystems throughout their lives, they could be at greatest risk. Since steelhead trout and coho salmon both spawn and rear (for one or more years) in freshwater, they may be at greater risk than pink and chum salmon. Pink and chum salmon rear in saltwater after emergence from freshwater incubating habitats.

Generally, as total miles of roads and acres of potential timber harvests increased by alternative, fewer likelihood points were assigned to outcomes **I** and **II**, and more likelihood points were assigned to outcome **III** and in some cases outcomes IV and V (see Table 3-18). Therefore the possibility of gaps in species distribution increases with increased miles of road constructed and acres harvested. For some species a gap in distribution may have greater significance than for others. Some species such as cutthroat and steelhead trout appear to have isolated populations which may be more susceptible to local extirpation. Species-specific comments are included in the Fish/Riparian panel assessment summary included in the planning record.

Table 3-18
Average 10 Year and 100 Year Outcomes for coho, pink and chum salmon, steelhead and cutthroat trout and Dolly Varden Combined by Alternative

Alternatives	Outcomes									
	I		II		III		IV		V	
	10	100	10	100	10	100	10	100	10	100
1	90	88	10	13	0	1	0	0	0	0
2	32	24	35	23	30	42	5	11	0	0
3	55	45	37	35	8	19	1	2	0	0
4	56	49	37	38	7	13	1	1	0	0
5	58	51	35	37	6	11	1	1	0	0
6	39	27	36	33	23	34	3	7	0	0
7	21	17	29	20	43	46	8	16	0	1
9	20	17	35	22	39	46	6	15	1	1

Note that because these are averages they may not sum to 100 points.

Stream characteristics. The occurrence of Large Woody Debris, pool frequency and percent area, width-to-depth ratios, residual pool depth and grain size stream bed distribution, were stream characteristics considered by the panel to assess alternatives. The physical scientists agreed Outcome **I** could not be achieved under any management alternative (see Table 3-19). It was their judgment that watersheds already heavily disturbed by previous management would not be recovered in 100 years, and that current practices would continue to degrade some habitats.

The physical scientists suggested that as road mileage and acres of harvest increased, the likelihood that riparian management objectives would not be met increased. The entire panel generally felt that greater riparian protection, longer timber harvest rotations, and reserves (including Wild and Scenic River designation) increased the likelihood that riparian management objectives would be met. An assumption was made that greater numbers of roads would be located in higher elevations on less stable terrain and harvest would occur on less stable areas when compared to historical harvest and road construction. All panelists agreed that if this scenario were true, then the result would be a greater likelihood of hillslope failure, erosion of fine sediment from road surfaces, and capture and rerouting of natural drainage.

Table 3-19
Average 10 Year and 100 Year Outcomes for Physical Stream Characteristics by Alternative

Alternatives	Outcomes I		II		III		IV		V	
	10	100	10	100	10	100	10	100	10	100
1	0	0	95	90	5	10	0	0	0	0
2	0	0	0	5	85	70	15	25	0	0
3	0	0	40	35	55	60	5	5	0	0
4	0	0	45	40	50	55	5	5	0	0
5	0	0	50	45	45	50	5	5	0	0
6	0	0	35	30	55	60	10	10	0	0
7	0	0	0	0	65	60	35	40	0	0
9	0	0	0	0	70	65	30	35	0	0

Note that because these are averages they may not sum to 100 points.

Long-term Effects of Alternatives

The panelists generally agreed on the possible relative outcomes of the management alternatives on the fisheries resources and stream channel attributes. This is demonstrated by identical rankings of alternatives by the two sets of panelists, although the physical scientists gave lower over-all scores to each alternative. Listed in order of increasing risk (least risk to greatest risk) to both the physical characteristics of stream channels and the species considered, the alternatives can be ranked in this order: Alternative 1, 5, 4, 3, 6, 2, 9 and 7.

All panelists agreed that Alternative 1 presents the least risk to the fish resource. However, the physical scientists concluded there was some likelihood that degradation from current conditions would be an outcome in all of the alternatives. Fisheries scientists assigned most points to Outcome I, that "new management activities would not cause additional degradation."

Alternatives 3, 4 and 5 were assigned similar outcomes. The fisheries scientists assigned about half the possible points to the likelihood that Outcome I would be met. The physical scientists scored Alternatives 3, 4, 5 and 6 similarly but assigned Outcome III the most points, with Outcome II second.

In Alternatives 2, 6, 7 and 9 most likelihood points are assigned to Outcomes III and IV. This group of alternatives was viewed by the panel as having a greater likelihood that riparian objectives would not be met on a substantial area of the Forest or across the majority of the Forest where riparian habitat occurs, and that either some gaps, or large gaps, will occur in the distribution of fish relative to their historic ranges.

Discussions by Alternative. Panelists agreed that many past management activities, such as timber harvest and road construction and maintenance, will continue to contribute to degraded fish habitat and stream channel conditions. This current condition was considered across all alternatives, thus precluding likelihood points being assigned to Outcome I by physical scientists in any alternative. While discussing the likelihood of outcomes for each alternative, assuming each alternative was actually implemented, the panel (both biologists and physical scientists) reached the following conclusions:

Alternative 1. Low activity levels in a relatively small part of the Forest would reduce the level of additional degradation. This low activity level should also reduce the level of re-entry into previously entered areas, resulting in uninterrupted recovery of degraded watersheds.

Alternative 2. The road network and area harvested, particularly in high hazard soils, increases the likelihood of future habitat degradation and reduces the likelihood of habitat recovery due to re-entry into possibly already degraded areas. Riparian option 3 applied in all watersheds would likely be less effective in reducing risks to stream channels and fish habitat than the greater levels of protection offered by riparian options 1 and 2. Headwater areas are of particular concern since they are afforded less protection under option 3 than under options 1 or 2. These concerns decrease the likelihood of Outcomes I or II and increase the likelihood of Outcome III.

Alternative 3. A moderate network of roads and area harvested would increase the likelihood of areas of future habitat degradation and reduce likelihood of habitat recovery due to re-entry into possibly already degraded areas. Increased protection from riparian coverage in higher-value watersheds will likely mitigate many effects of roads and area harvested. The inclusion of large blocks of reserves (Old-growth Habitat LUD) increases the likelihood of recovery of degraded habitat within them.

Alternative 4. Similar to Alternative 3 except this alternative will have a higher likelihood of obtaining Outcomes I and II because longer harvest rotations should reduce disturbance levels. However, the lack of high levels of riparian protection and the absence of large blocks of old-growth forest reduce the likelihood points assigned to Outcomes I or II.

Alternative 5. Similar to Alternative 4, but additional large blocks of old-growth forest could reduce the likelihood of gaps and increase the likelihood of recovery of degraded habitat in these areas.

Alternative 6. Relatively large amount of area harvested and moderate network of roads (same as alternative 5) would increase the likelihood of gaps and decrease the likelihood of habitat recovery. Additional old-growth habitat reserves may offset some of effects of area harvested and amount of roads.

Alternative 7. An extensive network of roads and area harvested decreases the likelihood of obtaining Outcomes I and II and increases the likelihood of obtaining Outcome III. Riparian option 3 (applied to all watersheds) is less effective in reducing risk to fish than options 1 or 2. Headwater areas are of particular concern since they are afforded less protection under option 3 than options 1 or 2. The lack of estuary fringe protection increases risks to fish.

Alternative 9. An extensive network of roads and area harvested would decrease the likelihood of obtaining Outcomes **I** or **II**. The panel expressed concern about increased potential of future degradation and decreased potential of recovery of currently degraded habitat. TTRA riparian requirements, which lack protection for smaller non-fish-bearing streams, and the absence of additional reserves and estuary fringe, increases the level of risk to fish stocks and results in more likelihood points assigned to Outcome **III**.

Alternatives Not Rated. Alternatives 10 and 11 were not available for evaluation by the fish/riparian panel. However, an approximation can be made for the placement of Alternatives 10 and 11 into the ranked order of alternatives previously mentioned.

The panelists deliberated over many aspects of each of the alternatives while evaluating the likelihood of various outcomes, but placed emphasis on the amount of timber harvest and road construction and the degree of protection afforded the riparian ecosystem. Considering only these variables, a revised list of alternatives, in order of increasing risk (least risk to greatest risk) to both the physical characteristics of stream channels and the species considered, can be ranked in the order of: Alternative 1, 5, 4, 11, 3, 10, 6, 2, 9 and 7. The placement of Alternatives 10 and 11 is based on the miles of roads to be constructed in 100 years (8,757 and 7,639, respectively); the projected Allowable Sale Quantity (300 MMBF and 267 MMBF, respectively); and the amount of riparian protection (Options 2/3 and Option 2a, respectively (see discussion under "Riparian Management Options" following in this section)). Depending on the relative importance given to the amount of riparian protection as compared to timber harvest and road construction, the use of riparian protection option 2a in Alternative 11 could place this alternative between Alternatives 1 and 5.

Short-term Effects of Alternatives

After assessing 100-year outcomes, the panel assessed the likelihood of outcomes for the first decade of plan implementation. With the exception of sockeye salmon (Table 3-17), the relative risks of management activities negatively affecting the physical stream attributes or the fish species were less in a 10-year time period than a 100-year time period. The panel identified major storm events as the principle influence in the triggering of shifts in stream channel conditions. The panelists believed that the frequency of major storm events is such that the likelihood of a major storm occurring is less over 10 years than over 100 years. Additionally, a time lag exists for the effects of habitat degradation to be reflected in decreases in the size of fish populations, due to the length of time most of the fish in this assessment rear in the ocean before returning to spawn. The outcome distribution does reflect the panelists opinion that there are risks to stream channel processes and fish populations in a 10-year time period.

The distribution of likelihood points for sockeye salmon indicated a slight increase in risk. Upon closer examination it is apparent that this increase is probably an anomaly attributable to missing scores from one panelist.

General Effects Considerations from the Panel

Roads. The greatest risk to the fish resource is caused by roads. Increased sediment yield, including yields from roads during construction, use during timber harvest activities, and lack of sufficient maintenance or proper closure following timber harvest activities, were all viewed as potential problems for maintaining fish resources. Roads were also viewed as causing risk to fish movement due to blocked culverts. At highest risk were stream-rearing fish, particularly cutthroat trout, that occupy the smaller headwater streams during some parts of their lives. Juveniles of stream-rearing fish are often highly mobile during their freshwater stage, moving seasonally between stream reaches. Some panelists expressed concern over the high likelihood that road failures would occur in heavily roaded watersheds. The consensus was that the rate of failure was largely dependent on storm events.

Riparian protection options were thought to provide little reduction in the risks to fish or stream channels caused by roads during construction. Road construction practices were considered by the panel to be an area requiring additional attention to insure that risks to fish and stream channels are not excessively high. Roads were also considered by the panel to increase the risk that improved access would contribute to over-harvest of fish by anglers.

Timber Harvest. Timber harvest activities increased risk to fish resources. Of particular concern was the protection of riparian areas including flood plains, areas of riparian vegetation, and certain wetlands associated with riparian systems. Also of concern was the amount of protection afforded steeper channels (often not fish-bearing) in the headwaters areas. Panelists considered it important to maintain the natural function of these steeper channels, including the V-notches. Forested leave strips were considered to be an important measure to insure protection of headwater areas. Protection of estuaries was also considered important when locating roads and timber harvest units. Adequate buffers between estuaries and logging and roading activities were considered in the point likelihood distribution. The panelists considered maintaining a high level of riparian protection to be important. All alternatives with lower relative levels of riparian protection exhibit higher panel ratings of risk to fish resources. Panelists agreed that, even with the highest level of riparian protection the risk of detrimental effects on fish would still be relatively high, in heavily impacted watersheds, due to cumulative impacts throughout the watershed.

Watershed analysis. The panelists identified watershed analysis as an important tool in tailoring riparian protection measures and road layout to site-specific conditions. Watershed analysis is considered to be "indispensable" if consideration is being given to modifying riparian protection guidelines to provide less protection: the application of watershed analyses would do much to avoid potential adverse effects to fish resources during resource management activities. Concern was expressed that standards be identified for an acceptable level of watershed analysis. (See Fish Forest-wide standards and guidelines in Chapter 4 of the Proposed Revised Forest Plan.)

Riparian Protection Options. The panel supported the application of different levels of protection for riparian areas associated with different levels of fish values. However, the panelists believed that all alternatives should receive Option 1 protection for the highest valued watersheds for fish and nothing less than Option 2 protection across the remainder of the watersheds. The additional protection afforded high gradient streams, particularly V-notches, by Options 1 and 2 were thought to be particularly important to reducing the risk to stream channels and fish. The group believed stream channel conditions were degraded and risks to fish increased as timber harvest and the associated roads occurred at higher elevations in the watershed, on steeper slopes and on less stable soils. The buffers prescribed in the Riparian protection options were recognized to be subject to blowdown. The panelists believed generally as the buffer widths increased the risk of total buffer blowdown decreased.

Additional Effects Analysis

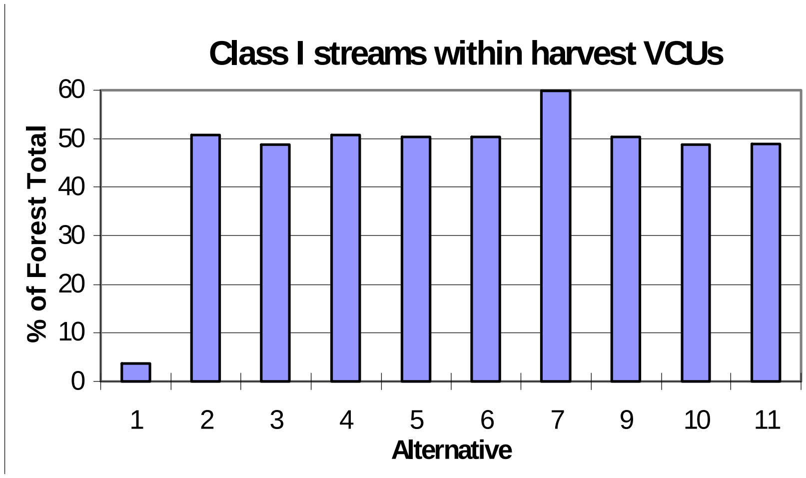
The fish and riparian panel evaluated Alternatives 1 through 9. Alternative 8 has been dropped from further consideration in the final EIS. Alternatives 10 and 11 were not evaluated by the panel but are analyzed in this section.

Scope of the potential effects. Past measures to protect fish habitat from the negative effects of land-disturbing management activities have focused primarily on site-specific conditions or stream reaches. Since fish populations can be affected by activities which alter the natural watershed processes a broader scope of analysis is necessary. Recent efforts to address salmon population declines in the Pacific Northwest broadened the scope of the analysis from the stream reach level to the watershed level. Both the Anadromous Fish Habitat Assessment (AFHA) and the Fish/Riparian Assessment Panel considered the effects of management activities in the context of watershed function and stream channel process. Analyses of management impacts on fish and riparian areas are conducted using VCU's as the basic land units. VCU's generally follow watershed boundaries and for analysis purposes can be considered to be generally equivalent to watersheds.

Except for Alternative 1, all alternatives increase the likelihood that fish dependent on the freshwaters of the Forest could be negatively affected by management activities. Although there are specific measures in each alternative designed to reduce the likelihood of significant degradation of fish habitat, there remains a risk to fish associated with management activities planned under each alternative. The relative likelihood of habitat degradation becomes greater with increases in miles of roads as well as with the amount, rate and location of timber harvest within a watershed. Timber harvest and associated management activities planned in those watersheds, in each alternative, have the potential to negatively affect stream channel processes, and thus fish habitat.

Except for Alternative 1, timber harvest activities on the Forest could potentially affect from 40 to 60 percent of the total Tongass anadromous and high value fish habitat (Figure 3-3). The analysis shows a lack of distinct differences in miles of class 1 streams which could potentially be affected in all alternatives (excepting Alternative 1). This suggests that fish habitat may be better protected with a higher level of riparian protection than by the application of reserves or non-timber management criteria.

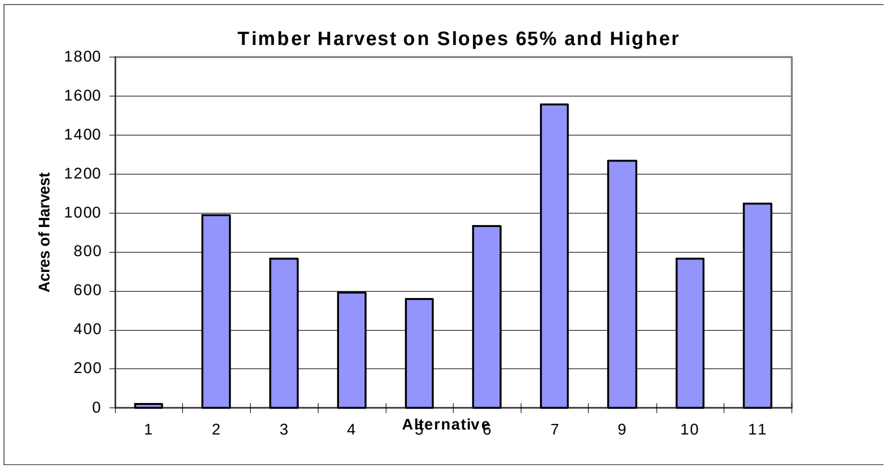
Figure 3-3
The percentage of Forest-wide total class 1 streams occurring in the VCU's entered for timber harvest, by alternative, by year 2095.



Unstable terrain. Concerns were raised in both the AFHA report and the Fish/Riparian Panel Assessment that future management activities would occur more frequently on steeper slopes and on more hazardous soils than did past management activities. Increased timber harvest and road construction in these areas increases the likelihood of landslides which transport large quantities of sediment and woody debris. Upon reaching streams this material blocks or shifts channels, alters existing habitat structures, and can fill-in pool rearing habitats and increase the percentage of fines in spawning gravel. These changes in fish habitat would likely decrease the habitat capability to produce fish.

Soils classified as high hazard, or MMI 3 (generally on slope gradients of 55 to 72 percent) are soils where natural mass failures or landslides are small and infrequent but that have a moderate to high risk of management-induced mass failure. The upper range of MMI 3 soils (65 to 72 percent) generally have a higher risk of mass failure than do the soils in the lower range (55 to 64 percent). MMI 4 soils (slopes greater than 72 percent) are soils where risk of mass failures are unacceptably high, and these have been removed from the tentatively suitable timber base. Some small inclusions of MMI 4 soils are found in the total acres of MMI 3 soils in this analysis. Analysis indicates that the amount of harvest on slopes of 65% and greater will increase over the past harvests on the same percent slope. Increased risks to fish habitat are expected to occur as a result of operating on steeper slopes. Figure 3-4 provides a comparison of 10-year acres of harvest, by alternative, for those soil within the upper range of MMI 3 soils (and MMI 4 inclusions).

Figure 3-4
Estimated acres of harvest for ten-years, on slopes of 65% or greater, by Alternative.



Roads. Both the AFHA report and the Fish/Riparian Panel Assessment expressed concern about the negative effects of road construction and maintenance on fish habitat. Roads can potentially create areas of hillslope instability resulting in landslide generation, contribute fine sediment from surface erosion, block fish migration, and alter surface and subsurface water flow patterns. As future harvest activity will increase proportionately on steep slopes (see above), a corresponding increase in miles of both system and temporary roads on steep and less stable terrain is also expected. Greater use of helicopter logging could offset some of this activity.

Table 3-20 shows the miles of existing roads and projected road construction in VCU's where timber harvesting may occur. At the end of 100 years of Forest plan implementation the estimated system road density among alternatives ranges from .73 to 1.25 miles/mile^2. With the exception of Alternatives 4, 5 and 6, road development will be more intensive early in the 100-year period, with nearly all of the construction being completed during the first 50 years. Although the numbers of miles of roads are relatively low in Alternatives 4, 5 and 6, these alternatives feature uneven management timber prescriptions which require road construction out to the end of 160 years. Total miles of roads at the end of 160 years are 5,019, 4,668 and 4,820 respectively.

Glossary

Table 3-20
Miles of system roads existing and planned by Alternative(1) at the end of 100 years.

Alternative	Existing Roads	New Roads	Total Roads	Percent Increase	Road density/ sq. mile
1	565	0	565	0%	1.02
2	4,359	6,190	10,549	142%	1.14
3	4,280	3,755	8,035	88%	.91
4	4,280	2,403	6,778	55%	.73
5	4,350	2,561	6,911	59%	.75
6	4,350	4,736	9,086	105%	.98
7	4,377	8,964	13,341	205%	1.12
9	4,327	7,844	12,171	181%	1.25
10	4,335	4,422	8,757	102%	.99
11	4,265	3,374	7,639	79%	.88

[1] Only roads in VCUs available for timber harvest, in each alternative, are included, which is why "existing" road miles vary. Road density calculations are based on the area of the VCUs being entered for timber harvest.

Approximately 28 percent of the VCU's within the Tongass are currently roaded. This percentage will increase in all alternatives except Alternative 1. At the end of 100 years, all the other alternatives except Alternatives 7 and 9 would have from 44 to 49 percent of VCU's roaded, with Alternatives 7 and 9 exceeding 50 percent.

System roads in Region 10 are designed with consideration for resource protection, legal obligations, total cost and the importance of the road. As a general rule, Region 10 Best Management Practices (BMPs) recommend that bridge crossings for system roads be designed to pass not less than a 50-year to a 75-year flood. Culverts for Class **I**, **II**, and **III** streams are recommended to be designed to pass not less than a 25-year to a 50-year flood. The American Fisheries Society (Furniss et al. 1991), recommends a 100-year flood as the minimum for bridges and large culverts and a minimum 50-year flood for other drainage structures. Best Management Practices guidelines allow a greater risk of degradation to fish habitat than do standards designed specifically for fish habitat protection.

Temporary roads are roads which are anticipated to be utilized only for the duration of timber sale activities and are not designed to as high of an engineering standard as are system roads. Because of the temporary nature of these roads (often intended to be used for less than one year) investments in stream crossings structures and road surfacing are much less than are similar investments in system roads. These temporary roads may create greater short-term risks to fish habitat than do system roads. They may also create greater long-term risks when cumulative effects are considered. Miles of temporary roads anticipated for the first decade under each alternative are displayed in Table 3-21.

Table 3-21
Estimated miles of temporary roads to be constructed during a 10-year period (1)

	Alternative									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Miles of temp. Roads	0	489	278	145	138	362	689	513	278	273

[1] Actual miles of temporary roads in alternative 1, 4 and 5 are likely to be higher than the numbers indicated in this table. Miles of temporary roads constructed for partial harvests (uneven-aged management) are likely to be greater than the miles of roads constructed for the same timber volume of clear-cut.

Stream Flow and Sediment Transport. Intensive timber harvest activities have potential to impair hydrologic function in watersheds. Concerns for impaired hydrologic function include peak flows, sediment transport and summer low flows. The peak flow and sediment transport issues are closely interrelated. Studies in the Pacific Northwest have shown a range of stream peak and low flow responses to various levels of watershed harvest. An Alaska study speculated that measurable decreases in flow occurred when 30% of a watershed was harvested. Following a recommendation by team of Hydrologists (Cumulative watershed effects, 1996), Alternative 11 received a FORPLAN model constraint (harvest threshold) of no more than 20% of the acres in a watershed will be in an age class of 30 years or less. Watershed analysis direction (Forest Plan, Appendix J) applied to Alternative 11 gives direction that should the threshold be reached, a watershed analysis should be conducted to determine the cumulative watershed effects of further harvest in the watershed.

Stream Temperatures. Summer high and winter low water temperatures influence fish survival and condition. Water affects the metabolic rate of aquatic organisms and can affect the migration timing of adult and juvenile fish. Small changes in water temperatures can affect emergence of fry from the gravel's and have a fairly large effect on eventual adult survival (Hotby and Scrivener, 1989). Harvest of streamside vegetation, as well as the total amount of harvest in a watershed, can affect water temperature.

Some stream systems are particularly sensitive to high temperatures, including slow-flowing streams with southerly aspects, and streams with shallow lake and muskeg sources. Timber harvest to the streambank is suspected of raising stream temperatures to a level which may contribute to adult fish kills although data indicates that fish kills have occurred in both logged and unlogged areas (Gibbons, 1989).

Low winter temperatures can lead to detrimental winter stream conditions, such as anchor ice formation and freezing of spawning gravel's. Pool size is reduced with increased size of surface and anchor ice. Low temperatures may be aggravated by streamside vegetation canopy removal, but estimating the effects are very difficult due to the influences of intermittent snow or ice cover and high variability in winter air temperature, wind and precipitation patterns commonly found in Southeast Alaska. Identification of temperature-sensitive streams, and watersheds requiring special management due to temperature considerations will occur during watershed analysis.

Riparian Management Options. The AFHA report indicated that current practices are not fully effective in preventing habitat degradation or protecting salmon and steelhead stocks over the long term. To address this concern, a range of options have been developed to further protect fish. Various combinations of these options were applied to the plan alternatives. (See Riparian Standards and Guidelines, in Chapter 4 of the revised Forest Plan, for a description of Option 2A. Options 1, 2 and 3 are included in FEIS Appendix I.) Table 3-22 shows how the options are applied by alternative.

Table 3-22
Riparian management levels applied in each Alternative, and percentage of streams in timber harvest VCUs receiving Option 2 (AFHA recommended level) protection[1]

Alternative	Total miles of streams in VCUs entered[2]	FHIP 1 Watershed level of protection	FHIP 2, 3 VCU level of protection	Percent of total streams protected with Option 2 or higher
1	1,691	Opt. 2	Opt. 3	21
2	23,977	Opt. 3	Opt. 3	0
3	22,988	Opt. 1	Opt. 2	100
4	24,045	Opt. 2	Opt. 3	20
5	23,807	Opt. 2	Opt. 3	20
6	23,807	Opt. 2	Opt. 3	20
7	28,308	Opt. 3	Opt. 3	0
9	24,556	TTRA/BMP	TTRA/BMP	0
10	22,988	Opt 2	Opt 3	20
11	22,520	Opt. 2a	Opt 2a	100

[1] Stream miles include all streams in the watershed and/or VCU.
[2] "Entered" means available for timber harvest.

Riparian Option 1 increases riparian protection above the recommendations made in the AFHA report primarily by increasing the area managed to insure windfirm core buffers. Option 1 will most likely allow little, if any, additional degradation of fish habitat over the long run. Riparian Option 2 includes most of the recommendations brought forward by the AFHA report. This option is less protective than Option 1, but more protective than Option 3. Option 3 is similar to current practices, although it may be slightly better than current practices in some guidelines. Option 3 is more likely to allow degradation of fish habitat than Options 1 and 2.

Following release of the RSDEIS and subsequent internal and external comment, which included many comments recognizing AFHA as the best available information on riparian protection, further analysis of AFHA was completed. Option 2 riparian protection was determined to fall short of meeting the intent of AFHA in several important areas, and a revision of Option 2 was undertaken to address the shortfalls. The revised Option 2, labeled Option 2a, is believed to provide a higher level of protection of riparian areas and aquatic resources than the original Option 2. The two most significant changes are the direction for watershed analysis and the protection of headwater areas. Option 2a has mandatory buffer widths until watershed analysis is completed. Following watershed analysis buffers may be modified providing they meet the stream process group objectives and are consistent with the findings of the watershed analysis. Streams in the headwater areas (high gradient contained channels) will receive no-harvest buffers within the slope breaks and outer areas managed for windfirmness more frequently than the same areas receiving Option 2 riparian protection. Although Option 2a does not have specific widths for managing for windfirmness (widths are variable depending on site specific conditions), this option does have attributes which are superior to Option 1 for reducing risks to fish habitat such as the requirement of watershed analysis prior to any changes in the riparian protection standards.

Watershed Reserves. In Alternatives 3, 5, 6, 10 and 11 reserves are implemented to address viability concerns for fish and wildlife. The 1991 SDEIS recognized that regardless of the level of fish habitat protection, some level of risk remained that fish habitat could be negatively impacted by some management activities. To further reduce that level of risk, watershed reserves are identified to maintain a spatial distribution of watersheds in which no timber harvest would occur (Kessler et al., 1995). The Alaska Department of Fish and Game, Commercial Fisheries Division statistical troll areas are used as the template to determine spatial distribution. Legislated reserves (such as Wilderness and legislated LUD II areas) were found in all but three statistical troll areas. These three areas were further examined and watersheds in two of the three areas were recommended for reserve designation (Lake Eva and Wright Glacier). No areas in central-western Prince of Wales Island met the criteria for watershed reserves, due to the land-ownership patterns, amount of past timber harvest, and preponderance of small watersheds. The proposed reserve strategy does not resolve all fish viability concerns, particularly in light of the lack of information on genetically discrete salmonid stocks, the relative significance of various fish stocks, and the importance of meta-populations throughout Southeast Alaska. The reserve strategy, if fully implemented, does however address the National Forest Management Act regulation regarding habitat for maintaining viable, well-distributed populations in the Forest.

Alternatives 3, 10 and 11 implement a full range of recommended habitat reserves. Alternatives 5 and 6 implement reserves in four provinces and the three additional watershed reserves identified specifically for fish.

Conclusion. In most alternatives, the natural range of variation in stream processes and fish habitat will likely be negatively affected by management activities over the long term. The extent of harvest activity and associated road development are likely to result in decreases of some fish populations in managed watersheds. Measures taken to mitigate, or moderate, the negative effects have been incorporated into the alternatives in ways to provide differing levels of risk to the fisheries resource. Both Alternatives 3 and 11 apply option 2 or higher riparian protection to all watersheds and therefore provide less risk to fish and stream channel processes than other alternatives. Alternative 11 has the highest level of protection of fish and riparian resources (with the exception of Alternative 1, which has no timber harvest or road construction scheduled).

Effects on Other Resources

Fish habitat, and its maintenance and enhancement, may complement or conflict with the production or capability of other resources. This section lists some of these potential interactions not covered in the previous discussion.

Heritage Resources. Occasionally the location of fish habitat enhancement projects may coincide with the location of cultural resource sites. This may occur because early Alaskans and native people fished at sites that had high fish production or at waterfalls with fish barriers. Development of fish projects requires careful cultural reconnaissance to avoid any conflicts between the resources. Implementation of the Forest-wide direction and standards and guidelines for

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Heritage Resources should result in to negative effects to these resources. The effect of fisheries on Heritage Resources is not expected to change by alternative.

Recreation. Maintenance and improvement of fish resources generally has a complementary benefit on recreation. A number of fish improvement projects are specifically designed to improve fishing opportunities for Forest users. The effects of fisheries on recreation are not expected to change by alternative.

Visual Quality. Maintenance and improvement of fish resources generally complements visual resource management. Forested areas retained along streams primarily to maintain fish habitat capability often enhance the visual condition. Improvement of fisheries in visually sensitive areas may lead to a reduction in visual quality where human-made structures are constructed. However, most of the time, fish habitat improvement projects can be constructed in a manner that will meet the allocated Visual Quality Objective. Those alternatives with a Retention Visual Quality Objective could have greater inherent conflict between visuals and fish.

Wilderness. ANILCA allows aquaculture development throughout the Forest including Wilderness. An objective of Wilderness is to maintain natural ecosystems. Maintenance and improvement of fish resources may include the construction of structures, such as fish passes and often increase the fish production capacity of streams These actions may have the effect of:

- Increasing recreation use with a decrease in desired solitude
- Effects on ecosystems due to the introduction of species not indigenous to the watershed.
- Structures not compatible in type and scale to the Recreation Opportunity Spectrum Class (ROS) setting.

Only those projects passing a broad scope justification analysis will proceed for further planning. In order to mitigate the effects of aquaculture in Wilderness, fish projects may require special construction to blend into the natural character of the areas and be limited to developments essential to project operations (ref. FSM, R10 Supplement 2300-95-2, effective 2/28/95). The effect of fish resource maintenance and improvement is not expected to differ by alternative.

Subsistence. Maintenance and improvement of fish resources is of positive benefit to subsistence users. Improvement of fish habitats generally provides greater opportunities for the subsistence user. The alternatives which present the least risk to fish resources are most likely to maintain subsistence opportunities (see Fish/Riparian Panel Assessment).

Wildlife. Maintenance of fish habitats complement the needs of wildlife. Riparian areas in an unharvested condition provide habitat for wildlife species requiring aquatic and riparian habitats and, often, old-growth forest conditions. Greater numbers of fish provide increased food for many fish-eating wildlife species, such as brown bear, black bear and eagles. The alternatives which present the least risk to fish resources are most likely to contribute to riparian habitats and fish as food resources to wildlife (see Fish/Riparian Panel Assessment).

Timber. The maintenance of fish habitat in riparian areas requires that parts of riparian areas and some areas adjacent to riparian areas, not have timber harvest or have reduced timber yields. The alternatives which have the greatest levels of protection of fish and riparian resources (riparian protection Options 1 and 2, and 2a) have the greatest effect on timber harvest. The largest single effect is created by the buffering of headwater areas. Protection of these areas with no-harvest buffers causes some areas otherwise available for timber harvest to be isolated and inoperable.

Water. In some instances, increased escapement of anadromous fish could decrease water quality in streams due to increased biological oxygen demand of live fish, as well as the decay of adult spawned carcasses. The change in water quality is usually only a concern where the water is used as a domestic or hatchery water source. These potential effects will have to be analyzed during site-specific planning of fish improvement projects. Otherwise, maintenance of water quality complements optimum fish habitat capability requirements. The effect of fish resource maintenance and improvement is not expected to differ by alternative.

Forest Health

Affected Environment

Current Situation

Insects, diseases, and related decay processes are an integral and natural part of forest ecosystems. Many of these appear to play key roles in gap-level disturbance (see discussion of old-growth forests under Biodiversity) and in providing wildlife habitat in old-growth forests. Due to the nature of the forests in Southeast Alaska, which are primarily mature with few contiguous blocks of second growth, insects and disease have had limited effects on overall timber availability. Losses to the timber resource caused by heart rot of live trees are considerable in old-growth forests, however, and it is not uncommon for 30-40 percent of the volume of older live trees to be decayed and thus unusable for wood products.

In addition to heart rot, some of the more common destructive insects and diseases or conditions within Southeast Alaska are:

Black-Headed Budworm, *Acleris gloverana* (Wals) is one of the more destructive forest insects in coastal Southeast Alaska. In the 1950's, almost one-third of the net timber volume was lost on many hemlock sites due to budworm defoliation. Localized outbreaks continue to occur throughout the hemlock type. Larval feeding strips hemlock foliage and can cause growth reduction, top-kill, and, at times, tree mortality.

Hemlock Sawfly, *Neodiprion tsugae* (Middleton) is a serious defoliator of western hemlock throughout Southeast Alaska. Outbreaks tend to be of longer duration in southern Southeast Alaska where widespread damage is usually confined to the area south of Frederick Sound, especially along Clarence Strait. Larvae feed on mature (older) rather than current year (new) foliage. Most sawfly outbreaks do not cause tree mortality, but the tops are killed in some trees and tree growth may be reduced.

Spruce Beetle, *Dendroctonus rufipennis* (Kirby) is the most destructive forest insect Alaska-wide, although outbreaks in Southeast Alaska are typically smaller and of shorter duration than those in south/central and interior Alaska. Most outbreaks originate in blowdown or logging residuals (cull logs) and spread to adjacent standing timber. Mortality in unmanaged Sitka spruce stands varies and can be as high as 75 percent. Weather conditions appear to play a role in the expansion or contraction of beetle populations. Spruce beetle activity has been noted across the Tongass National Forest and adjacent lands from Yakutat Forelands to Dall Island.

Hemlock dwarf-mistletoe, *Arceuthobium tsugense* (Rosendhal, G. N. Jones) is a destructive disease of western hemlock throughout Southeast Alaska as far north as Haines. Infestation levels vary: dwarf-mistletoe is absent in some stands; in other stands, almost every hemlock is infected. Western hemlock trees heavily infected with dwarf-mistletoe can be reduced in volume by as much as 50 percent over a 100-year period. The spread of dwarf-mistletoe in young hemlock stands is often the result of leaving standing infected hemlock in cutover areas (Shaw, 1982; Shaw and Hennon, 1991). Dwarf-mistletoe responds to light with increased seed production. Rates of spread to adjacent and lower canopy trees may increase in partial cuts where hemlocks remain.

Alaska Yellow-Cedar Decline and mortality of Alaska yellow-cedar continues to be one of the most widespread and important forest problems in Southeast Alaska.

Aerial surveys have mapped some 400,000 acres of decline. This decline is associated with wet, poorly-drained sites, and recent research has demonstrated that no organism is the primary cause of decline (Hennon, et al., 1985; Hennon 1990; Hennon, et al., 1990(d)). Since it is not contagious, Alaska yellow-cedar decline will not spread to sites where it is not found now (Hennon, et al., 1990(b)).

Hemlock Fluting. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their trunks, a condition which reduces the value of hemlock logs because they yield less sawlog volume and because some of the milled wood contains bark. Fluting continues to be a problem throughout Southeast Alaska. Researchers have recently explored reasons for this trunk deformation and have documented its presence in young hemlock stands.

Decays. Stem decays cause substantial loss in all tree species in unmanaged stands. Many decay fungi enter through tree wounds. The accidental wounding of trees during partial cuts and commercial thinnings will invariably increase the impact from decay organisms in managed stands.

Animal Damage. Significant animal damage to trees is apparent at various locations across the Tongass National Forest. Porcupine feeding on hemlock and spruce is common on Mitkof Island and many mainland areas. Young trees in managed and unmanaged stands are often top-killed or killed outright as porcupine feeding girdles the main bole. This damage becomes significant when groups of trees are killed or deformed. Porcupines also cause basal wounds on older trees which serve as entry points for decay fungi. Brown bears cause basal wounds on Alaska yellow-cedar each spring on Baranof and Chichagof Islands.

Future Trends

In the future, the greatest potential forest insect and disease effects are likely to be in mature and overmature stands where disease levels are high. Tree vigor tends to decrease with maturity, causing an increase in susceptibility to insects and diseases. Heart rot levels are directly proportional to both tree and stand ages. The spruce beetle has the potential to significantly alter the desired condition of stands in certain locations near the mainland where the insect has periodically become active. Stem and root decay, and the incidence of hemlock dwarf-mistletoe, have historically increased with intensified land management activities, particularly under harvesting systems other than clearcutting. The adverse effects of these forest insects and diseases, at least in part, can be mitigated through silvicultural treatments

Methodology and Scientific Accuracy

Forest pest activity on the Tongass National Forest is typically detected during on-the-ground activities, or during annual aerial surveys conducted by the region's Forest Pest Management (FPM) group. The timing of surveys coincides with foliage and pest development. Pest activity noted during surveys is documented and reported to the appropriate land manager. In cooperation with land managers, FPM people conduct on-site investigations to verify the pest, to evaluate the pest and its host(s), and to formulate future management alternatives. Often, pest and host monitoring is required to fully understand potential impacts prior to development of management alternatives.

Populations of historically significant defoliating insects are monitored through a sampling system that occurs in conjunction with the annual aerial survey. Defoliating larvae are collected, identified, and counted at designated sites. This data, in conjunction with future collection of host and weather information, will greatly enhance FPM's ability to predict defoliator damage.

The impact of hemlock dwarf-mistletoe and methods of reducing damage from the disease in managed stands have been established by several research studies (cited above). In addition, Forest Pest Management has surveyed numerous even-aged stands from 10 to 100 years old to determine the incidence and impact of hemlock dwarf-mistletoe in managed stands.

A series of research studies have yielded information on the pathology and epidemiology of decline of Alaska yellow-cedar (cited above; see also Hennon, et al., 1990(a); Hennon, et al., 1990(c)). In addition, information on the distribution of decline and acreage affected has been determined by mapping during aerial surveys.

Porcupine damage in managed stands is currently being assessed by two Forest Pest Management studies: an intensive sampling every six months of plots in young stands on Mitkof Island where damage was known to be heavy (Eglitis and Hennon, 1986), and an extensive sampling of young-growth stands from 10-100 years old located throughout Southeast Alaska.

With continued harvest of mature timber stands on the Tongass National Forest, forest pest research will begin to focus on pest activity within second-growth stands. This research will be conducted in cooperation with the Pacific Northwest Research Station.

Forest Health

Environmental Consequences

Direct, Indirect and Cumulative Effects

In general, alternatives that favor low amounts of timber harvest will tend to perpetuate higher disease levels in old-growth forests. Ecological processes and wildlife habitat will be maximized, but so will the continued loss of timber, primarily due to high levels of heart rot. Higher amounts of timber harvest will generally yield young stands with little significant insect and disease activity. However, how the alternatives achieve these harvest levels varies, with some relying primarily on even-aged management, others on uneven-aged management. Uneven-aged management will maintain or even increase levels of heart rot and hemlock dwarf mistletoe.

In general, endemic levels of insect and disease activity in mature and overmature forests will be allowed to run their course. Timber losses will be accepted, yet harvesting flexibility will be maintained to take advantage of timber salvage opportunities, particularly for dead and dying yellow-cedar stands. Insect and disease suppression may be justified in high quality, mature to overmature stands that cannot be salvaged immediately, or that lie near recreation areas and communities where scenic values are high.

Animal damage, such as that from porcupines, is expected to continue and will likely be increasingly evident in precommercially-thinned stands where porcupines are present. Winter feeding by porcupines is known to damage and sometimes kill young trees in both managed and unmanaged stands.

Mitigation

Maintaining biotic and structural diversity provides an opportunity for limiting some insect and disease problems. Some insects and diseases are host-specific, depend upon plants which are under stress, or flourish under homogeneous conditions. In other cases, and particularly for heart rot, favoring younger-aged stands through even-aged management may be the most effective way of limiting insect and disease problems. Diversity can be influenced through processes outside the control of the land manager (such as windthrow or landslides), or purposefully directed.

The careful use of alternatives to clearcutting can be a tool for maintaining desirable but not excessive levels of diseases, such as heart rot and dwarf mistletoe, that have important ecological consequences. Integrated Pest Management provides the opportunity to evaluate these and more traditional clearcut practices. Through prescription processes, stands with unacceptable insect and disease-related losses as well as those of high risk for future losses will be identified for treatment. Detection methods such as aerial surveys, currently in use, will continue to be used for the early identification of epidemics.

Heritage Resources

Affected Environment

This section was formerly called Cultural and Historical. These resources are now both included under the term "Heritage Resources." Heritage Resources located within the Tongass National Forest include a diverse range of prehistoric and historic sites and artifacts that span approximately 10,000 years of human occupation and resource use. Prehistoric remains include campsites, village sites, graves, resource areas, rock art, portages, and rock shelters. Historic sites include houses, cabins, mines, trails, portages, canneries, boatworks, shipwrecks, and military installations. Many of these cultural remains provide the only record of former human occupation, work areas, and lifestyles. Many areas have traditional or spiritual significance for contemporary Native Americans. The Heritage Resources of the Tongass represent an important part of our local, regional, and national cultural heritage.

Between 1976 and 1994, approximately 149,000 acres of National Forest lands were inventoried for cultural resources, with over 2,000 cultural resource sites identified. These and more recent surface inspections account for less than one percent of Tongass National Forest acreage. A similar, relatively high, density of cultural sites is expected to be located within the Forest in the future. Specific locations associated with Native Alaskan traditional and religious use are identified on an ongoing basis. Information gathered from these inventory efforts provides information about heritage resource distribution and sensitivity to damage.

Certain types of Heritage Resources such as sites, artifacts, and other observable results of human activity have a greater probability of being located in specific areas, including intertidal zones, beach fringes, riparian zones, areas of known mineral deposits, and uplifted fossil beaches. The environmental characteristics that invited human use and habitation in prehistoric times are often the same factors which invite use today. However, because of elevational and sea level changes after deglaciation, the location of the earliest human activity areas may be further inland and at higher elevations than more recent activity areas.

Methodology and Scientific Accuracy

The Forest has established and maintained a cultural resource management program to identify, evaluate, preserve, and protect significant cultural resources on a Forest-wide and project-specific level in compliance with the National Historic Preservation Act, as amended, as well as a number of other acts and implementing regulations. The preservation and protection of the Forest's cultural resources are both closely associated with their locations, the type of management activity, and the environmental characteristics where these activities occur. Impacts to the resource may result from natural forces, from public access, or from project-related activities. Future management options will vary and are likely to include increased demand for scientific study and use for interpretation and public enjoyment.

Additional inventory information is gathered on an ongoing basis. Information gathered from continuing inventories will provide insight into resource distribution and the sensitivity of sites to damage. Further scientific study will increase knowledge about cultural traditions associated with early human migration and later exploration and development of the region, as well as human behavior in response to social and environmental change.

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Heritage Resources

Environmental Consequences

Direct, Indirect and Cumulative Effects

The preservation and protection of the Forest's Heritage Resources are both closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics where management activities occur. Effects on the resource may occur from natural forces, from public access, or from project-related activities.

Erosion and other environmental effects may deteriorate heritage sites through decomposition. This kind of resource damage is most evident in objects or structures made of wood. Stabilization, regular maintenance, rehabilitation or data recovery are means of preventing the loss of the sites and the information they contain.

Public use may destroy heritage sites through inadvertent damage caused by compaction, or other ground-disturbing activities. Vandalism, including relic collecting, defacement and theft, results in the loss of information and destruction of the resource. Protection of significant sites from public use includes the establishment of public education programs, maintaining confidentiality about specific-site locations, monitoring, and directing public use away from the most vulnerable sites.

Areas managed for recreation provide opportunities for protection and interpretation for public education and enjoyment. Active educational and interpretive programs can create a greater awareness of the importance of Heritage Resources and foster a sense of stewardship while adding to the recreational experience. However, protective measures to control or eliminate intentional destruction of these areas by relic collecting, theft and other forms of vandalism must be implemented.

While multiple-use activities have benefited Heritage Resources by providing opportunities for inventory, evaluation, and interpretation in remote areas of the Forest, ground-disturbing activities have the most potential to adversely affect these resources and their environmental settings. The amount of impact is determined largely by the location and nature of the activity, the characteristics of the soils, and the degree of use.

Heritage resource management may increase the cost of project implementation. Some areas may need to be avoided entirely in order to protect the resource. This may result in greater expense in accessing sites and a loss of commercial products, such as timber or minerals. Protection of significant cultural resources often precludes timber or mining activities within a designated site boundary. When preservation in place is not desired, or possible, costs may increase due to project delays for required mitigation. Normally, when the Section 106 process of the National Historic Preservation Act is completed early in the planning process, project delay or additional costs are minimal.

In all alternatives, the preferred management of sites eligible for, nominated to, or listed in the National Register of Historic Places is avoidance and protection. Potential effects from environmental modification may require mitigation to achieve an effect that is considered to be not adverse in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. These potential effects are diminished when the physical settings around significant cultural resources are maintained in a natural state.

Land Use Designations allowing timber harvesting and road construction are most likely to affect Heritage Resources through alteration of environmental settings or damage to unknown sites as projects are implemented. In many instances, retention of a natural setting is crucial to imparting and protecting the values which qualify a cultural resource for National Register status. Conversely, the opportunity for the identification of new sites is higher within these areas because of the intensity of inventory efforts. Direct impacts may occur to sites that are determined to be ineligible for the National Register of Historic Places. Mining activities may have similar effects. An indirect effect common to alternatives and prescriptions is that the discovery of new sites can lead to vandalism if locations become known to the public

Potential effects to cultural resources and the differences in risk between the alternatives are difficult to measure. Table 3-23 uses first-decade road construction miles and timber harvest acres as relative indicators of potential adverse effects. Since project areas are inventoried for cultural and historic sites prior to implementation, the levels of risk are considered relatively low for all alternatives. Alternatives 7 and 9 have the highest risk related to road construction and timber harvesting. Alternative 1 has no risk in the context of the table, however, recreation and tourism activities also pose some risk under all alternatives.

Table 3-23
Average annual ground-disturbing activities, first decade

Alternative	Timber Harvest (acres)	Road Construction (miles)
1	0	0
2	14,705	190
3	9,505	104
4	6,288	52
5	4,550	49
6	11,525	124
7	20,297	263
9	17,428	225
10	11,168	121
11	8,571	110

Over time the effects of decay, neglect, and natural landscape changes threaten the preservation of significant cultural resources. Increased project activity could result in accelerated loss of cultural resources, primarily from indirect effects through increased public access and the potential for looting and vandalism of cultural resource sites.

Mitigation

All alternatives include requirements for inventory, protection, preservation, and interpretation, and for consultation with the State Historic Preservation Office as described in the Heritage Resource Standards and Guidelines (see Forest Plan, Chapter 4). Effects are avoided or mitigated through a variety of measures. Mitigation of potential effects to cultural resources other than avoidance may include protective enclosures, systematic monitoring of project activities, or mandatory restrictions on project design. When impacts cannot be avoided, systematic recovery of the information through excavation, collection of materials, and detailed documentation may be required as determined through consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. Protection of significant heritage resource sites from public use includes the establishment of public education programs, maintaining confidentiality about specific locations, monitoring, and directing public use away from the vulnerable sites.

Karst and Caves

Affected Environment

The Tongass National Forest contains the largest known concentration of dissolution caves in Alaska. These caves, formed by the dissolving of rock by acid groundwater, are found within a characteristic geologic landscape known as karst—lands underlain by carbonate (limestone and marble) rocks within which a subsurface drainage system has developed. The karst lands are recognizable by their internal drainage system, sink holes, collapse features, closed basins, and the presence of caves. Most caves in Southeast Alaska are found in karst landscapes.

The karst and cave features and their associated resources are a recently discovered and recognized attribute of the Tongass, with national and international importance. The cave systems are extensive and diverse. In general, karst areas are being seen as distinct ecosystems with interrelated biological, mineralogical, cultural, and paleontological components, and unique recreational values. The information presented here is based largely on a recently completed karst resources and caves assessment (Baichtal and Swanston 1996), which contains more detail and specific references.

The Federal Cave Resources Protection Act is the primary law recognizing caves. It requires protection of caves designated as significant on Federal lands, and gives criteria for determining significance. Although the intent of the Act is to protect caves specifically, caves and their associated resources are an integral part of the karst landscape. To fully protect the cave resource, the caves and their karst landscapes need to be managed as an ecological unit.

Characteristics of the karst ecosystem include: mature, well-developed spruce and hemlock forests along valley floors and lower slopes; increased productivity for plant and animal communities; highly-productive aquatic communities; well-developed subsurface drainage; and the underlying unique cave resources. The visible karst landscape also contains "epikarst," or surface features, particularly in the alpine and sub-alpine zones. These include deep shafts and fissures, eroded rills, and spires or spikes of limestone. The current karst inventory for Tongass National Forest lands includes 479,000 acres of karst areas.

Karst lands add a vertical, underground dimension to land use planning. Karst subsurface drainage networks generally operate independently of, and with more complexity than, the surface drainage systems above, and the watershed characteristics of the surface may have little or no relationship to the subsurface system. On karst lands, the many solution-widened fissures at the surface become entry points into the subsurface drainage system, where water and sediment from surface sources move vertically downward into the underground lateral systems. Sediment and water from disturbed lands or roads may enter this system at a single point and emerge unexpectedly at one or more distant springs, sometimes crossing surface watershed boundaries. Karst groundwater systems routinely transport water for several thousands of feet to receiving caves, springs, and surface streams.

Mechanisms of sediment transport are different between karst and non-karst landforms. A particle of soil in non-karst lands, as the result of landslides or surface water flow, may be transported laterally over relatively great distances into a watercourse to become sediment, although only a small proportion of these soil particles may actually reach a water course. Atop a karst landform, depending on the openness of the karst system, a soil particle may only need to be transported laterally a few inches or feet before being washed vertically down into the subsurface karst system. This openness is one reason for the vulnerability of karst to disturbance from management activities.

Most Tongass National Forest caves predate the most recent glaciation, as evidenced by the presence of glacial clays, glacial sediments, wood, Pleistocene vertebrate remains, and possibly ancient ice. This glaciation modified a pre-existing karst landscape, collapsing some passages and systems, gouging into others, and filling some with sediments. The epikarst (surface karst), which is well developed in higher elevations, has been removed in places at lower elevations by glaciation. Where low-elevation epikarst is present, primarily on the outer coast of islands seaward of Prince of Wales, vegetation has been reestablished and a forested epikarst created. With the development of forested epikarst and peatlands, and the entrance of associated acidic waters into underground tributaries, a system of enlarged caves and vertical shafts has developed.

There is a definite tie between the karst landscape and the productivity of the spruce and hemlock forests found there. Dense stands of very large diameter spruce and hemlock at lower elevations are characteristic of many karst landscapes. The major contributors are believed to be the nutrient rich soils, well developed subsurface drainage, and dissected bedrock surface which allows the tree roots to hold fast and become more windfirm. The old growth on this low-elevation karst provides a well structured, multi-layered canopy resulting in high quality winter habitat. The structure of the forest provides many forbs and shrubs for wildlife. It is possible that the available forage contains, at a minimum, higher calcium levels allowing for better bone, muscle, and antler development. The combination of quality forest structure and abundant nutritional browse make the karst landscape in general exceedingly important habitat.

Many wildlife species find the surface karst features and the stable environment and shelter provided within the caves to be valuable habitat. Caves have been used as natal den sites for otters, and as resting and denning sites for deer, bear, wolves, and small furbearers. Deer are known to rest around cave entrances both in summer, when the air coming from the caves is cooler, and in winter, when the cave entrance environment is warmer than elsewhere. Some bird species, including dippers, thrushes, and swallows, are known to use cave entrances for nesting and feeding. Rookeries for seabirds have been found in some littoral (sea coast) caves. Cave systems provide habitat for many invertebrate organisms and an extensive inventory of invertebrate species is underway.

Cave systems provide critical summer and winter roosting and hibernating habitat for bats. Bats select cave sites because they fulfill specific requirements involving cave structure, air circulation patterns, temperature, humidity, and location relative to feeding sites. Southeast Alaska caves appear to be most important to bats during periods of winter torpor; no use of caves as summer roosts or maternity colonies has been noted as yet. Much work remains before a good understanding of the year-around importance of caves to bats is understood.

Preliminary studies suggest that aquatic habitats associated with karst landscapes may be 8-10 times more productive than adjacent non-karst aquatic habitats. Karst aquatic habitats support a greater abundance, distribution, density, and variety of invertebrate species than non-carbonate habitats, have higher growth rates for smolts and resident fish, have less variable water temperatures and flow regimes, and contain unique habitat affecting species distribution, abundance, and adaptation.

The potential cultural and paleontological significance of the caves and karst landscape is high. The Pleistocene paleontology of the area is primarily known from cave and rock shelter deposits, which are often intimately related to archaeological sites. The cool, stable, non-acid environments in the caves result in exceptionally good preservation of bone and organic materials. To date, significant archaeological and paleontological materials have been discovered in over thirty caves and rock shelters within the Ketchikan Area of the Tongass. Evidence of human habitation, the oldest dating to nearly 9,730 years before present (B.P.), has been discovered in several caves on Prince of Wales and nearby seaward islands. Seven black bears (Ursus americanus), one dating to approximately 39,000 years B.P., and ten grizzly or brown bears (*Ursus arctos*) ranging in age from 35,363 to 7,205 years B.P. and now extinct on Prince of Wales Island, have been found.

Aerial and on-the-ground observations are revealing the effects of past resource management on karst systems. Hydrologic evidence suggests that timber harvest increases the amount and changes the timing of peak surface flow, resulting in accelerated sediment and debris transport. Passages have flooded which had not flooded for centuries, and many cave entrances are infilled and/or blocked by logging slash, sediment, and debris, resulting in surface flows being re-routed into different passages. In the past runoff generated from road surfaces commonly is diverted into karst features. It is not known what cumulative effects past timber harvest has had on the epikarst landscape. In some portions of the Ketchikan Area, 70 to 80 percent of the commercial forest land within specific karst blocks has been harvested. It is estimated that about 50 percent of the karstlands below 1,400 feet in elevation and on slopes less than 60 percent in the Thorne Bay Ranger District have been harvested (based on the GIS database).

On the low to moderate vulnerability karst lands were mineral or glacially-derived soils fully or partially cover the epikarst, forest regeneration is exceptional. In these areas even the complete loss of soil and litter from the surface of the limestone will not prohibit the re-establishment of a forest, since the displaced surface materials are retained within the epikarst channels (Harding and Ford 1993). Inclusions within these areas, such as sharp karst knobs, steep slopes, and areas of intense karst development, have had problems regenerating or now support stunted, chlorotic vegetation. On highly sensitive karst lands the epikarst channels are too deep to allow conifer seedlings to establish themselves even if the displaced soil is retained. The bottom of the channels may also be open, directly transporting sediment and debris into the karst groundwater system. Highly sensitive or vulnerable karst areas are generally found at higher elevations, have thin organic soils which are easily displaced, are on steeper slopes, or are in areas of intense karst development. Previous harvest in such areas has increased the percentage of bare rock, resulting in less-than-desirable forest regeneration.

Although most caves found to date on the Tongass are not suitable for recreation purposes because of frequent flooding, instability or presence of fragile structures, the Forest Service is seeking opportunities for surface and subsurface public access and interpretation.

Karst and Caves

Environmental Consequences

There are three options for managing caves and karst areas in the alternatives. Current direction (Alternative 9) extends only to the protection of designated significant caves under the Federal Cave Resource Protection Act. Alternatives 2 and 7 use standards and guidelines from the unpublished 1992 FEIS for caves. These standards and guidelines include a process for compiling an inventory of significant caves, measures to take in protecting all known significant caves, and some recognition of the connection between karst geology and caves.

The third approach to cave and karst management is designed to assess the vulnerability or sensitivity of karst areas to planned resource activities. This strategy strives to maintain the natural karst processes and the productivity of the karst landscape while providing for other resource uses where appropriate. The karst vulnerability strategy is outlined in detail in the Karst and Cave Resources Forest-wide Standards and Guidelines (revised Forest Plan, Chapter 4). These are applied in Alternatives 1, 3, 4, 5, 6, 10 and 11. A protocol for accessing vulnerability levels is presented in Appendix I of the revised Forest Plan.

Under this strategy, project planning will first identify all potentially affected karst lands and features, and the extent of their hydrologic systems. Karst areas would then be rated in terms of their vulnerability to the proposed management activities. Low vulnerability areas would not require any special management. High vulnerability areas would be removed from the suitable timber base (if the project is to harvest timber), or otherwise avoided. In moderate vulnerability areas, activities would be allowed, but with some restrictions on practices or project design.

All alternatives include, at a minimum, direction for protecting significant caves under the Caves Act, and no significant adverse effects to those caves are anticipated under any alternative. However, alternatives 2, 7 and 9 do not include the Karst and Cave Resources standards and guidelines. In these alternatives, karst features and systems that go beyond the extent of associated significant caves are not covered by Forest Plan direction. In moderate and high vulnerability karst areas, if management activities such as timber harvesting occur, adverse effects such as those described above under Affected Environment are likely. In these areas, over time, karst ecosystems and processes could be significantly adversely affected, with the potential reduction or loss of fish, wildlife and plant habitats, and the destruction of unknown but possibly significant archaeological and paleontological resources.

The current inventory of known karst areas can be used to estimate the potential risk to karst resources from the alternatives, in particular those not adopting the Karst and Cave Resources standards and guidelines. Table 3-24 shows the acres of inventoried karst areas, and those that are suitable timber lands, that are included within the Moderate and Intensive Development LUD groups by alternative. Since even with application of the standards and guidelines there is some risk of affecting unidentified karst areas, Alternative 1 among those using the standards and guidelines has the lowest risk. Among those alternatives not adopting the Karst and Cave Resources standards and guidelines, Alternatives 7 and 9 pose the greatest risk to karst ecosystems across the Tongass, each with about 75 percent of the inventoried karst area of 479,000 acres available for timber harvest. Alternatives 2 and 4 include about two-thirds of inventoried Karst in these

LUD groups, and Alternatives 3, 5, 6, 10 and 11 roughly 50 percent. Alternative 2 also does not adopt the karst and cave resources standards and guidelines

Table 3-24
Inventoried karst area within Moderate and Intensive Development LUD groups by alternative

Alternative	Total Inventoried Karst Areas	Portion that is Tentatively Suitable Timber Lands
1	6,183	3,321
2	316,753	160,574
3	258,870	129,086
4	316,753	160,453
5	238,136	143,617
6	238,136	143,617
7	268,832	191,543
9	356,021	188,665
10	251,659	115,892
11	225,979	104,593

Source: Query Qkarstrx.

Lands

Affected Environment

The Lands category includes non-recreation special uses, land ownership administration and adjustments, and Transportation and Utility Systems. Most non-recreation special uses (roughly 500 are under authorization in any given year) are industrial uses such as commercial fishing camps, transportation facilities, and electronic sites. Appendix E of the revised Forest Plan lists the existing and potential electronic sites. A recent study (summarized in Morrell 1992) identified locations within the Tongass where electronic communication coverage is weak or lacking.

Land ownership within the Tongass National Forest is complicated by several on-going land selection processes. The Alaska Statehood Act of 1959 authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within National Forests in Alaska, for furthering the development and expansion of Alaskan communities. As of October 1995 the State had received title to approximately 212,400 acres located in the Tongass National Forest. The State has completed its National Forest selection process, and most of the land requested by the State has been approved by the Forest Service. Approximately 104,000 acres remain to be conveyed from the Chugach and Tongass National Forests.

The Alaska Native Claims Settlement Act of 1971 (ANCSA) provided for conveyance of 23,040 acres of land to each of the ten Native village corporations and two urban corporations located in Southeast Alaska, additional acres to the Regional corporation (Sealaska), and up to 160 acres to Native individuals who had occupied that land as a primary place of residence on August 31, 1971. As of October 1995 approximately 544,400 of a total of approximately 560,700 acres had been conveyed. The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to their designation as National Forest to apply for conveyance of up to 160 acres, under conditions prescribed by the Act and Federal Regulations. As of October 1995, 2,014 acres in 37 Native allotments had been conveyed, with an additional 7,914 acres pending adjudication by the Bureau of Land Management.

"Transportation and Utility Systems" are major rights-of-way corridors and their associated sites. These systems include State and Federal highways, powerlines of 66 kV capacity or greater, and pipelines 10 inches or more in diameter if they are a public utility. A number of such systems have been potentially identified or proposed in recent years, and several are currently under study. The revision of the Forest Plan has developed a Transportation and Utility Systems Land Use Designation (LUD) which can be applied to these potential corridors. With certain exceptions Transportation and Utility Systems are allowed throughout the Tongass, as directed by Title XI of ANILCA.

Lands

Environmental Consequences

There are no significant environmental consequences within the Lands category anticipated for any of the alternatives. Minor changes to the National Forest land base may continue to occur as a result of the ongoing conveyance processes, or from future land exchanges. An adjustment to the suitable timber land base has been made for each alternative for lands anticipated to be conveyed in the future ("encumbered"). The future addition of electronic sites by private industry could help improve electronic signal coverage Forest-wide.

Major Transportation and Utility Systems can reduce scenic quality while at the same time increasing recreational access, and may affect other resources. Each proposed Land Use Designation is identified as being either an "avoidance area" or a "window" for the location of these systems. Windows represent areas of no conflict between desired LUD uses and the designation of a transportation or utility corridor or site. Avoidance areas represent LUD's where such a designation would not be desirable. While no LUD precludes the designation of a corridor or site, the idea is to locate them within a window where possible. Alternatives with more acres in "windows" would thus make this location easier. The differences in window and avoidance area acres between the alternatives are not considered significant effects.

Use of the Transportation and Utility Systems LUD will help reduce potential conflicts in the event of future development of either major state highways or utility systems (such as transmission lines). This LUD is applied in all alternatives, except Alternatives 1 and 9, to selected potential highway routes and utility corridors identified in recent studies (see discussion in Transportation section, and the alternative maps). This LUD will function as a "window" as just discussed. Under Alternative 1, and under Alternative 9 but considerably less so, the future development of many of these routes or systems could be subject to more stringent environmental standards, particularly for scenic quality, and could therefore be costlier than under the other alternatives.

Minerals

Affected Environment

A wide variety of mineral deposit types and mineral resources occur within the boundaries of the Tongass National Forest. Examples of some of these mineral resources are gold, silver, molybdenum, and uranium, and nationally-designated “strategic” and “critical” minerals such as lead, zinc, copper, tungsten and platinum group metals. The Forest Service recognizes that minerals are fundamental to the Nation’s well being and, as policy, encourages the exploration and development of the mineral resources it manages. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on National Forest System lands.

Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau. This discovery sparked keen interest and, by the turn of the century, dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained active until World War II. From the close of World War II to the mid-1970’s, mineral exploration and production in Southeast Alaska remained low compared to the activity documented at the beginning of the century. Prospecting and exploration generally increased during the mid-1970’s, in part due to the Quartz Hill/Greens Creek discoveries, improved metal prices, technological advances, and the deregulation of gold. Metal prices have maintained generally favorable trends since the mid-1980’s, resulting in increased exploration and renewed interest in precious metals, mainly gold.

Mineral resources are legally divided into three groups: locatable minerals, leasable minerals, and salable minerals. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group of minerals.

The General Mining Law of 1872, as amended, grants every United States citizen the right to prospect and explore public domain lands open to mineral entry. The right of access is guaranteed and is not at the discretion of the Forest Service. By law, designated Wilderness, National Monuments, and other withdrawn areas are closed to mining claim location. These withdrawn areas, however, are subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future.

The Forest Service works with mining claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining plan of operations submitted by the claimant, disclosing impacts of the proposed mining operations in a site-specific environmental document, approving only those activities that are reasonably necessary for the proposed operation, monitoring operations to ensure environmental standards are met, and ensuring prompt and reasonable reclamation of disturbed areas.

Locatable minerals

A locatable mineral is any mineral which is “valuable” in the usual economic sense, or has a property that gives it distinct and special value. Examples of some locatable minerals on the Tongass National Forest are gold, silver, copper, molybdenum, iron, nickel, lead, zinc, limestone, and marble.

Most estimates of locatable mineral resource potential use a format recognized and developed by the U.S. Bureau of Mines and the U.S. Geological Survey (USBM and USGS, 1980). Mineral resources are divided into “identified resources” (the primary responsibility of the U.S. Bureau of Mines) and “undiscovered resources” (the primary responsibility of the U.S. Geological Survey). The Tongass contains both identified and undiscovered reserves.

The gross metal value of identified mineral resources within the boundaries of the Tongass National Forest was estimated by the U.S. Bureau of Mines (Caldwell, 1990). In 1990, this value was $37.1 billion dollars (expressed as 1988 dollars). Highest among the individual minerals were molybdenum ($14.4 billion) and iron ($12.7 billion), with gold third at $2.26 billion. The gross metal value of undiscovered mineral resources was estimated for the Tongass National Forest by the U.S. Geological Survey (Brew, 1990). In 1990, this value was $28.3 billion dollars (expressed as 1988 dollars). Highest among the individual minerals were copper ($6.8 billion), iron ($4.6 billion), molybdenum ($4.35 billion), and tin ($3.4 billion). These totals cover the entire Tongass, and thus include areas currently withdrawn from mineral entry, such as wilderness.

Demand for mineral resources can be inferred based on the amount of money spent by the mining industry to prospect and explore for mineral resources in Southeast Alaska. Increases in the amount of money spent on exploration reflect an increase in demand for mineral resources. Between 1982 and 1987, the mineral industry spent an average of $2.92 million per year on mineral exploration in Southeast Alaska, with a high of $5.85 million in 1987. Between 1988 and 1991, the industry spent over $20 million each year. Expenditures for the last three years were: 1992 - $14.86 million; 1993 - $15.67 million; 1994 - $9.8 million (Alaska Department of Natural Resources, “Alaska’s Mineral Industry” annual summaries).

Demand for mineral resources can also be inferred by modeling the economic viability of identified mineral resources. Identified mineral resources with high degrees of economic viability will reflect an increase in mineral-related activities or in demand for those resources by industry. The economic viability of 148 mineral deposits located within the boundaries of the Tongass National Forest were modeled by the U.S. Bureau of Mines (Coldwell 1990). Fifty-two mineral activity tracts covering 605,854 surface acres were classified as having a high potential for experiencing mineral exploration or development activity during the next 10 to 15 years. These are displayed in Table 3-25, and located in Figure 3-5. Based on economic criteria or the presence of an active gold deposit, 22 of these were identified as most likely to be developed (Rank = 1), and 10 were identified as likely to provide a positive rate of return discounted at zero percent.

Table 3-25
Identified Mineral Resources of the Tongass NF Displayed by Mineral Activity Tract

Map No.	Tract Name	Acres	Rank	Gross Value ($ Thousands)	Pre-Tax NPV 0% DCFROR[3] ($ Thousands)	Gold (troy oz.)	Silver (troy oz.)	Lead (lb.)
1	Chilkat Peninsula	40	3	10,954	-	24,000	-	-
2	Sullivan[1]	7,938	1	-	-	-	-	-
3	Bohemia Basin[1]	9,376	1	530,320	202,032[2]	-	-	-
4	Berners Bay	10,318	1	918,086	382,810[2]	2,011,450	-	-
5	Juneau Gold Belt[1]	85,699	1	387,947	5,195[2]	5,519,693	4,794,500	201,840,000
6	Fremming	501	3	5,859	-	7,500	30,000	300,000
7	Douglas Island	1,319	2	163,311	-	357,800	-	-
8	Funter Bay[1]	11,499	1	25,721	-	-	-	-
9	Greens Creek[1]	7,528	1	1,683,141	1,398,284[2]	630,000	84,000,000	273,000,000
10	Taku Mo	3,199	3	11,440	-	-	-	-
11	Enterprise	1,505	3	4,793	-	10,500	-	-
12	Apex-El Nido	4,603	2	11,655	-	25,536	-	-
13	Basaltic Cu[1]	4,484	3	2,502	-	-	-	-
14	Mirror Harbor[1]	2,242	2	21,233	-	-	-	-
15	Pinta Bay[1]	1,301	3	-	-	-	-	-
16	Chichagof[1]	12,946	1	329,155	167,448[2]	716,000	203,000	-
17	Slocum Arm[1]	8,625	3	-	-	-	-	-
18	Silver Bay[1]	22,706	3	-	-	-	-	-
19	Pyrola[1]	3,261	2	106,854	-	-	5,715,000	16,510,000
20	Hasselborg[1]	1,860	3	-	-	-	-	-
21	Crystal/Friday	1,391	2	27,386	-	60,000	-	-
22	Windham Bay[1]	23,909	3	9,664	-	20,655	20,120	4,000
23	Sumdum[1]	41,419	3	487,093	-	6,678	8,129,140	224,800
24	Pt Astley[1]	2,004	3	35,009	-	58,800	89,000	2,400,000
25	Zarembo[1]	27,886	1	60,008	-	7,800	3,174,000	10,060,200
26	Portage Mountain[1]	1,280	3	5,678	-	10,040	55,200	-
27	Duncan[1]	2,393	3	50	-	-	-	-
28	Grnd Hog/Glacier[1]	15,859	1	237,677	-	-	683,784	126,230,000
29	Shakan	42,763	1	2,837	-	-	-	-
30	N, Bradfield Cn[1]	1,120	3	23,790	-	-	-	-
31	Hyder[1]	56,396	1	95,497	-	107,999	1,755,175	53,797,300
32	Franks Ridge[1]	5,866	3	-	-	-	-	-
33	Khayyam[1]	23,450	1	5,970	-	5,040	25,200	-
34	South Arm[1]	7,943	3	-	-	-	-	-
35	Niblack[1]	8,915	1	-	-	-	-	-
36	Dolomi[1]	8,634	1	-	-	-	-	-
37	Lime Point	900	3	2,123	-	-	-	-
38	Big Harbor[1]	3,535	3	-	-	-	-	-
39	Jumbo[1]	12,326	1	31,848	-	28,800	63,900	-
40	Hollis	17,148	1	-	-	-	-	-
41	Kasaan[1]	8,176	1	97,289	13,311	43,200	95,850	-
42	Salt Chuck[1]	4,817	1	2,757	-	1,189	19,635	-
43	Union Bay	17,492	3	12,511,500	7,077,019	-	-	-
44	Helm Bay	7,204	1	49,203	-	107,800	-	-
45	Tongass Narrows	4,488	1	85,451	637	189,240	-	-
46	Thorne Arm	7,657	1	51,668	-	113,200	-	-
47	George Inlet[1]	6,198	3	45,308	-	78,144	-	312,000
48	Quartz Hill	2,402	2	13,740,000	5,787,407[2]	16,344,000	2,000,000	-
49	Barrier Island[1]	4,414	3	-	-	-	-	-
50	Nichols Mountain[1]	16,882	3	-	-	-	-	-
51	Bokan[1]	17,750	2	4,157,915	719,244	-	-	-
52	McLeod Bay	2,287	1	-	-	-	-	-

[1] Contains deposits of critical minerals.
[2] Also contains deposits with a positive after-tax NPV at 4 % DCFROR
[3] DCFROR = discounted cash flow rate of return

Glossary

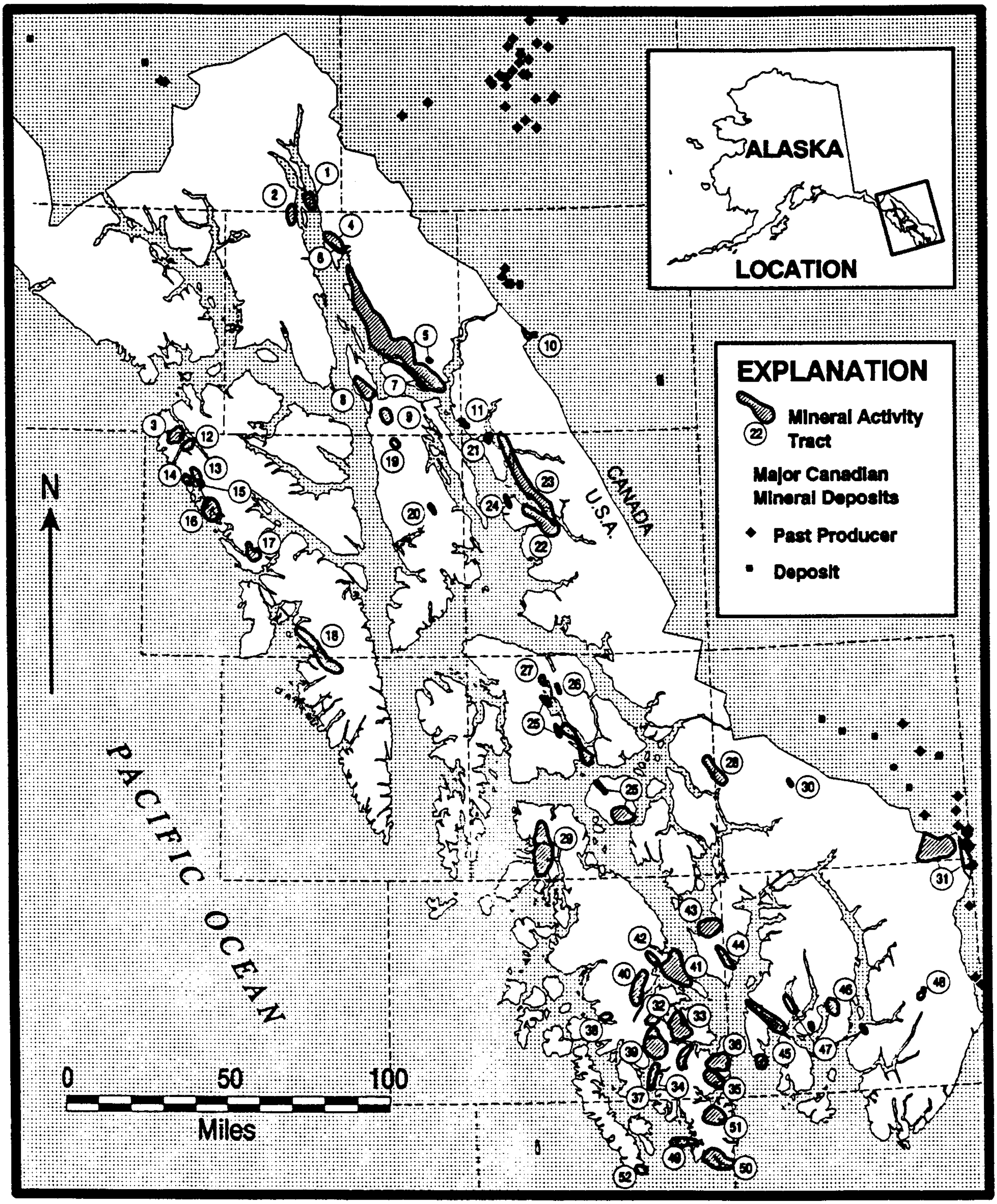
Table 3-25 (continued)

Map No.	Zinc (lb.)	Copper (lb.)	Moly (lb.)	Iron (tons)	Other Minerals
1	-	-	-	-	-
2	-	-	-	-	-
3	-	82,000,000	-	-	140,800,000 lb. Nickel; 8,000,000 lb. Cobalt
4	-	-	-	-	-
5	201,493,200	164,000	-	-	-
6	4,200,000	-	-	-	-
7	-	-	-	-	-
8	-	3,920,000	-	-	3,810,000 lb. Nickel; 1,680,000 lb. Cobalt
9	679,000,000	-	-	-	-
10	-	-	2,000,000	-	-
11	-	-	-	-	-
12	-	-	-	-	-
13	-	2,719,900	-	-	-
14	-	2,529,600	-	-	6,633,600 lb. Nickel
15	-	-	-	-	-
16	-	-	-	-	-
17	-	-	-	-	-
18	-	-	-	-	-
19	55,600,000	-	-	-	212,000 tons Barite
20	-	-	-	-	-
21	-	-	-	-	1,350 oz Platinum
22	4,000	-	-	-	-
23	37,002,000	313,975,000	-	-	-
24	11,786,000	758,000	-	-	-
25	31,548,000	1,133,000	-	-	-
26	-	-	-	-	-
27	-	54,000	-	-	-
28	404,230,000	286,000	-	-	-
29	-	-	496,000	-	-
30	-	3,420,000	-	313,500	-
31	4,673,920	1,919,200	150,000	-	420,000 lb. Tungsten
32	-	-	-	-	-
33	1,562,400	2,872,800	-	-	-
34	-	-	-	-	-
35	-	-	-	-	-
36	-	-	-	-	-
37	-	-	-	-	54,424 tons Barite
38	-	-	-	-	-
39	-	4,500,000	-	293,800	-
40	-	-	-	-	-
41	-	22,987,320	-	2,437,700	-
42	-	2,140,700	-	-	122 oz Palladium
43	-	-	-	190,000,000	-
44	-	-	-	-	-
45	-	-	-	-	-
46	-	-	-	-	-
47	-	-	-	-	-
48	-	-	2,517,396,000	-	-
49	-	-	-	-	-
50	-	-	-	-	-
51	-	-	-	-	11,729,000 lb. Uranium
52	-	-	-	-	-

Source: Coldwell, 1990.

Glossary

Figure 3-5
Identified Mineral Activity Tracts with High Development Potential, Tongass National Forest



Leasable Mineral

Federally-owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates and sulfur. These minerals are subject to exploration and development under leases, permits, or licenses. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management in cooperation with the Forest Service. The resource potential for oil and gas is considered to be moderate to low in the Yakutat region (with no potential elsewhere in the Tongass). Coal occurrences are classified as lignite and of small extent. Geothermal resources occur in 19 known locations in Southeast Alaska. No leasable minerals are presently being produced on the Tongass National Forest, and the anticipated demand is expected to remain quite low.

Salable Minerals

Salable, or "common variety," minerals are sold rather than located or leased. These minerals include petrified wood and common varieties of sand, rock, building stone, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits which, although they have economic value, are used for agriculture, as building materials, for cleaners and abrasives, etc. The predominant salable commodity extracted on the Tongass National Forest is crushed rock used to construct timber sale roads. The supply of quality rock sources is largely dependent upon the locations of active logging operations. Presently, there is an adequate supply of rock sources with suitable quality (hardness and durability) in the Ketchikan Area. However, rock quality is poor in the Chatham and Stikine Areas and good material sources are difficult to locate in current timber production areas. Sand and gravel sources are scarce throughout the Forest except within the Yakutat Ranger District.

All roads built in the Tongass require rock for construction because the subgrade soils have poor strength characteristics. The demand for rock will closely follow the need to construct new timber sale roads. The total in-service use of rock for existing roads was 43,962,500 cubic yards, used to construct 3,355 miles of road. As the use of forest roads increases, and both the Alaska State Department of Transportation and the Federal Highways Department assume responsibility for road maintenance, the demand for crushed rock will increase. It will be expensive to locate sites with suitable quality and quantity in the northern part of the Forest, and haul distances will increase. Outside National Forest lands, new and existing communities will require mineral materials for development of roads, and for foundations for homes, schools and other buildings. The demand for rock from public land in support of these growing communities is likely to increase.

Methodology and Scientific Accuracy

The methods used by the U. S. Bureau of Mines, Alaska Field Operations Center to identify locatable mineral resources within the Tongass are detailed in their report, "An Economic Analysis, Tongass Land Management Plan, Mineral Resource Inventory" (Coldwell, 1990). In brief, a mineral resource inventory was first compiled from all available sources, resulting in identifying 148 locatable mineral deposit areas within the Tongass. These 148 deposits were assigned to a mineral deposit model (Berg, 1984) and tonnage and grade were determined for each based on published information or were calculated using models developed by Cox and Singer (1986). The gross metal value (GMV) for each deposit area was calculated by combining the tonnage and grade figures with an average price from the period 1978-1987 for each commodity. Each deposit area was evaluated to determine its pretax net present value.

The 148 deposit areas were grouped down to 52 identified mineral activity tracts, and further classified into rankings (priorities) based upon attributes reflecting their market demand and thus the likelihood of exploration and development activity within the next 10 to 15 years. Priority 1 areas contained at least one deposit with a positive after-tax net present value at a four percent discounted cash flow rate of return (DCFROR), and/or at least one active gold deposit (site of current industry activity). Priority 2 areas contained at least one deposit with a positive pre-tax net present value at zero percent DCFROR, and/or at least one critical and strategic mineral deposit with a vulnerable supply source. Priority 3 areas do not meet these criteria. The lower rankings may be an indication of a lack of available information, not necessarily a lesser likelihood of mineral occurrence.

The methods used by the U.S. Geological Survey, Branch of Alaskan Geology to identify "undiscovered" locatable mineral resources are detailed in their report, "Undiscovered Locatable Mineral Resources of the Tongass National Forest and Adjacent Lands, Southeastern Alaska" (Brew et al, 1990). Their work involved the definition of areas or "tracts" that may permit the occurrence of one or more deposit types; the estimation of the numbers of undiscovered deposits of each type in each tract, along with the expected tonnage and grade of each type; and the use of computer simulation using these estimates to produce a probability distribution of the quantities of contained metal in the tract. This resulted in the preparation of location maps along with descriptions of 930 metal-bearing localities: a concise statement of the results of a century of mineral exploration and development in Southeast Alaska.

Each tract is considered likely to contain one or more different types of mineral deposits. The estimation of the number of deposits of a given type in a tract is the single most-critical step in probabilistic mineral-resource assessment. It requires reevaluating all of the factors used in initially defining the tract, together with three additional factors: thoroughness of exploration (tracts already thoroughly explored are less likely to contain undiscovered deposits); size of tracts (smaller tracts are likely to contain fewer undiscovered deposits); and physical dimensions of deposit types (different types of deposits occupy different volumes of rocks).

Methods used to estimate environmental consequences of the alternatives are discussed in that section.

Minerals

Environmental Consequences

Direct, Indirect and Cumulative Effects

The demand for access to National Forest lands for the purpose of mineral exploration and development is expected to increase over the next ten years. Plans of Operation will continue to be submitted for approval, and regulations under which those operating plans are processed will not change by alternative. Identified and undiscovered mineral resource tracts, characteristics and location of mineral deposits, and Southeast Alaska geology will not vary as a result of implementing any of the alternatives.

Locatable minerals

Under any alternative, future exploration and development (except for valid, currently existing rights) would be precluded in areas withdrawn from mineral entry, such as Wilderness. The availability of mineral resources of the Tongass National Forest may also be affected by the allocation of other Land Use Designations in each alternative, and the use of Forest-wide standards and guidelines during project implementation. The standards and guidelines of certain Land Use Designations could affect the cost of conducting exploration, development, and reclamation activities, and thus influence the exploration of some areas for their mineral resources.

Most withdrawn lands are designated so by the U.S. Congress (i.e., Wilderness withdrawals). On other National Forest System lands, the Forest Service does not have the authority to approve or disapprove most mineral operations (the exception being salable minerals), but can recommend stipulations on how mineral resources are developed. Thus, the potential effects of alternatives on mineral resources can be estimated by analyzing the relative degree to which Land Use Designations and their associated prescriptions could economically constrain proposed mineral activities.

For this purpose three categories of Land Use Designations are identified: withdrawn areas (which assume higher costs for the development of valid existing rights), and two “open” categories, one with average costs and one with higher-than-average costs. Wilderness and National Monument acres remain the same for all alternatives, as do existing withdrawals within the Research Natural Area, Special Interest Area, Enacted Municipal Watershed, and Experimental Forest designations. A few additional withdrawals could occur for recommended Wild Rivers, individual Research Natural or Special Interest Areas, and high vulnerability karst areas. Open areas with higher costs generally correspond to non-withdrawn areas in the Natural Setting LUD group, while open areas with average costs correspond to those areas within the Moderate and Intensive Development LUD groups.

Using the Forest-wide acreage breakdowns of LUD groups by alternative (see Table 3-1) gives the overall effects on economic availability of mineral resources. Alternatives 7 and 9 have the fewest acres in the higher-cost category, followed by Alternatives 2 and 4, 5 and 6, 3 and 10, and 11 (in that order), and finally Alternative 1 which has the most acres in higher-cost open areas.

Locatable minerals are divided into identified resources and undiscovered resources. Only the 52 mineral activity tracts (identified resources) were considered for allocation to the Minerals LUD. These allocations are shown in Table 3-26.

Table 3-26
Identified mineral resource tracts assigned the Minerals LUD by alternative[1].

Alternative	Tract No.	Tract Name	Acres
7	2	Sullivan	7,938
7	3	Bohemia Basin	9,376
7	4	Berners Bay	10,338
7	5	Juneau Gold Belt	84,401
7	8	Funter Bay	11,499
7	9	Greens Creek	7,528
7	25	Zarembo	27,886
7	28	Ground Hog/Glacier	15,859
7	29	Shakan	42,763
7	31	Hyder	44,846
7	33	Khayyam	23,450
7	35	Niblack	8,915
7	36	Dolomi	9,195
7	39	Jumbo	11,906
7	40	Hollis	17,008
7	41	Kasaan	7,096
7	42	Salt Chuck	4,518
7	43	Union Bay	17,512
7	44	Helm Bay	7,204
7	45	Tongass Narrows	4,488
7	46	Thorne Arm	7,657
7	51	Bokan	17,750
7	52	McLeod Bay	2,287
Total Acres			**401,420**
2-6, 10 & 11	2	Sullivan	7,938
2-6, 10 & 11	3	Bohemia Basin	9,376
2-6, 10 & 11	4	Berners Bay	10,338
2-6, 10 & 11	5	Juneau Gold Belt	84,401
2-6, 10 & 11	8	Funter Bay	11,499
2-6, 10 & 11	9	Greens Creek	7,528
2-6, 10 & 11	28	Ground Hog/Glacier	15,859
2-6, 10 & 11	35	Niblack	8,915
2-6, 10 & 11	36	Dolomi	9,195
2-6, 10 & 11	41	Kasaan	7,096
2-6, 10 & 11	43	Union Bay	17,512
2-6, 10 & 11	51	Bokan	17,750
Total Acres			**207,407**

[1] No tracts are assigned in Alternatives 1 and 9.

Alternatives 1 and 9 did not use the Minerals LUD. Alternatives 2-6, 10 and 11 allocate this LUD to the 12 mineral activity tracts that appear to be most likely or economic to be developed over the next 10-15 years. Alternative 7 applies the Minerals LUD all "Rank 1" tracts, and all others with a positive net present value discounted at zero percent (see Table 3-25), with the exception of those tracts entirely within or surrounded by Wilderness: a total of 23 tracts. The primary effect of this LUD would be to allow development at "average" operating costs, regardless of the underlying Land Use Designation. Each alternative also recommends additional areas that could become withdrawn.

Table 3-27 compares the alternatives using the cost/LUD group concept for the areas with identified mineral resources (605,000 acres). The Current Plan (Alternative 9) has the fewest acres of identified mineral resources in allocations potentially causing higher costs for their exploration and development, and Alternative 1 by far the most. The other eight alternatives fall between these two in a fairly close grouping.

Table 3-27
Effects on economic availability of identified mineral resources[1]

	Withdrawn Areas		Open Areas	
	Existing	Recommended	Higher Cost	Average Cost
Alternative 1	24%	2%	73%	1%
Alternatives 2, 4	24%	1%	39%	36%
Alternatives 3, 10	24%	1%	43%	32%
Alternatives 5, 6	24%	1%	42%	33%
Alternative 7	24%	0%	37%	39%
Alternative 9	24%	0%	24%	52%
Alternative 11	24%	1%	40%	35%

[1] Percentage of total area (605,000 acres) within each category.

A similar analysis for the 6.66 million acres of undiscovered mineral resources is shown in Table 3-28 below. Here Alternative 1 again has the most acres in allocations potentially causing higher costs, followed fairly closely by Alternatives 11, 5 and 6. The remaining six alternatives have comparably fewer high-cost acres.

Table 3-28
Effects on economic availability of undiscovered mineral resources[1]

	Withdrawn Areas		Open Areas	
	Existing	Recommended	Higher Cost	Average Cost
Alternative 1	34%	2%	63%	1%
Alternatives 2, 4	34%	1%	35%	30%
Alternatives 3, 10	34%	1%	37%	28%
Alternatives 5, 6	34%	1%	50%	15%
Alternative 7	34%	<1%	35%	31%
Alternative 9	34%	<1%	33%	33%
Alternative 11	34%	1%	56%	9%

[1] Percentage of total area (6.66 million acres) within each category.

Leasable and Salable Minerals

The effects of alternatives on leasable minerals are not discussed. The Tongass has no current leasable mineral activity and none is projected. Salable or common variety minerals, primarily crushed rock, are utilized in each of the alternatives. Their predominant use is to construct roads in support of the Tongass National Forest transportation system, and thus the amounts used will correspond closely to the miles of new road construction by alternative. These are shown in Chapter 2 and in the Transportation section of this chapter.

Effects on Other Resources

The development of mineral resources in the Forest generally requires construction of an underground mine complex, a millsite, road and pipeline systems, tailings and waste rock disposal areas, a marine transfer/docking facility, and lodging accommodations if the mine location is not close to an existing community. Total surface-disturbing acreage can vary markedly with specific project characteristics: the operating Greens Creek mine involves about 320 acres, and the proposed Kensington mine project will use about 280 acres. The effects of any such development are analyzed at the time a specific project is proposed.

Recreation and Tourism

Affected Environment

Background

The first portion of the Recreation and Tourism section describes the concepts and techniques used in the inventory and analysis of the recreation resource. The supply of recreation opportunities is then displayed using these concepts. Use and demand discussions follow the supply discussion. Supply and demand are brought together in the environmental consequences section, which describes the potential effects to the recreation resource of implementing each alternative.

Several recreation issues are emphasized in the discussions on supply and demand, and tracked into the consequences section. These issues can be summarized as:

- tourism and its economic impact
- resident lifestyles and values
- the pristine and unique nature of the recreation opportunities found on the Tongass.

Supply of Opportunities

Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features, including inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual fish and wildlife populations, that provide opportunities for a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places in the world. Southeast Alaska imparts a feeling of vastness, wildness, and solitude. These feelings are enhanced by the small resident population and relative absence of development compared to most other National Forests.

Recreation and tourism on National Forest is more than providing facilities or recreation sites. Especially on the Tongass National Forest, where most recreation and tourism attractions and much of the use occurs in remote, undeveloped areas, understanding the inherent values of recreation settings and their attributes and attractions is critical. Many Alaska residents purposefully live in proximity to such settings as a part of their lifestyle. Most visitors, who travel long distances to see Alaska, expect to find it wild and “unspoiled,” while at the same time seek comfort and convenience, reliable transportation and other features requiring some level of infrastructure and development. The challenge to managers is to identify and understand the relationship between the settings and the variety of client groups. Commercial providers of recreation activities base much of their marketing strategy on particular environmental settings and identified recreation places within those settings.

In Southeast Alaska, the U.S. Forest Service and the National Park Service administer the largest units of public lands available for outdoor recreation. Table 3-29 displays the amounts of available recreation lands in public ownership.

Table 3-29
Distribution of Public Lands in Southeast Alaska Available for Outdoor Recreation.

	Type of Area	Acres
Federal	Tongass National Forest	16,882,653
	National Park System	3,238,604
State	State Park System	85,000
	State Forests	247,000
	State Wildlife Refuges/Critical habitats	8,588
Municipal	Municipal Parks	3,150
Private	Commercial Recreation Areas	4

Source: Outdoor Recreation Alaska SCORP, 1988, (plus Alaska's Outdoor Legacy SCORP, 1992 Draft), Revision database, Q227brx 10/96

While the large acreages of Federal lands are impressive, and contribute greatly to the feeling of vastness and solitude so predominant throughout Southeast Alaska, they are also deceiving in the amount of land area that is actually available and useable for outdoor recreation. The difficult and steep terrain, wetlands, icefields and glaciers, and heavy vegetation confine most of the recreation activities to the accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Some use is made of the ice fields, and the alpine areas (above tree line), but access is usually by aircraft. Near the communities, both residents and visitors use the developed campground and picnic areas, beaches, and visitor centers.

The State of Alaska is a significant provider of recreation opportunities as well. Many of the state land selections (see Lands section of this chapter) were based on recreation opportunities for local communities residents. Most of these opportunities are still undeveloped. State selections were also made for future development of a system of marine parks. Currently there are two designated State Parks and one State Historic Site in Southeast Alaska. Numerous other state recreation lands also exist or are pending transfer of title.

In 1990, the Forest Service, the states of Alaska and Washington, and the province of British Columbia, entered into an agreement to cooperatively develop a system of marine parks stretching from Southeast Alaska to Puget Sound in Washington state. The goal is to identify and designate a system of parks and recreation areas for marine travelers no more than a day apart. These areas and travel routes will transcend a variety of managed and natural settings. Logistical needs, such as safe anchorages, and supply and fuel stops, will be incorporated into this system.

Community road systems are limited, but heavily used for access to recreation sites and attractions near local communities. These road systems are primarily located near the larger communities of Juneau, Sitka, Ketchikan, Petersburg and Wrangell. There is an extensive road system connecting the small communities on north Prince of Wales Island, and systems developing near the communities of Hoonah and Kake. There is no interconnecting highway system between islands or between communities on the mainland.

Roads exist in other locations where timber harvest has taken place, but if there is no community or interconnecting access to the Alaska Marine Highway System (ferries) there is little recreation use made of them. Where a road system is accessible by the Alaska Marine Highway System, independent tourists and local users from other parts of Southeast use the road systems for recreational purposes.

Recreation Opportunity Spectrum

The Forest has the potential to provide a wide variety of recreation settings. The Recreation Opportunity Spectrum (ROS) has been developed to help identify, quantify, and describe these settings. The ROS system portrays the appropriate combination of activities, settings, and experience expectations along a continuum which ranges from highly modified to primitive environments. Seven classifications are identified along this continuum and include Urban, Rural, Roaded Natural, Roaded Modified, Semi-primitive Motorized, Semi-primitive Non-motorized, and Primitive. A general Forest-wide inventory of the ROS classification was made in 1989, and is periodically updated. This baseline will be used to measure anticipated changes to the settings resulting from alternative allocations.

The Recreation Opportunity Spectrum classes are described below, using seven elements that are considered in the allocation and management of the associated recreation settings. These elements are:

Visual quality. A measurement of the degree of modification of the natural landscape characteristics that are apparent within the setting.

Access. The mode of access required or appropriately used in the pursuit of activities, and the relative ease with which users can travel to or within the setting.

Remoteness. The perceived separation of the setting from the sights and sounds of other human activity or structures.

Visitor management. The degree and appropriateness of the perceived control and regulation of visitor actions and the extent and appropriateness of services and information provided within the setting.

On-site recreation development. The degree and appropriateness of the recreation facilities provided within the setting.

Social encounters. The degree of solitude or social opportunities the setting provides, usually in terms of other parties encountered while traveling within the setting, and/or within sight or sound while camped within the setting.

Visitor impacts. The degree of impact both on the attributes of the setting and on other visitors within the setting.

These factors are now used to describe the ROS classes, in a comparative summary given in Table 3-30.

Table 3-30
Comparison of ROS Classes

	Urban	Rural	Roaded Modified	Roaded Natural
Visual Quality	Alterations to landform and vegetation dominate landscape; nonrecreational activities not exceed Mod - FG; Max Mod - MG.	Alterations to landform and vegetation dominate landscape; nonrecreational activities not exceed Mod - FG; Max Mod - MG.	Alterations dominate the landscape; nonrecreational activities/ structures evident, but do not exceed maximum modification.	Alterations to landscape subordinate; nonrecreational activities, not to exceed modification though typically partial retention.
Access	Access and travel facilities are highly intense, motorized, and often with mass transit supplements.	All methods of access and travel may occur, but subject to formal regulation.	All methods of access and travel when needed and compatible with intended activities.	All methods of access and travel may occur, when compatible with intended activities; zones of non-motorized use.
Remoteness	Remoteness from sites and sounds of human activity not available or important.	Remoteness from sites and sounds of human activity not available or important.	Remoteness from continuous sounds of human activity is expected	Remoteness from continuous sounds of human activity is of moderate important.
Visitor Management	Intensive on-site controls are numerous and obvious.	On-site regimentation and control is obvious.	On-site regimentation and controls are few.	On-site regimentation and control is obvious.
On-site Recreation Development	Recreation structures and facilities readily evident, but appropriate for setting, designed for high use levels. Information and interp facilities may be large and complex.	Recreation structures and facilities readily evident, but appropriate for setting, designed for high use levels. Information and interp facilities may be large and complex.	Recreation structures and facilities may be present, but are provided primarily for protection of the resource rather than user convenience. Facilities are rustic and harmonize with a backcountry setting.	Recreation structures and facilities provided for site protection and user convenience. Facilities are contemporary but of rustic design and harmonize with natural setting.
Social Encounters	High concentrations of people at one time.	Moderate to high concentrations of people at one time.	Moderate concentration of users on roads and little evidence of others or interactions at campsites	Interactions with others may be moderate to high. Moderate concentrations of people, especially on trails and in dispersed areas.
Visitor Impacts	Very noticeable but managed to prevent physical resource degradation.	Very noticeable but managed to prevent physical resource degradation.	Human use noticeable, but not degrading to resources. Site hardening dominates campsites; parking areas.	Visitor use noticeable but not degrading to resources; established VQOs.

Table 3-30 Continued

	Semi-Primitive Motorized	Semi-Primitive Non-Motorized	Primitive
Visual Quality	Alterations few; subordinate to landscape, designed and located to not exceed partial retention.	Alterations few and subordinate to landscape; nonrecreational activities and structures designed not to exceed retention.	Alterations to landscape not evident; structures do not exceed retention.
Access	Travel on trails designed for/open to motor vehicles; Roads maintained for high clearance vehicles; Motorboats operating on waterways, May establish zones of non-motor use for facility/ resource protection.	Trails closed to motorized use; nonmotorized boats used on freshwater lakes and streams.	Trails closed to motorized use; non-motorized boats used on freshwater lakes and streams.
Remoteness	Nearby sights and sounds of human activity are rare; Distant sounds may occur.	Nearby sounds of human activity are rare; Distant sounds may occur.	No or very infrequent sounds of human activity.
Visitor Management	On-site regimentation and controls are few.	On-site regimentation and controls are rare.	On-site regimentation and controls are very rare.
On-site Recreation Development	Recreation structures and facilities may be present, provided primarily for protection of site rather than user convenience. Facilities, when present are rustic and harmonize with natural setting.	Recreation structures and facilities may be present but provided primarily for protection of site. Facilities, when present are rustic and harmonize with natural setting.	Recreation structures are rarely present, provided primarily for the protection of the site. Facilities, when present are rustic and harmonize with natural setting.
Social Encounters	Low interaction between users. Campsites seldom within sight or sound of another group except during peak periods.	Low interaction between users. Campsites seldom within sight or sound of another group except during peak periods.	Very low interaction between users and no other groups in sight or sound of overnight camps.
Visitor Impacts	Human use noticeable, but not degrading to resource or backcountry setting.	Human use noticeable, but not degrading to resource elements.	Human use essentially unnoticeable. Site hardening--boardwalks, boat moorings, food caches.

The goal of most recreationists, both resident and visitor, is to participate in and enjoy various outdoor recreation activities. Forest managers cannot provide recreation experiences, but they can provide the opportunities for these experiences to be realized. Recreation opportunities can be broken down into three components: 1) a choice of physical and social settings; 2) opportunities for activities to occur within those settings; and 3) a reasonable expectation that satisfactory experiences can be realized. The quality of the setting available and appropriate for the activity plays a key role in the outcome of the visitor's experiences.

The Recreation Opportunity Spectrum (ROS) is a tool used to inventory this supply of setting opportunities. Table 3-31 displays current amounts of opportunities Forest-wide, categorized by ROS classes. This does not mean that these settings provide opportunities on every acre: these will be limited by the topographic and logistical factors previously described.

Table 3-31
Forest-wide Recreation Opportunity Spectrum acres

ROS Class	Acres
Primitive	11,003,662
Semi-Primitive Non-Motorized	3,157,977
Semi-Primitive Motorized	1,180,725
Roaded Natural	183,574
Roaded Modified	1,349,512
Rural	6,464
Urban	739

Source: Revision data base, Q227brx (10/96)

Recreation places

The unique setting that makes the Tongass different from other National Forest recreation opportunities is that of an island and marine environment in close association with major mountain ranges and ice fields. The marine interface that ties the sea with the land, is the most accessible and most sought after setting for recreation opportunities. It is also valuable for development activities and certain species of wildlife. This setting is also limited, relative to land-based opportunities.

More specifically, the Forest also offers vast unmodified landscapes and wildland wildlife and fish habitats unequaled on other National Forests. Because of the island and marine environment there is an abrupt change in character from the relatively small urbanized centers of population to almost immediate wilderness.

Outdoor recreation in Southeast Alaska is much more demanding of skills and proper equipment to deal safely with the environment than in most other Forests. There are newly-discovered wild caves with environments of unknown nature; multitudes of rivers and streams which could add new dimensions to the nation's Wild and Scenic Rivers System; and recreation opportunities that can only be accessed by boat or aircraft. The Region's recreation cabin system and interpretive program on the Marine Highway ferries are extremely popular and highly used by both residents and visitors. In addition, the opportunity to hunt and view large and often dangerous wildlife species is still available on the Tongass. But an underlying concern among many outfitters and guides throughout Alaska is the diminishing amount of primitive, uncrowded settings as more people visit and/or participate in wildland adventure activities.

The majority of the Forest is undeveloped and is primarily used for dispersed recreation activities. Concentrated use areas and facilities, such as visitor centers and campgrounds in the vicinity of communities are the exception. Viewing scenery and wildlife, boating, fishing, beachcombing, hiking, and hunting are the principal dispersed recreation activities participated in by resident users.

Access plays a key role in the nature of how the outdoor recreation resource is used. Access is typically by boat, or by vehicle on community road systems. The use of aircraft for access is limited by the number of people that can be carried, and by the cost. (A typical round-trip flight for a party of four and their equipment to a lake 30 miles from a community with charter air service costs about $300-$400.)

The pattern of use associated with known protected boat anchorages, boat landings, aircraft landing sites, and the limited road systems, makes it possible to identify specific "recreation places." Recreation places are those areas that are easy to access and that are used for recreation activities. It is these specific places, and the quality of the settings that are associated with them, that constitute the effective supply of recreation opportunities throughout the Tongass National Forest.

Obstacles to access, both physical and economic, greatly influence the patterns and intensity of use throughout the Forest. The distance traveled to participate in outdoor recreation activities is typically limited by either the available community road system or by the distance capable of being covered by small boats during a day's activities. These "home ranges" were identified as recreation places lying within 15 to 30 miles of communities. For purposes of effects analysis, inventoried recreation places have been classified into two categories: those within a radius of approximately 20 miles from communities, and those lying outside. Almost half (48%) of the recreation place acres are within a community home range.

In order to understand the recreation resource, as well as the effects of other management activities on the recreation setting, these specific geographic areas with recreation value were identified and tracked in the Revision data base. Around 1,436 recreation places, totaling approximately 3.6 million acres (21 percent of the total National Forest), have been identified (see Table 3-32).

Table 3-32
Tongass-wide Summary of Recreation Places

	Number of places	Acres (1,000)	Capacity (1,000 of RVD's)
Inside Wilderness	311	1,312	890
Outside Wilderness	1,159	2,315	4,053
Tongass-wide Total	**1,436**	**3,627**	**4,943**

Source: Revision data base

As previously indicated, the setting of these recreation places plays a key role in their attractiveness and utility. Many recreation opportunities are dependent on this relationship and may require a natural type of setting, such as viewing scenery or the pursuit of solitude. However, some activities may not be directly dependent on the setting, such as hunting and fishing. The present setting of recreation places is displayed in Table 3-33.

Table 3-33
Recreation Opportunity Spectrum Class Summary for Recreation places

ROS Class	Acres
Primitive	1,574,141
Semi-Primitive Non-Motorized	895,626
Semi-Primitive Motorized	705,774
Roaded Natural	122,559
Roaded Modified	324,361
Rural	3,963
Urban	360

Source: Revision Data Base)

Recreation places can also be categorized into three general groupings, according to their principal uses and attraction: marine, freshwater, and land-based.

Marine recreation. The marine setting is the most predominant of the outdoor recreation opportunities. There are approximately 11,000 miles of shoreline with thousands of sheltered waterways, inlets, bays and anchorages which provide access (by either boat or aircraft) to most areas with recreation attractions. Thirty-four percent of the identified recreation place acres are primarily related to marine recreation opportunities. However, approximately 43 percent of the individually identified recreation places occur within this category. While the Forest Service manages the upland areas (above mean high tide), jurisdiction over the intertidal lands and the saltwater fishery is exercised by the State. This means that coordination between both levels of government is necessary to assure consistency in recreation settings and objectives.

The family boat is used in the same manner as wheeled recreational vehicles are used in other places. The majority of use in marine recreation places originates in local community boat harbors or launching sites accessed by road systems. Typical day-use occurs within a 15-30 mile radius (Marine Recreation in the Tongass National Forest, University of Oregon, 1983).

A recent survey (Shea, 1990) indicates that there is a strong relationship between marine access and wildlife viewing opportunities on the upland areas, and that non-hunting wildlife use primarily accessed by boat is one of the fastest growing commercial recreation businesses in Southeast Alaska.

The most popular activities participated in by users of marine recreation places are: beachcombing and hiking, fishing, motorboating, clamming and crabbing (Alaska Public Survey, 1983). Wildlife viewing is a rapidly increasing activity. Other popular activities are hunting onshore and kayaking/canoeing. For overnight users, the most popular activities remain the same with the addition of camping onshore and staying in cabins. However, many people's "favorite place" is further away and takes longer to reach than time allows for one-day outings. While the types of

Glossary

activity patterns are essentially the same at “favorite” and “most often visited” places the reason for differentiating between the two are subtle but important. Reasons given for why a place is “favorite” are remoteness, various land (setting) characteristics such as beaches, anchorages, and scenery. Reasons given for “most often visited” places are distinguished by qualities of access, convenience, facilities, and particular activity opportunities (University of Oregon, 1983).

Freshwater recreation. The Tongass also abounds in freshwater recreation opportunities. There are approximately 45,000 miles of streams and rivers and over 20,000 lakes and ponds within the Tongass National Forest. Twenty-five percent of the inventoried recreation place acres are primarily related to freshwater recreation opportunities, and account for around 21 percent of the identified recreation places. Streams and some lakes near communities are accessed by the community road system or a combination of roads and trails. Away from the communities, the freshwater environment quickly becomes remote and is accessible only by air, or, in some cases, by small boats.

Eighty-one of the 145 Forest Service recreation cabins and shelters on the Tongass National Forest are located on or near freshwater lakes or streams. The limited system of trails from saltwater to inland lakes and along streams is important for recreation access to these sites.

The most sought-after settings at freshwater-related recreation places are those that provide opportunities for: 1) getting away (solitude); 2) enjoying natural and scenic settings; 3) fishing for a diversity of species; and 4) good airplane access (USDA Forest Service, Alaska Region Admin. Doc. 159, 1986).

Land-based recreation. While 41 percent of the inventoried recreation place acres are primarily related to land-based recreation opportunities, they account for about 37 percent of the places. The effective capacity of these areas is generally quite low. Many of these areas are located in the approximately 10 million acres of forested lands, nearly 4.3 million acres of alpine terrain (which contain about 3.75 million acres of icefields and rock) and over 1.5 million acres of muskeg. Some recreation use occurs in all these land areas, but in general, use occurs were access is more available. Where trails are available to access the alpine ridges and mountaintops, people use them.

However, the presence of this vast undeveloped area plays a very important role in providing the perceptions of naturalness and remoteness associated with the more defined marine and freshwater recreation places. Both of these attributes are rated as “very important” by 80-90 percent of the recreation users of the Tongass. When asked about sensitivity to change, natural-appearing settings and solitude were the setting attributes about which people were most sensitive (Clark and Johnson, 1981).

The most popular activities of users of the identified land-related recreation places are hunting, hiking (where there are trails), and driving for pleasure (where there are roads). The principal setting attributes of these places are access, remoteness from communities and developed sites, availability of parking sites for recreation vehicles (but without facilities), viewing scenery, exploring little-used roads, and freedom of choice of activities. These perceived attributes appear to be much the same on the Tongass NF as in other places in the Pacific Northwest (Clark, et al., 1984).

Important Recreation Places

The recreation places inventory is an evolving system, developed primarily to aid in the Forest Plan revision. Public comment on the 1990 DEIS identified a major concern with the initial inventory. The inventory did not differentiate really important recreation places from just ordinary ones. The initial inventory did identify the concept of community home ranges, but many commenters suggested taking the inventory a step further, to place a value on recreation places for certain uses, such as tourism and hunting.

Several suggestions were made on how to value recreation places. One idea was to involve the tourism industry in identifying them. Another thought was to rate them relative to one another, or to assign a high, medium or low value. These suggestions were critically reviewed as to their strengths and weaknesses. Directly involving the tourism industry appeared to be a massive endeavor, and many entities would likely be missed. In addition past experience in working with other agencies and the industry resulted in a broad brush approach of identifying large areas. These large areas often prove to be counter productive in the planning process, diluting the value of the most important ones. These areas are ultimately refined by Forest Service specialists at the field level, within the context of the recreation place and ROS concepts.

Assigning a value or rating for recreation places presented problems of value judgments. For instance, which recreation place is more important for marine recreation, a good bay with scenery used by many powerboats, or a good bay with scenery only accessible to kayakers? They are both important in the eye of the beholder.

Consequently, a single rating system was used and several categories identified. These categories include facilities, marine, hunting, fishing, and tourism. The place is either important, or just ordinary or common. Recreation places may contain one, several, or none of these values. The judgments were based on resource specialists at the field level, and received varying levels of review by the public.

Following is a brief discussion of the criteria and results of this inventory. Recreation places important for tourism are discussed under that heading later in this section. The environmental consequences section describes the impacts to these important recreation places by showing the relative change to the setting by Land Use Designation groups.

Facilities. Included within recreation places are developed recreation sites. These are campgrounds, picnic sites, trails, interpretive sites, cabins, and other sites which provide facilities for concentrated visitor use. These facilities, with the exception of cabins, are generally accessible from community road systems. An inventory of these places is found in Table 3-34. Facilities such as campgrounds, visitor centers, and picnic sites will be managed to continue providing the existing setting attributes. Facilities such as trails and cabins may be subject to setting changes in the future.

Recreation places with facilities were rated as being important. In addition, other recreation places with a facility investment, such as a viewing platform, and facilities authorized by a Special Use Permit for recreation purposes, were identified as important. Twenty eight percent of the inventoried recreation places were rated as important in this category, accounting for 33 percent of the recreation place acres.

Several important recreation complexes exist on the Forest. These areas provide a variety of recreation opportunities such as camping, picnicking, hiking, fishing, etc., all within close proximity, and generally easily accessible from population centers. In addition they provide a natural setting and usually encompass a key attraction, such as a glacier or series of lakes and rivers. Some of these complexes have been designated as Special Interest Areas in recognition of their concentrated opportunities and unique settings. Existing Recreation Special Interest Areas include Admiralty Lakes, Mendenhall Glacier, and Ward Lake; several others are being proposed. For descriptions see the “Special Interest Areas” section of this Chapter.

Table 3-34
Tongass Recreation Facilities

Facilities	Chatham Area	Stikine Area	Ketchikan Area	Tongass NF Total
Anchor Buoys	4	2	22	28
Campgrounds	3	1	10	14
# of Sites	92	15	59	166
Fishing Sites	0	0	0	0
Interpretive Sites	1	1	3	5
Historic Sites	0	0	1	1
Observation Sites	1	3	3	7
Organized Camps	1	1	1	3
Picnic Areas	8	7	10	25
# of units	74	21	47	142
Recreation Cabins				
in Wilderness	19	16	18	53
nonwilderness	33	26	34	93
on saltwater	12	26	15	53
Total Rec. Cabins	54	39	52	145
Recreation Residences	17	27	4	48
Recreation Road Miles	143	258	837	1,238
Resorts & Lodges	2	0	2	4
Other Concession	0	0	0	0
Ski Areas	0	0	0	0
Trails (# miles):				
nonwilderness	198.9	66.9	153.6	419.4
Wilderness	43.0	23.7	18.4	85.1
Total Trail Miles	241.9	90.6	172.0	504.5
Trail Shelters	8	5	12	25
Trailheads	3	32	13	48
Visitor Centers	2	0	1	3
Winter Sports	0	1	0	1

Revised: December 14, 1990

Marine. Marine recreation places are those important to the unique marine recreation opportunities found on the Forest. This category differs from that discussed previously, which displayed the principle utility and attraction. Important marine places represent the relationship of all recreation places valuable to marine recreation, which may include land-based recreation places associated with marine access or experiences. It does not include all of the marine category, but those which are truly unique or typify the Southeast Alaska experience. An example would be a popular recreation cabin, accessible by boat and a short hike. Fortythree percent of the identified recreation places were identified as being important for marine recreation, yet involved only 32 percent of the total recreation place acres. This suggests the high value of the narrow marine interface.

Hunting. Important hunting areas were distinguished from ordinary hunting areas by several factors. These include heavy recurring use, hunter success, ease of access, opportunities for several species, and prized species such as mountain goats and moose. Information from Alaska Department of Fish and Game was used for the first sort in identifying these important areas, but often involved extensive areas. For instance, a hunting use area was often identified as extending several miles inland from an area of marine or road access. These areas were then refined to identify the area important for hunting, with considerations for access, terrain, and topography, etc. The remainder of the area may have been identified as a recreation place, with hunting as an activity, but not as important. Important hunting areas account for 26 percent of the recreation places, yet encompass 41 percent of the acres. This is to be expected as hunting generally involves large areas.

Fishing. Important fishing areas were identified using the Forest Habitat Integrity Plan (ADFG, 1982) ratings for sport fishing values. Those rivers and lakes receiving the highest rating resulted in the corresponding recreation places to be identified as important for fishing. Thirteen percent of the recreation places fell into the important category for fish, encompassing 12 percent of the acres.

Tourism

Background

For a century now, people have been venturing north to experience the scenic beauty of Alaska's Inside Passage. The actual numbers of visitors have been up and down, affected by two world wars and major and minor economic depressions and booms. But overall, the tourism industry has grown substantially. The most consistent thread one can follow in the development of the visitor trade in Southeast Alaska has been the persistent demand for the natural scenic beauty. The attraction of the wild, unspoiled scenery was evident in the writings of John Muir and others in the late 1800s. The Inside Passage has continued to grow in popularity, and has become the "single most highly promoted attraction in all Alaska" (Eric McDowell). It was true in 1879 when John Muir stepped off a mail steamer at Fort Wrangell, and it remains the center focus today as kayakers and cruiseship passengers alike explore the Inside Passage: "What is different about Alaska is, in a word, its wildness. What calls tourists is not what western civilization has done, but what it has not done" (Bright, 1985).

While the tourism industry has grown for the past 100 years, the decade of the 1970s saw increased growth and the return of cruise ships into the market place. The 1980s and 1990s saw even stronger growth. More cruise ships were attracted to Alaska, and in particular, Southeast. New, larger ships were constructed to meet the growing demand. New businesses were created around this tourism base, such as hotels, bus lines, and flightseeing operations. Ecotourism, the business of bringing in small groups into the wilderness, appeared on the scene in the late 1980's and continues to grow.

The emerging importance of the tourism industry to the state and the region has resulted in several comprehensive studies. These studies describe the characteristics of the visitors, the economic contributions, their preferences and satisfaction, and the marketing implications for continued growth and viability of the industry. Most of the following discussion borrows from these studies. They are:

Southeast Alaska Pleasure Visitor Research Program, Summer 1988, prepared by Data Decisions Group, Inc., 3/89 (SEAPVRP); Alaska Visitor Statistics Program (AVSP), Summer 1993, of which there are three volumes, 'Patterns, Opinions, and Planning,' 'Alaska Visitor Expenditures,' and 'Alaska Visitor Arrivals,' prepared by the McDowell Group; and "Alaska's Visitor Industry, An Economic Profile," prepared for the Department of Commerce and Economic Development, State of Alaska, by the McDowell Group, July 1991 (AVI).

A profile of the typical vacation/pleasure visitor is summed up by the following description from the AVSP study:

Southeast Vacation/Pleasure visitors:

- utilized cruise ships more than any lodging type (62 percent)
- cruiseship and the Alaska Marine Highway (ferry) were the most used forms of transportation
- were the greatest shoppers
- utilized visitor centers (seven out of ten visitors)
- participated in many sightseeing opportunities, particularly city tours and Native cultural presentations
- enjoyed photography, casual walking, and wildlife watching. (AVSP; Patterns, Opinions, Planning, Summer 1993, p. 189)

Forest Use

Tourists, or nonresident recreationists, can be broadly categorized into two major groups, the independent visitor, and the package visitor. The independent visitors constitute a small, but growing, group. They are characterized by those who get off the ferries and planes and engage in a variety of activities. They spend more time in the communities and on the Forest, and may secure the services of outfitters and guides, restaurants, motels, and transportation services such as floatplanes, boats, and gas stations. Their itineraries are planned mostly by themselves, but they often secure the services of mini-packages such as day excursions or fishing charters. The independent travelers compete more directly with residents for recreation opportunities on the Forest, for facilities, recreation place capacity, and resources such as fish, game, and solitude.

The package visitors are typically the cruiseship clients, but also some who arrive by ferry and airplane. This is a very large group which uses the Forest primarily as a scenic resource. These visitors spend less time in the area and generally follow preplanned and regimented itineraries. Much of their land-based activities are centered around communities. Half-day and day excursions into the Forest are increasing in popularity, but are mostly oriented around boat trips and flightseeing, using the Forest as a backdrop.

The recreation place inventory includes those areas of the Forest important for tourism, which are identified on the Recreation places map in the map packet. It indicates 61 percent of all recreation places are important for tourism. The acreage of these tourism places accounts for 42 percent of all the identified recreation places on the Forest.

The marketing of recreation opportunities by commercial suppliers has important similarities to resident recreation concerns. For example, businesses which provide boat or aircraft access for wildlife viewing and other activities have a low tolerance for the presence of other groups in the same area. The presence of more than two or three other parties in a bay or area may cause such operators to seek substitute locations The ability to market Alaska tourism, in part due to the high cost of visiting Alaska, is dependent on meeting customer expectations of seeing and experiencing vast, awe-inspiring, untamed land and its wildlife. Conversely, resident recreationists who traditionally use an area may discover commercial businesses operating in the same area.

Attractions

Southeast Alaska ranks second among the five regions visited in the state (AVSP). In the summer of 1993, 302,800 visitors, or 60 percent of the total visitors to the state, passed through the area. Two of the top three attractions in the state are directly associated with the Tongass: the Inside Passage ranks first, and the Mendenhall Glacier ranks third. Southeast communities account for four of the six most frequently visited communities in the state: Juneau ranks second, Ketchikan third, Skagway fourth, and Glacier Bay sixth. Table 3-35 displays the attractions most visited by all visitors to the region in the summer of 1993, and their ranking relative to the entire state. Table 3-36 displays the communities visited in the region by all visitors, and their ranking relative to the entire state.

Table 3-35
Southeast Alaska Attractions Visited (All Visitors, Summer 1993)

Attractions	Number of Visitors	State-wide Ranking	Percent of all Alaska Visitors	Percent of all Region Visitors
Inside Passage	387,200	1	46	77
Mendenhall Glacier	331,800	3	40	66
Ketchikan Totems	331,800	4	40	66
Skagway Historic District	296,700	6	35	59
Glacier Bay	256,400	7	31	51
Sitka Russian Church	186,000	10	22	37
Sitka Historic Park	165,900	12	20	33
Alaska State Museum	145,800	16	17	29
Misty Fjords NM	60,300	32	7	12
Chilkat Eagle Preserve	50,300	34	6	10
Tracy Arm Fjords	25,100	42	3	5
Chilkat Dancers	25,100	43	3	5
Eaglecrest Ski Area	5,000	59	1	1
Regional total	**502,800**	**2**	**60**	**100**

Source: *Alaska Visitor Statistics Program*, “Patterns, Opinions, and Planning” Summer 1993 p. 56-58

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Table 3-36
Southeast Alaska Communities and Places Visited (All Visitors, Summer 1993)

Places	Number of Visitors	State-wide Ranking	Percent of all Alaska Visitors	Percent of all Region Visitors
Juneau	408,700	2	49	81
Ketchikan	386,900	3	47	77
Skagway	318,900	4	38	63
Glacier Bay	263,600	6	32	52
Sitka	234,200	9	28	47
Haines	114,300	18	14	23
Wrangell	56,400	22	7	11
Petersburg	37,900	23	5	8
Wilderness Areas	18,200	28	2	4
Other SE Communities	23,900		3	5
Regional total	**502,800**	**2**	**60**	**100**

Source: *Alaska Visitor Statistics Program,* "Patterns, Opinions, and Planning" Summer 1993 p. 53-54

As in the past, the outstanding scenery is the main reason for visiting the region. The many islands, waterways, and landforms, with the backdrop of towering mountains and glaciers winding down to the sea, is a familiar sight throughout the area. Indeed, this is borne out by the two leading attractions, the Inside Passage and the Mendenhall Glacier. Opportunities for seeing whales, bald eagles, puffins, bears and other wildlife add to the experience. Not surprisingly, wildlife is the second most cited reason for visiting the area. Table 3-37 lists the reasons for visiting Southeast Alaska.

Table 3-37
Reasons for visiting Southeast Alaska

Reason	Independents	All Visitors
Scenery	66%	66%
Wildlife	31%	35%
Recommendations	25%	25%
Visit Friends/relatives	23%	7%
Fishing/hunting	19%	8%
Wilderness areas	16%	13%
Specific Attractions	13%	10%
Part of cruise	9%	60%
Advertising	7%	10%
Price	2%	8%

Source: *Southeast Alaska Pleasure Visitor Research Program (SEAPVRP)*, Summer 1988, p. 20.

Economic Contribution

The economic contribution to the State of Alaska and the region from tourism is high. In terms of employment, the tourism industry is Alaska's second largest private sector industry (seafood is first) (AVI). The tourism industry is also the second largest private sector industry in terms of employment in Southeast Alaska (after seafood harvesting and processing).

Approximately 463,000 pleasure-related visitors spent $138 million in Southeast in 1993. Total visitor spending in the region for the same time period exceeded $152 million. These figures do not include interstate travel by Alaskans, transportation to and from the state, or the multiplier effect for support industries. The average visitor expenditure to the region was $324, per person/per trip, according to the 1993 AVSP study.

Sixty-four percent of the regional expenditures are attributable to the package tour, of which the cruise ships are the vast majority. The remainder come from the independent visitors. Juneau, Skagway, Ketchikan, and Sitka rank 3, 4, 5 and 9 out of the top ten cities in Alaska for visitor expenditures, capturing eight percent, five percent, five percent, and two percent, respectively, of the state totals (AVSP).

For more information on the economic importance and value of the tourism industry to the region, see the Regional Economy section of this chapter.

Trends and Findings

Over the last decade (1985 to 1994) cruiseship use within Southeast Alaska increased 172 percent, rising almost every year to a high of 372,923 passengers in 1994. Ferry system use for the same time period fluctuated somewhat, averaging over 340,000 passengers per year, with a high of 372,680 passengers in 1992. And airline use (enplaning at Juneau) showed an overall increase of 40 percent, to 229,820 passengers in 1994. It can be assumed that essentially all cruiseship use is by nonresident tourists, but it is not possible to separate out ferry and airline use between Southeast Alaska residents and nonresidents. Table 3-38 displays Southeast visitation trends for major access modes and several popular excursions.

One of the more obvious trends is the seasonal nature of tourism in the region and the state. The AVI study estimates over two-thirds of all visitors to the state arrive in the summer. This percentage is even higher for pleasure-related visitors. May through September is the typical season, with most arrivals in July and August. This has been a concern for the state and the industry, which has been exploring ways to build upon the “shoulder” seasons of fall and spring, as well as increasing winter visitation in specific locales.

Several trends and findings from the various studies are important for further understanding of the nature and makeup of the tourism industry to the region. These highlights are selected in the context of the implications they may have for future management of the Tongass.

Table 3-38
Southeast Alaska Visitation Trends

Year	Juneau Cruise Ship Passengers	SE AK State Ferry Passengers	Juneau Airline Departures	Juneau Ice Field Tour Passengers	Mendenhall Glacier Visitors
1994	372,923	347,998	229,820	62,449	265,000
1993	306,600	342,613[4]	200,066	53,600	210,000
1992	269,000	372,680	236,824	45,638	160,000
1991	248,428	368,780	190,244	41,887	145,482
1990	237,070	363,122	183,677	34,765	188,000
1989	193,983[1]	343,100[2]	176,429	27,326	184,452
1988	198,870[1]	344,209	167,314	25,018	110,000
1987	202,000	326,644	157,952	22,152	119,577
1986	164,400	296,070[3]	156,667	17,553	110,229
1985	137,000	313,147	163,837	12,925	94,072
1984	118,781	311,459	168,685	NA	NA
1983	99,706	307,782	167,302	NA	NA
1982	87,358	300,000	150,871	NA	NA
1981	83,566	282,000	156,257	NA	NA
1980	86,815	276,000	155,699	NA	NA

1 Bankruptcy of large company reduced total passengers these years.
2 Threat of strike reduced passengers late in season.
3 Two Seattle-run vessels (one trip per week) reduced total traffic.
4 Ferry Taku out of service May and June reduced total passengers.
Sources: Alaska Marine Highway Traffic Reports, Juneau Convention and Visitors Bureau, Juneau Airport Manger's Office, Juneau Ranger District Records.

From the 1989 SEAPVRP study specific to Southeast Alaska:

Overall satisfaction rating for their trip is 6.3 out of 7.

- 13 percent were repeat visitors.
- 27 percent (89,600) of pleasure visitors are independent, while 73 percent (242,700) are package visitors. This is a 20 percent and 40 percent increase respectively since 1985.
- Average age of pleasure visitors is 53.1; 49 for independent visitors and 57 for package visitors.
- Two marketing recommendations from the study worth mentioning are: 1) to focus on the independent segment, and 2) to use scenery, wildlife, ferry boats, and wilderness in advertising.

From the AVSP study specific to Southeast Alaska:

- 32 percent of the visitors to Southeast are likely to repeat a vacation to Alaska in the next five years, and 87 percent are likely to recommend Alaska to others.
- The vast majority of visitors to the region travel by cruiseship. Domestic air is the second most frequent mode of travel, highway third, and ferry fourth.
- Southeast is predominantly a "package tour" market, accounting for 67 percent of regional visitors. Independent visitors account for 33 percent.

From the AVSP study for Alaska in general:

- Visitor arrivals have grown 12.2 percent since summer 1985. Most of the growth took place between 1985-1986 when visitor arrivals jumped 11.1 percent, attributed primarily to Expo 86 in Vancouver, Canada, then declined in 1987. Since 1986, the net growth in visitor arrivals has been only one percent. Between 1988-1989 arrivals increased by 4.3 percent. Thus, the overall annual growth rate of visitors to Alaska in the past five summers has been a steady 3-4 percent

- "Total market growth appears weak in recent years, especially in the package visitor market. The four-year trend shows annual growth of about 3 percent. No growth has occurred in the total Vacation/Pleasure market since the exceptional Expo 86' year. In fact, Alaska has struggled in the past two years to recover from the post-Expo visitor recession in 1987 and now is back to 1986 volume. ... package growth is primarily a function of cruiseship capacity and the marketing and discounting which is required to fill that capacity. On the other hand, independent travel is mostly a function of growing demand for Alaska, stimulated in part by state and regional marketing programs. Actual growth in total package demand for the Alaska destination has not occurred while independent demand has grown." (page 27, AVA)
- Modes of travel are changing. Air arrivals have increased significantly since 1985-1989 (Domestic Air 17.8 percent, International Air 82.2 percent). Cruiseship arrivals have increased only modestly (2.7 percent). Marine Highway arrivals have grown considerably between 1986-1989 (16.5 percent), though maximum capacity may be reached in the next few years.
- Alaska visitors are well-educated, well-to-do income-wise, and average 49 years of age. The average age of vacation/pleasure visitors is 50, four years younger than in 1985.

Visitor origins are changing since a similar study in 1985 for the state. In 1985, 94 percent of visitors were from the rest of the United States, however by 1989 only 88 percent were. This reflects a drop of visitors from the western U.S., the principal source (California and Washington, in particular), from 50 percent to 43 percent. Visitors from overseas have increased from 2 percent to 6 percent. Table 3-39 displays visitor origins for Southeast Alaska from the 1988 SEAPVRP.

Table 3-39
Geographic origin of Southeast Alaska Pleasure Visitors

Visitor origin	Percent of all visitors
Alaska	2
Western US	33
California	18
Washington	4
Midwest	18
South	18
East	15
Canada	10
Overseas	4

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, p.59.

Another survey in the region focused in on those businesses which provide non-hunting wildlife uses, such as photography, viewing, and study. It indicated this type of use is increasing rapidly. This business opportunity is growing as much as 33 percent annually, and client expenditures contributed substantially to the economy. About 90 percent of the 200 firms providing this service appear to be nonresidents of Southeast Alaska (Shea, 1990).

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The findings and trends from these studies have similar marketing implications for the industry. In summary, they indicate visitors to Alaska and the region are getting younger, becoming increasingly independent, and are more likely to repeat a visit than in the past. This is important to Southeast, which presently relies heavily on the cruiseship industry. As visitors are getting younger they are more likely to be employed, and thus spend less time in the state than in the past, hence, an increase in air travel. They are likely to demand more action and activity oriented products, such as wildlife viewing, and independent travel options. Increased use of the Forest is likely to result if these trends hold true. Consequently, more competition for use of recreation places may result in the future.

Most residents of Southeast Alaska support the growing tourism industry for its economic contribution and diversification. However, some local residents are questioning the benefits and believe that unregulated growth of this industry would be detrimental and that the social costs to the communities are too great.

Many mid-sized boat-based tourism operators are feeling “squeezed” between designated Wilderness and developed areas. These operators typically bring large groups ashore for nature tours. Group size limits in Wilderness prevent their use of these areas. A recent study indicates that development activities have caused a decline in the number of anchorages suitable for nature tourism in Southeast Alaska (AISRT, 1995).

Outlook

It appears that cruise ships will continue dominating the overall tourism industry in the region into the future. However, the independent market is growing. Market segments such as ecotourism, flightseeing, wildlife viewing, and services offering excursions and opportunities for these travelers will continue to evolve. Expansion of the industry into the shoulder seasons of fall and spring is being pursued as well. Visitor satisfaction is currently high, and the visitor industry appears to be on top of the changing trends and demographics of the visitors to maintain that quality.

The various studies draw similar conclusions on the projected growth of the industry. The AVSP study discusses growth potential ranging between three and four percent, but acknowledges that package visitors, indicative of the cruiseship industry, have leveled out somewhat. It also acknowledges the capacity limitations of the state ferry system, which is almost at maximum. Both of these are primary modes of transportation into Southeast. A draft study recently completed for the Alaska Visitor Association, *Destination: Alaska, Strategies for the Visitor Industry* (AVA, September 23, 1992), projects an overall summer growth rate for the state at 4.1 percent. It further breaks out the growth rate for various categories as follows: Air Tour-2.7 percent; Cruise-4.3 percent; Independent/Package Air-10 percent; Independent Air-4.6 percent; Highway/Ferry-0.9 percent; and Other Pleasure-0.9 percent. The annual growth rate for Fall/Winter/Spring is projected at 1.6 percent.

One of the primary concerns expressed by the State of Alaska for the Tongass Plan revision, and in the draft State Comprehensive Outdoor Recreation Plan, 1992-1996 (SCORP), was future development of the infrastructure needed to serve the visitor industry. In response to the SDEIS, the state expressed concern for impeding the growth of “roaded recreation opportunities” in non-development Land Use Designations. Additional input by the state expanded upon this concern:

"We urge you to consider the multiple opportunities for the tourism industry including expansion of destination-oriented tourism facilities to increase the diversity and stability of the regional economy."

The AVA study expressed similar concerns in regards to public lands. One of the findings of the study was a concern for access to publicly-managed lands for commercial tourism purposes. Existing public lands which are accessible are at, or near, capacity. It further recommends "public access zones ... in which commercial tourism development may be allowed, while protecting the remaining areas around them." Another finding was the need for a "primary tourism zone where visitors can best be accommodated through a concentration of the industry's energies."

As the Tongass is the major backdrop for nearly all tourism to the area, and a destination for many, it will continue to play a major role in shaping the industry in the region. The challenge is in striking a balance between commodity uses, tourism requiring access and development, tourism requiring vast tracks of natural settings, and the local recreational and subsistence uses of the Forest. This challenge is similar to one of the marketing implications from the AVSP study:

> Alaska's first order of business is maintaining the quality of the Alaska visitor experience. This means preserving the natural environment which provides most of the state's main attractions as well as enhancing the manmade means for experiencing them. This must be done in the face of increasing visitor volume and pressure on some of the state's primary natural attractions. If the quality of the Alaska experience is diminished, negative word of mouth will hinder marketing, fewer visitors will repeat an Alaska trip, and volume is likely to drop. Conversely, if the quality of the experience is maintained and enhanced, repeat visitor volume will continue to increase and the state's best marketing method - positive word of mouth - will bring more first time visitors.

Resident Lifestyle and Outdoor Recreation Needs

The distance from Alaska to the lower 48 States and other parts of the world (with the exception of Canada), and the associated travel cost, are major reasons for the difference between resident recreationists and the visitors described in the surveys. The surveys indicate that visitors are generally older, often purchase package tours, utilize many expensive services, and spend relatively little time in remote settings while in Southeast Alaska. They travel primarily by ship and by air. This is in contrast with most places in the rest of the United States where the two groups are often much less distinctive (primarily due to motor vehicle travel).

Unfortunately, historic reporting of recreation use does not separate visitors and residents, making it impossible to distinguish the effects or values of the two groups from existing data. The state, while maintaining reasonably good records about visiting tourists, has few or no similar studies about resident impacts, values, desires, needs, or the effect of tourism on resident recreation opportunities.

Local residents of Southeast Alaska seem to value highly the opportunities for remote, uncrowded wildland and marine outdoor recreation. Most of Southeast Alaska is known for its abundant opportunities to "get away from it all." Many residents take advantage of this fact and frequently head for the wilds to boat, fish, hunt, camp, hike, beachcomb, pick berries, and to do the many other things possible in this vast region. Although the number of residents is small, many spend more time out of doors than their counterparts in the Lower 48. Because of the highly dispersed nature of this type of recreation, much of it is inconspicuous and easily overlooked and information about the amount of dispersed use is difficult to obtain. The most recent information available about the recreation habits and effects of the local resident is the Alaska Public Survey (1979), and to a lessor degree, Statewide Comprehensive Outdoor Recreation Plans (SCORP).

Because of the nature of the geography and jurisdictional patterns in Southeast Alaska, it is assumed that most dispersed recreation takes place on National Forest lands or the saltwater immediately adjacent to National Forest Lands. The currently available data appears to either underestimate the nature and extent of many recreation activities or overcompensates in inconsistent ways. The net result is that while there is a general intuitive feeling by many that outdoor recreation opportunities and activities are highly important to residents, there is little recent documented evidence to clearly support this intuition.

The 1979 Alaska Public Survey did indicate the close attachment many residents have for the region. To quote from the report:

> "Perhaps the most important findings are:
>
> The importance of the region's natural resource base in providing an attractive setting in which to live and recreate. We found that, for many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource base provided. There is little substantial information to collaborate the belief, especially in the case of residents.
>
> The strong attachment of residents to the region. Southeasterners live in the region longer, are more satisfied with community life there, and are more likely to mention other places in their present region of residence as good places to live than are the residents of Southcentral and Interior Alaska we interviewed.
>
> Both of these tend to distinguish Southeasterners from other Alaskans we interviewed and explain their great concern with natural resource planning for the region's public lands. Because of their strong ties to the region, they are likely to persevere through considerable economic inconvenience, such as might accompany a major change in the region's economy, before they would move elsewhere. Many expressed an interest in pursuing another line of work if necessary to remain in the region." (Alaska Public Survey—Residents and Resources, ISER, University of Alaska).

Between 1967 and 1979 resident recreation "demand" changed significantly. The population increased about 1/3 and demand for recreation opportunities followed. There was also an increase in the per capita participation rate. The average southeastener spent twice as much time participating in outdoor recreation activities than in 1967. This indicates a growing interest in recreational activities, much the same as the rest of the United States during the same period of time. On the other hand, for the first time the cost of pursuing recreation opportunities (boating and flying) was frequently mentioned as a barrier to participation. Outside of "lack of time" and "weather", the most significant "barrier" to participating in recreation activities in 1979 was stated to be insufficient places accessible from their communities for dispersed recreation. As the cost of access to recreation opportunities and places becomes more of a barrier to participation, the location of available sites and places become more important. Other barriers mentioned frequently were "equipment cost" and "need for better information about how and where to go."

In 1967, the lack of facilities was the most mentioned problem. This concern seemed to have been alleviated by 1979. Current public scoping indicates a rising concern about reopening trails, or building new trails near communities. Trails were the leading facility need identified in the 1992-1996 SCORP as well.

A sizable number of residents in 1979 indicated they would stop going to their favorite place if any of a number of development-related activities took place there. The two most detrimental changes that people feared would take place were: 1) more people (crowding), and 2) new timber harvesting activities.

Tables 3-40 and 3-41 indicate the activities participated in by Southeast Alaska residents in 1978-79. This can be compared with 1992 activities, Table 3-42. It displays a similar pattern of participation as occurred in the past, although activities in the surveys are not always comparable.

Changes in Resident Recreation Patterns

Several factors influence total resident recreation demand. Three important ones are: regional population, per capita participation, and recreation travel behavior. These are discussed below.

Regional population. As a region's population increases, so too should the demand for recreation opportunities in the region. If the pattern of recreation remains constant, the increase should be essentially proportional. In the five decades since 1930 the population of Southeast Alaska has increased more than 20 percent per decade except during World War II. Between 1967 and 1979 the region's resident population increased by about a third to approximately 60,000 people. In the past decade the State, as a whole, experienced a significant boom/bust economic shift triggered by the world pricing of oil, timber and fish. The result has been a rise and then fall of resident population to a point about equal to the population of 1979. The prognosis for the next decade is for the population of Southeast Alaska to show a slow increase, and a similar increase is expected for resident recreation use.

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Table 3-40
Most popular outdoor recreation activities in Southeast Alaska 1978-79

Activity	Annual Days Per Capita[1]
Walking, running for pleasure	44.0
Driving for pleasure	27.0
Hiking, beachcombing	25.0
Motorboating	24.0
Playing outdoor sports and games	22.0
Fishing	16.0
Bicycling	6.8
Camping	6.1
Hunting	4.7
Spectator sports	4.5
Canoeing and kayaking	3.8
Swimming, scuba diving	2.2
Summer OHV travel	2.1
Sailing, winter OHV travel	1.7
Flying, downhill skiing	1.6
Cross-country skiing	1.3
Hang-gliding, golf	<1.0

1 Average annual participation days per capita by Southeastern Alaska adult residents in 1978-79.
Source: Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.

Table 3-41
Southeast Alaskan resident recreation taking place on the coast[1]

Activity	Percent of Days on the Coast
Motorboating	89
Kayaking, canoeing	74
Sailing	Insufficient data
Fishing	80
Clamming, crabbing	100
Hunting[2]	79
Camping	34
Swimming	64
Hiking, beachcombing	89
All dispersed recreation[3]	75

1 On the coast refers to recreation activities occurring along saltwater shores.
2 Assumes all deer and waterfowl hunting is coastal, all other noncoastal.
3 Includes above activities summer and winter off-road vehicles, travel, flying, cross-country skiing, all of which are assumed to be noncoastal.
Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.

Table 3-42
Southeast Participation Rates, 1991-1992

Activity	Number of Times
Walking	43.0
Driving for pleasure	22.2
Bird watching	20.4
Fishing	19.5
Biking	18.8
Hiking	13.0
Jogging	11.8
Picnic	11.0
Clamming	8.5
Field	8.3

Source: Alaska Public Survey, Residents and Resources, ISER, University of Alaska,.

Per capita participation. The pattern of people's recreation changes through time; because of this, recreation demand projections are more than simply population projections. Table 3-43 highlights changes in per capita participation by Southeast Alaska residents between 1967 and 1979. Some comparison can be made with the 1992 participation rates in Table 3-42, although survey methods are different.

Some of the most popular activities (such as hunting, and fishing) exhibited no significant change. Eight activities, snowmobiling, canoeing, cross-country skiing, motorboating, snowplay, downhill skiing, camping and bicycling, experienced increases exceeding 50 percent in the 12-year period. Overall, this shift or substitution appears to favor dispersed, nonconsumptive recreation activities, those requiring a large land or water base per recreationist. This may be indicative of the relative decrease of these opportunities for uncrowded and highly scenic settings elsewhere in the country and many foreign countries.

Over time, the supply of certain recreation opportunities in Southeast Alaska has increased: road systems have expanded into previously inaccessible areas, the number of Forest Service recreation cabins and other facilities has increased, and visitor services and tourism marketing have increased. The advent of the all-terrain vehicle (ATV) is playing a role in how local residents view the construction and management of roads (for example, there is a strong desire to allow continued use of ATV's for hunting and fishing.) In some cases, supply-induced increases in participation have occurred. This appears to be the case on Prince of Wales and Mitkof Islands where road systems developed for timber harvesting created an opportunity for road-related access to previously inaccessible recreation settings and an opportunity for recreation activities involving wheeled vehicles (something that was relatively rare in those parts of Southeast Alaska). Use increased, but existing capacity now is greater than demand, primarily because the resident population on the islands is low and the Alaska Marine Highway system has a limited capacity to bring outside visitors and their vehicles to the islands.

Table 3-43
Changes in the ways Southeast Alaskans engaged in Recreation Activities: 1967-1979

	Percent Change in Average Annual per Capita Days	Absolute Change in Average Annual per Capita Days
Activities Showing Increases		
Snowmobiling	1,530	+1.6
Canoeing	529	+3.2
Cross-country skiing	317	+1.0
Motorboating	149	+12.2
Snow play	144	+2.0
Downhill Skiing	114	+0.8
Camping	110	+3.3
Bicycling	88	+6.3
Walking, running for pleasure, hiking, and beachcombing	52	+14.7
Activities Remaining the Same[1,2]		
Hunting, Fishing, Flying	No Change	No Change
Play outdoor Games & Sports	No Change	No Change
Activities Showing Decreases		
Driving for pleasure	23	-8.2
Outdoor swimming	33	-2.2

1 "Statistical uncertainty in average annual per capita participation days for specific activities is typically 5 to 15 percent for both 1967 and 1979 data, but ranges higher for less frequently engaged in activities. With these uncertainties, we can only say that change in these activities, if any, has been small (20 percent over 12 years). We cannot quantify that change more precisely." (Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.)

2 This data comes from the 1979 Alaska Public Survey. More recent information on hunting and fishing is available in surveys conducted by the Alaska Department of Fish and Game and is summarized in the sections on Fish and Wildlife in this chapter. Projected demand for hunting and fishing can be found in the Regional Economy section of this chapter.

Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.

Supply-induced participation changes have also been accompanied by additional demand for specific recreation places or facilities for a related activity. With increased opportunities for roaded access and activities came the need for fisher parking, dispersed campsites, picnic sites, trails to scenic attractions, and additional short access routes to cabin sites and previously inaccessible beaches. Increased tourism has resulted in increased demand for interpretive services, and walking and hiking opportunities near the major communities.

Travel Behavior. The Alaska Public Survey data for Southeast Alaska seems to show that although there is a rising concern about the costs of accessing desired places, people are not turning away from outdoor recreation activities, but are, in fact, increasing their participation. Public scoping and SCORP surveys indicate a desire from many people for more hiking trails and other dispersed recreation opportunities made available close to communities. Along with this desire is the concern that those recreation places within normal travel distances be protected from adverse change. There is also a part of the population in each of the communities that do not have the financial capability to travel beyond the range of the local road system for outdoor recreation purposes.

Wildlife viewing appears to be increasingly important to the lifestyle and the economy of Southeast Alaska. In 1989, the Alaska Department of Fish and Game conducted a survey of 204 known businesses in Southeast believed to serve wildlife viewers. The 62 percent response rate indicated that there were about 120 businesses that are at least partially dependent on non-consumptive wildlife uses. In 1989 these businesses served approximately 146,000 clients who spent over $43 million. The survey also indicated that the principal concerns within this relatively new industry are that the current quality may be adversely affected by logging, remote home-sites, increases in small aircraft use, coastal hatcheries and mariculture, and increased use by other recreationists. Currently, the natural-appearing landscapes and low levels of encounters with other recreation users contribute significantly to the quality of the experience being realized.

Interestingly, the 1979 Alaska Public Survey did not identify non-consumptive use of wildlife (or wildlife observation) as an activity. This may be an indicator of changing values for both residents and visitors.

Off-Highway Vehicles.

The use of Off-Highway Vehicles (OHV's), often referred to as off-road vehicles (ORV's), is a growing activity in the Forest. Their use on the Tongass National Forest is limited due to topography, lush vegetation, and wet soils. Trails are generally planked or involve excessive grades, and are not designed for OHV's. The steep topography is also not conducive for designing new trails for OHV's. However, as the road system expands and technology and design improves, so have opportunities for OHV use. Activities include snowmobiling, access for camping, hunting, fishing, and subsistence purposes, and riding for pleasure and challenge. Road systems connected to communities are used most often, with riders seeking out primitive roads or spurs, usually associated with timber harvest areas. Use of remote road systems on islands is increasing, with lighter weight OHV's and bigger, more powerful boats to transport them.

Along with increased use, increased concern for resource impacts has surfaced. The limitations on accessibility often result in OHV use on muskegs, beaches, tidal areas, river channels during low flows and sensitive wildlife habitats, and effects to non-motorized recreationists. Executive Order 11644, as amended, directs that federal public land agencies, such as the Forest Service, "will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands."

OHV's are managed according to State law and existing Forest Service policy. The Forest is currently managed as open to OHV use unless specifically designated otherwise. This management strategy is planned to continue for the next 10-15 years. A comprehensive travel plan exists for the Juneau vicinity that addresses OHV use. Other areas on the Tongass have site-specific and/or seasonal closures to deal with resource conflicts and impacts. It is likely resource and user conflicts will arise in the future. Resolution of these concerns is best dealt with at the project, or site-specific, level.

Use and Capacity

The ephemeral nature of capacity makes it difficult to precisely predict the capability of the Forest to provide for recreation opportunities. Changing values and needs of the public, international events, weather, economics, socialization, seasons, marketing, new technology, and many other factors lead to shifting public demands and expectations for recreation opportunities. In addition, the modes of travel within Southeast Alaska constrain the potential demand somewhat. The ferry

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system can only carry so many people and vehicles, and the communities can only handle so many cruise ships and aircraft.

An attempt, though, is made to inventory recreation places for their capacity. Related to their current ROS settings. Primitive settings have the ability to provide greater opportunities for solitude and remoteness, which require larger areas and fewer people. Hence, the capacity of these areas is lowest. On the other end of the spectrum, Roaded Natural and Rural settings provide opportunities such as picnicking and interpretive facilities for concentrated use, and thus have a much higher capacity.

The Forest has the ability to provide a large capacity for some recreation opportunities. These include activities such as sightseeing, which take place off the forest, but use the Forest setting as the primary focus. They generally do not affect the on-the-ground recreation place capacity. The cruiseship industry is a prime example. It makes little difference whether one ship or ten ships pass through the Forest on the inland waterways. The limiting factors for them may be the amount of docking capacity at the communities, economics, marketing, or other logistical concerns, such as the number of inland excursions and tours available. Flightseeing is another example which does not directly affect recreation place capacity. At some point, overall scenic quality could be impacted and detract from the marketability of these industries. Scenery Management then becomes the key to maintaining the overall attractiveness of the Forest, and is discussed in the Scenery portion of this chapter.

Methodology and Scientific Accuracy

The supply of recreation opportunities is inventoried and described using two concepts: the Recreation Opportunity Spectrum (ROS) and Recreation Places. These concepts describe the quantity of recreation opportunities. Quality is described using the “Home Range” concept and by assigning a value to the recreation places. All of these concepts have been discussed in detail previously.

Recreation places were inventoried throughout the Tongass National Forest using the principles of the ROS and Visual Resource Management systems and incorporating the principles from the paper, Site Attributes--a Key to Managing Wilderness and Dispersed recreation (Clark and Stankey, 1985). The inventory considered both the physical and social attributes of the settings. The result was identification of sites and areas of known use and attractions which represent the land area necessary to reasonably meet the physical and social setting requirements for given ROS standards. A comprehensive inventory of Recreation places was conducted on the Tongass National Forest in 1988 and 1989. This inventory is continually updated and refined as new information is gained and visitor use patterns change. Overall these changes are generally minor. Using the knowledge of field personnel at the Ranger District level, approximately 1,400 specific recreation places, totaling approximately 3.6 million acres (22 percent of the total National Forest Land), has been inventoried.

The actual location of recreation places within the home range has been refined to better reflect local conditions, such as access along protected waters versus access over large exposed bodies of water, and the relative value or scarcity of an opportunity resulting in traveling beyond the 20-mile guideline for day-use trips. Recreation place values were assigned by district and area recreation personnel knowledgeable about their areas and the customers served, with some assistance from recreation users and other agencies.

The demand for recreation is described by examining studies on tourism and resident lifestyles (previously cited). Tourism studies for Southeast Alaska along with recreation use information is used to project demand. By analyzing trends in recreation participation and population growth, the supply and demand sides are brought together to display how alternatives impact both the quantity and quality of recreation opportunities. Discussions and results are found in the Regional Economy and Communities sections as well as this section.

Information Needs

Perhaps the largest obstacle to comprehensive planning for recreation and wilderness management on the Tongass National Forest has been the lack of reliable information concerning the use and value of the outdoor recreation resources. The Alaska Public Survey conducted in the late 1970's contains much of the most recent information available. Social and economic values have no doubt changed since that time, but little information is available as to specifically how.

Better and more up-to-date information is needed to support and guide resource allocation and management decisions. Primary needs begin with developing the ability to accurately count and identify the kinds of activities people are engaging in, and concurrently surveying users to gain information on the relative value and quality associated with opportunities for outdoor recreation, to measure current demand for opportunities and services, and to help make projections of future demands.

The ongoing State tourism surveys are not designed to provide information for use in developing strategies which recognize the amount and nature of the role the public lands play in the State's tourism industry, and these surveys ignore the use by, or impacts on, local residents.

A continuation of the Southeast Alaska Pleasure Visitor Research Program designed and conducted in 1988 would be useful to follow the trends in recreation and tourism affecting Southeast Alaska's economy.

Similarly, the Alaska Public Survey of residents could be updated, and perhaps expanded to the same depth and specificity as the TRUCS study of subsistence use in Southeast. Both these surveys, and the results of public scoping, indicate that the opportunities to participate in outdoor recreation by residents are as highly valued and important to the overall lifestyle and social well-being as are subsistence activities. Such information is important to the management of the recreation resource.

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Recreation and Tourism

Environmental Consequences

Direct, Indirect, and Cumulative Effects

Implementing the integrated management direction contained in the Land Use Designation management prescriptions and Forest-wide standards and guidelines will minimize the loss of recreation places. However, some alternatives have the potential to cause significant effects on the physical and/or social character of the inventoried recreation places found on the Forest. The analysis will focus on the consequences to the recreation resource, by analyzing changes in Recreation Opportunity Spectrum (ROS) classes, recreation places settings, highly valued recreation places, and implications for both local residents and tourists.

Effects on Supply

Recreation Opportunity Spectrum (ROS)

The mix of recreation opportunity settings will vary by alternative. ROS is an inventory tool, a result of many factors which can change over time. Knowing site specific changes, ROS can be used as a predictive tool to describe future setting opportunities. Given the programmatic nature of this planning document, it is not possible to predict the site specific changes that would occur from implementing any given alternatives.

In general, some setting assumptions can be made for the various Land Use Designations. However, many site-specific exceptions may occur to these assumptions. For instance an area identified for timber production will likely change to a Roaded Modified setting, but may not due to lack of suitable timber, topographic features, or no projects scheduled during the Plan period. A portion of it may maintain a Semi-primitive setting. Conversely, a natural setting Land Use Designation may be influenced by allowed timber harvest in an adjacent Land Use Designation. While the extent of these influences or exceptions are not quantified, they likely balance out when looking at the changes Forest-wide. Thus some ROS assumptions were made for the Land Use Designations to provide a predictive look for comparing the relative impacts of the alternatives.

Table 3-44 projects the effects of each alternative on the distribution of ROS classes, as expressed in acres. In comparing the alternatives based on forest-wide changes in ROS, keep in mind that these are long-term changes that in most cases would occur gradually over several decades; these predicted ROS class acres would occur after 150 years of alternative implementation.

Alternative 1 provides the greatest amount of primitive and semi-primitive opportunities. Alternative 7 results in the greatest shift from the existing condition to Roaded opportunities. Alternative 9 results in the next greatest shift to roaded conditions, followed by Alternatives 2 and 4, Alternatives 5 and 6, and Alternatives 10 and 3. Alternative 11 results in the greatest amount of primitive and semi-primitive opportunities outside of Alternative 1. The Rural and Urban classes remain essentially the same as the existing situation.

The ROS projections provide a general overview of how the complexion of the Forest will change over time. Roaded Modified areas, which currently comprise only 8 percent of the forest, will increase over five fold in the alternative with maximum development. However, even in this alternative, 50 percent of the forest will still remain in the undeveloped end of the opportunity spectrum. In addition, all of the alternatives except for 7 and 9 provide a beach fringe of natural vegetation, which will likely provide a natural setting transition zone next to saltwater for those Land Use Designations allowing timber harvest activities.

Table 3-44
Forest-wide Recreation Opportunity Spectrum (ROS) acres (in 1,000's), and percents by alternative after 150 years of alternative implementation[1]

	ROS Classes					
Alternative	**P**	**SPNM**	**SPM**	**RN**	**RM**	**R+U**
Current	11,003,662	3,157,977	1,180,725	183,574	1,349,512	7,203
	65%	19%	7%	1%	8%	0%
1	10,704,961	3,264,324	1,177,230	278,984	1,449,951	7,203
	63%	19%	7%	2%	9%	0%
2	8,970,267	1,731,937	733,432	396,635	5,043,179	7,203
	53%	10%	4%	2%	30%	0%
3	9,088,929	2,241,582	837,965	420,368	4,286,606	7,203
	54%	13%	5%	2%	25%	0%
4	8,970,267	1,731,937	733,432	396,635	5,043,179	7,203
	53%	10%	4%	2%	30%	0%
5	9,015,858	1,935,462	769,845	411,264	4,743,021	7,203
	53%	11%	5%	2%	28%	0%
6	9,015,858	1,935,462	769,845	411,264	4,743,021	7,203
	53%	11%	5%	2%	28%	0%
7	7,288,763	1,105,966	533,397	294,333	7,652,992	7,203
	43%	7%	3%	2%	45%	0%
9	8,239,025	1,571,690	658,244	428,159	5,978,333	7,203
	49%	9%	4%	3%	35%	0%
10	9,088,929	2,241,582	837,965	420,368	4,286,606	7,203
	54%	13%	5%	2%	25%	0%
11	9,446,229	2,539,241	1,018,464	411,768	3,459,748	7,203
	56%	15%	6%	2%	21%	0%

[1] All percents are percents of the total Forest acres (16,882,653). Rural and Urban ROS have been combined and represent less than one percent of total acres in all alternatives.
[2] P=Primitive; SPNM=Semi-primitive Non-motorized; SPM=Semi-primitive Motorized; RN=Roaded Natural; RM=Roaded Modified; R=Rural; U=Urban

Recreation Places

Changes in the character of the recreation place settings are described in terms of the Land Use Designation groups. These groups are different from the projections just discussed in the ROS section, due to the site-specific nature of Recreation places. Recreation places are specifically addressed in the management prescriptions and Forest-wide standards and guidelines, which will assist in maintaining the character of the setting. To determine the impact or degree of change for a specific recreation place, one must use the alternative map to determine within which Land Use Designation the area falls, and then refer to the management prescription for that LUD.

In general, the Intensive and Moderate Development categories provide Roaded Modified and Roaded Natural setting opportunities. Recreation places in the Natural Setting and Wilderness groups will likely retain their existing setting.

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It is somewhat misleading to strictly use the LUD groups to compare among alternatives because some alternatives prescribe elements that are not mapped such as the Beach and Estuary Forest-wide standards and guidelines and the unmapped small old-growth reserves. Alternatives 1, 3-6, and 11 retain a 1,000-foot beach and estuary fringe of essentially unharvested forest. Alternatives 2 and 10 retain a 500-foot beach and 1,000-foot estuary fringe of unharvested forest. Alternative 11 also includes mapped small old-growth reserves, but Alternatives 3, 10, 5 and 6 would require mapping of these small reserves at the project level.

The importance of home range recreation places has been discussed. Outlying recreation places also have special importance to residents or visitors engaging in multi-day trips, and for commercial outfitters, most of whom market the remoteness and solitude of these places. Thus three categories of recreation places are described: Forest-wide recreation place acres, acres within home ranges, and acres outside home ranges. Table 3-45 summarizes the effects of each alternative on recreation settings in terms of the Land Use Designation groups for these three categories. It is the relative difference among these groups that is considered in the following discussions of alternatives. The Communities section of this chapter displays the effects to individual community use areas.

Table 3-45
Forest-wide recreation place acres summary, by Land Use Designation groups

Alternative	Recreation Places	Intensive Development Acres	Intensive Development Percent	Moderate Development Acres	Moderate Development Percent	Natural Setting Acres	Natural Setting Percent	Wilderness Acres	Wilderness Percent
1	Home Range	7,690	0.4	7,358	0.4	1,393,655	75.9	426,733	23.2
	Rest of Forest	2,643	0.1	3,624	0.2	1,010,102	53.1	885,076	46.5
	Total	10,333	0.3	10,982	0.3	2,403,757	64.3	1,311,809	35.1
2 & 4	Home Range	363,816	19.8	404,888	22.1	639,999	34.9	426,733	23.2
	Rest of Forest	313,037	16.5	192,862	10.1	510,470	26.8	885,076	46.5
	Total	676,853	18.1	597,750	16.0	1,150,469	30.8	1,311,809	35.1
3 & 10	Home Range	273,533	14.9	311,553	17.0	823,617	44.9	426,733	23.2
	Rest of Forest	262,266	13.8	130,469	6.9	623,634	32.8	885,076	46.5
	Total	535,799	14.3	442,022	11.8	1,447,251	38.7	1,311,809	35.1
5 & 6	Home Range	325,234	17.7	367,168	20.0	716,300	39.0	426,733	23.2
	Rest of Forest	303,495	16.0	176,994	9.3	535,881	28.2	885,076	46.5
	Total	628729	16.8	544,162	14.6	1,252,181	33.5	1,311,809	35.1
7	Home Range	887,249	48.3	154,202	8.4	367,252	20.0	426,733	23.2
	Rest of Forest	675,784	35.5	119,857	6.3	220,728	11.6	885,076	46.5
	Total	1,563,033	41.8	274,059	7.3	587,980	15.7	1,311,809	35.1
9	Home Range	473,346	25.8	427,789	23.3	507,568	27.7	426,733	23.2
	Rest of Forest	403,250	21.2	243,291	12.8	369,828	19.4	885,076	46.5
	Total	876,596	23.5	671,080	18.0	877,396	23.5	1,311,809	35.1
11	Home Range	236,147	12.9	270,357	14.7	902,199	49.2	426,733	23.2
	Rest of Forest	203,369	10.7	118,499	6.2	694,501	36.5	885,076	46.5
	Total	439,516	11.8	388,586	10.4	1,596,700	42.7	1,311,809	35.1

Percents are percents of that category total.
Source: Revision data base, Q249C & Q3093C (11/96)

The acreage of settings within designated Wilderness remains constant. Over 35 percent of all recreation place acres are within these areas, which includes 23 percent of recreation places within the home range.

Home Range Recreation Places: Briefly, some of the highlights of this analysis for home range recreation places are:

- Alternative 1 maintains 99 percent in a natural or Wilderness condition.

- The other alternatives vary from maintaining 72 percent (Alternative 11) to maintaining 43 percent (Alternative 7) in a natural condition. The order of alternatives for maintaining most to least in the natural or Wilderness condition is: 1, 11, 3 and 10, 5 and 6, 2 and 4, 9, and 7.
- Alternative 7 puts the greatest amount of home range into intensive settings at 57 percent.

Forest-wide Recreation Paces: Some of the highlights of this analysis for Forest-wide recreation places include:

- Alternative 1 puts 99 percent of Forest-wide recreation places in the natural or Wilderness category.
- The other alternatives range from 77 percent (Alternative 11) to 51 percent (Alternative 7) falling into the natural or Wilderness category.
- Alternatives 7 and 9 have the highest percent in the development categories compared with the other alternatives, at 49 and 41 percent respectively.
- The alternatives tend to place a higher percent of home range recreation places in the moderate and natural categories, than Forest-wide recreation places. This is partly due to the fact that a higher percent of recreation places outside of the home range fall into the Wilderness category.

This does not imply that recreation places changing from a natural setting to a moderate or intensive setting is a negative impact. Many recreation opportunities such as campgrounds and roaded recreation activities require a higher level of development, and thus developing and area may be viewed as an opportunity to enhance or round out recreation offerings. Some communities may be lacking developed opportunities, while others may be in need of more primitive and semi-primitive opportunities. Even within communities, this perspective may differ, as one person may find challenge in Off-Highway Vehicle (OHV) use, enhanced by increased development, while another finds challenge in mountaineering, enhanced by a more natural setting. However, given the general nature of the current use, marketing techniques for out-of-state visitors, resident desires, and attractions that the Tongass provides, some of the natural setting changes will be viewed as a negative impact.

Important Recreation Places

Impacts to recreation places which are important for facilities, marine experiences, hunting, and fishing are further described by Land Use Designation groups by alternative. It is important to recognize that these changes will occur over time. Management strategies may change in the next planning period if public needs and wants change. Changes to the recreation resource will generally be incremental over time, and each project proposal will focus on site-specific issues and opportunities.

The rate of change can be correlated with the planned road construction activity for the various alternatives. In the first decade, Alternative 1 constructs no timber roads and Alternative 7 the most, at 2,627 miles. By the end of the eighth decade, nearly all of the road mileage planned for in an alternative will have been constructed except in Alternatives 4 and 5 in which roads will be built at a lower rate in earlier decades and new road construction would continue through the 16th decade.

Facilities. Table 3-46 displays the number of recreation place acres with facilities for each alternative by Land Use Designation group. This indicates the general degree of development each alternative has on the existing recreation places that have important facilities. Depending on the attraction of a recreation place, the degree of development around a recreation place may be large, or have little impact. For instance a remote public recreation cabin may be enhanced greatly by the solitude and natural scenery the area provides. Likewise the attraction of a similar cabin might be the outstanding steelhead fishing in the spring, with the setting being only a secondary factor. To determine the impact or degree of change for a specific recreation facility, including those permitted by special-use authorization, use the alternative map to determine within which LUD the area falls, and then refer to the management prescription for that LUD.

Table 3-46
Recreation Places Important for Facilities, acre summary by Land Use Designation Group

	LUD Group				
Alts.	Intensive Development	Moderate Development	Natural Setting	Wilderness	Total
1	2,204	3,822	712,833	485,588	1,204,447
2 & 4	77,461	180,608	460,790	485,588	1,204,447
3 & 10	63,728	131,728	523,403	485,588	1,204,447
5& 6	72,143	160,589	486,127	485,588	1,204,447
7	416,289	103,306	199,264	485,588	1,204,447
9	147,083	228,597	343,179	485,588	1,204,447
11	57,974	109,448	551,437	485,588	1,204,447

Source: Revision data base, Q3093a (11/96).

Currently, over 32 percent of the recreation places acres are important for recreation facilities. Some basic findings of the table for facilities include:

- Wilderness remains constant, with 40 percent of recreation place acres with facilities.
- Alternative 1 maintains the natural/Wilderness setting of the majority of place acres with facilities, at 99 percent.
- The other alternatives range from 86 percent (Alternative 11) to 57 percent (Alternative 7) falling into the natural or Wilderness category.
- Alternative 7, the alternative which most emphasizes development, places the greatest percent of recreation place acres in the intensive grouping, at 35 percent..

Marine. Table 3-47 displays marine recreation places. Most of their settings will be maintained to some degree, due to the retention of portions of the beach and estuary fringe in Alternatives 1-6 and 10-11. Again, the perceptions of naturalness and scenery are highly important values among Forest visitors engaged in the unique marine recreation opportunities the Tongass provides.

Table 3-47
Recreation places important for marine recreation, acre summary by Land Use Designation groups.

	LUD Group				
Alts.	**Intensive Development**	**Moderate Development**	**Natural Setting**	**Wilderness**	**Total**
1	2,426	380	719,322	442,399	1,164,527
2 & 4	113,267	221,629	387,232	442,399	1,164,527
3& 10	93,142	160,348	468,638	442,399	1,164,527
5& 6	104,605	207,054	410,469	442,399	1,164,527
7	463,017	103,473	155,638	442,399	1,164,527
9	272,950	191,104	258,074	442,399	1,164,527
11	87,335	124,912	509,881	442,399	1,164,527

Source: Revision data base, Q3093a (11/96).

Currently, over 31 percent of the total recreation place acres are inventoried as being important to marine recreation. Many of these recreation places are within the beach fringe and generally represent a Semi-primitive Motorized ROS setting. Land Use Designations favoring the Natural and Wilderness groupings maintain these setting attributes best. A quick look at the table indicates:

- Wilderness remains constant with 38 percent of recreation place acres important to marine recreation.
- Alternative 1 maintains nearly all of important marine recreation place acres in a natural or Wilderness setting, Alternatives 2 and 4 — 71 percent; Alternatives 3 and 10 — 78 percent; Alternatives 5 and 6— 73 percent; Alternative 7 — 51 percent; Alternative 9 — 60 percent; and Alternative 11 — 82 percent.
- Alternative 7 puts much of the acreage into an intensive setting, at 40 percent.

Hunting. Table 3-48 displays important recreation places and the distribution of acres by Land Use Designation group by alternative. Hunters who favor hunting in an undisturbed, natural setting will prefer those alternatives which have the most acres in the Natural Setting and Wilderness groups. Hunters who prefer using roads and road access will generally benefit from those alternatives with more acres in the intense and moderate groups.

Currently, around 40 percent of the recreation places are important for hunting. This large percentage is expected as hunting areas are generally large in extent. A summary of the table indicates:

- Wilderness remains constant, and maintains 29 percent of the acres important to hunting.
- Alternative 1 maintains 99 percent of the settings in either Wilderness or natural Land Use Designations. Alternatives 11, and 3 and 10, maintain the next highest amounts at 76 and 73 percent in these setting groups.
- Alternative 7 would provide the greatest amount of access and modified settings, the Intensive and Moderate groups, at 50 percent.
- All alternatives in general provide natural conditions for important hunting areas, at levels of 50 percent or greater.

Table 3-48
Recreation places important for hunting, acre summary by Land Use Designation groups.

	LUD Group				
Alt.	**Intensive Development**	**Moderate Development**	**Natural Setting**	**Wilderness**	**Total**
1	7,033	7,266	1,036,714	438,219	1,489,232
2 & 4	288,437	232,890	529,686	438,219	1,489,232
3 & 10	231,985	168,883	650,145	438,219	1,489,232
5 & 6	275,098	216,626	559,289	438,219	1,489,232
7	564,139	188,174	298,700	438,219	1,489,232
9	261,518	305,156	484,339	438,219	1,489,232
11	174,984	169,560	706,469	438,219	1,489,232

Source: Revision data base, Q3093a (11/96).

Fishing. Table 3-49 displays recreation place acres important because of quality fishing opportunities. The standards and guidelines for all alternatives maintain fish habitat. Application of the Tongass Timber Reform Act stream buffers provide a degree of setting maintenance for all alternatives of at least 100 feet. Additional riparian protection in Alternatives 1, 3-6, and 10-11 provide an additional degree of setting maintenance. In other words, fishing will remain good, and the immediate stream side area will remain natural. However, access to the stream and the areas immediately adjacent to the stream may be subject to modifications at various levels. This may affect the quality of the fishing experience for some.

Currently, about 12 percent of the recreation place acres are important for fishing. Alternatives with more acres in the Intensive and Moderate Development Land Use Designation groups will generally provide increased road access to these fishing areas. However, the setting adjacent to the stream side corridors will appear more modified over time. The Natural Setting and Wilderness Land Use Designation groups maintain the settings in a more natural condition, with access generally more challenging. Access may affect the quality of the fishing experience regardless of the degree of setting changes leading up to the stream. Following is a summary of the findings:

- Wilderness remains constant, accounting for 37 percent of the recreation place acres important for fishing.
- Alternative A maintains 92 percent of the settings in a natural condition; 2 and 4 maintain 67 percent; 3 and 10 maintain 78 percent; 5 and 6 maintain 70 percent; 7 maintains 49 percent; 9 maintains 56 percent; and 11 maintains 89 percent.
- Alternative 7 would likely provide the greatest amount of access, as well as setting modifications, to 51 percent of the important fishing recreation place acres.

Table 3-49
Recreation places Important for Fishing, Acre Summary by Land Use Designation Groups.

Alt.	LUD Group Intensive Development	Moderate Development	Natural Setting	Wilderness	Total
1	819	839	282,739	164,872	449,269
2 & 4	63,419	83,180	137,798	164,872	449,269
3 & 10	40,609	57,308	186,480	164,872	449,269
5 & 6	57,742	74,503	152,152	164,872	449,269
7	187,736	39,462	57,199	164,872	449,269
9	81,020	115,899	87,478	164,872	449,269
11	36,671	49,591	199,135	164,872	449,269

Source: Revision Data Base, Q3093a,11/96.

Tourism

Future management of the Tongass will continue to play an important role for the tourism industry in the region. However, the tourism industry is a function of many factors. Some of these factors are unrelated to management of the Tongass National Forest. World events of terrorism, the value of the dollar in foreign countries, and the price of oil can affect the nature of the market. Peoples preferences change, as do the demographics of the population. The amount of money invested in advertising, and the market segments the industry targets, are often motivated by good business practices rather than forest management. Those factors which are related to National Forest management are often at odds with each other. Some sectors of the industry require development of facilities, utilities, and easy access for the comfort and convenience of its clients. Other sectors of the industry require vast, remote areas in a natural setting, and only provide the basic essentials for their clients. Much of the industry in the region requires a mix of both: wilderness fringe areas within a day or less of major communities, where clients can return nightly for a hot shower.

By examining the mix of alternatives, and the Forest-wide standards and guidelines, some general trends and implications for the tourism industry can be discussed. These are based on the overall nature, use, and appearance of forest settings likely resulting from a given alternative, and as compared with those trends and attractions identified in the various tourism studies. Recommendations and concerns from the industry can also be compared with the Forest Plan to get an idea of how the needs of industry can be met. Even within this general overview of how the Forest Plan alternatives might affect the tourism industry, there will be some site-specific exceptions.

Attractions

Scenery and wildlife are primary reasons people visit the area. The Inside Passage is the state's number one attraction, and involves an extended experience of several days through an essentially wildland setting. Tourism has grown tremendously in the past two decades. At the same time, management activities such as road construction and timber harvest have continued, resulting in changes to the landscape. These management activities do not appear to have affected overall industry growth. They have undoubtedly affected some tourism operations in site-specific areas, both positively and negatively. Adverse impacts might include displacement of guides seeking solitude for a group of kayakers or hunters.

Benefits include access to attractions and opportunities in an area, provided by emerging road systems from communities.

A discussion on the visual impact of management activities can be found in the Scenery section of this chapter. The Forest is an important backdrop for many of the tourists to the area, such as the package visitor. It is also an important setting for many of the activities taking place.

How the alternatives affect the ability to market the region and attract visitors can only be generalized. There are no studies which identify a “tolerance level” for change. In addition, marketing strategies can change to create different expectations for visitors to the region. Some visitors will find any change unacceptable. Others will not be distracted by changes, and will still consider the area wild and pristine.

In order to temper the effects of change to the natural appearance of the Forest, several management strategies were developed. The Beach Fringe and Estuary Forest-wide standards and guidelines will maintain the forest near the saltwater beach shoreline and estuaries in Land Use Designations allowing timber harvest in most alternatives. The Visual Priority Travel Routes and Use Areas listed in Appendix F of the Forest Plan identify most of the primary travel routes and use areas of the tourism industry. The Scenery Forest-wide standards and guidelines provide special emphasis for scenic quality in those Land Use Designations allowing development activities for these areas. Site-specific planning for projects will take into account distance zones, activities, and values for tourism.

Even under the most development-oriented alternatives, about half of the forest will be maintained in a natural condition. All of the alternatives except Alternative 7, within the context of their themes, recognize the importance of the backdrop of the major communities in the selection of Land Use Designations.

Tourism Recreation Places

Table 3-50 displays the percent and relative distribution, by Land Use Designation groups, of recreation place acres important to the tourism industry by alternative. All alternatives provide a mix of opportunities, though some emphasize those in natural settings, while others provide for those in developed settings. These changes may be viewed as opportunities or detriments to various sectors of the industry. Based on numerous surveys and marketing campaigns for visitors, it is widely accepted that natural beauty and scenery are some of the principal ingredients for the industry. However, the state and part of the tourism industry have expressed a desire for increased access, and opportunities for development, as existing areas are at or near capacity.

Table 3-50
Recreation places Important for Tourism, Acres and Percents by Land Use Designation Groups.

	LUD Group							
	Intensive Development		Moderate Development		Natural Setting		Wilderness	
Alt.	acres	percent	acres	percent	acres	percent	acres	percent
1	2,663	0	8,265	0	1,135,304	52	1,051,030	48
2 & 4	155,026	7	254,310	12	736,896	34	1,051,030	48
3 & 10	110,536	5	186,516	8	849,180	39	1,051,030	48
5 & 6	139,601	6	234,517	11	772,113	35	1,051,030	48
7	594,639	27	185,791	8	365,802	17	1,051,030	48
9	252,544	11	292,868	13	600,820	27	1,051,030	48
10	110,536	5	186,516	8	849,180	39	1,051,030	48
11	110,684	5	164,099	7	871,449	40	1,051,030	48

Source: Revision Data Base, Q3093a, 11/96.

Currently around 59 percent the recreation place acres are important for tourism. This suggests that tourism encompasses vast areas of the Forest, which is consistent with the values of scenery, wildlife, remoteness, and solitude. A brief summary of the table indicates:

- Wilderness remains constant in all alternatives, and accounts for nearly 48 percent of recreation places important to tourism.
- Alternative 1 maintains the greatest amount of recreation place acres important for tourism in a natural setting or Wilderness condition at 99.5 percent.
- All alternatives maintain at least 64 percent in a natural setting or Wilderness.
- Alternatives 7 and 9 result in the greatest percent of important tourism recreation place acres in the Intensive Development group, at 27 and 12 percent respectively.

This analysis is based on the existing inventory of those recreation places important for the tourism industry. As businesses continue to evolve, so will the inventory. There is no right or wrong mix of opportunities, just shifts in the character of the Forest over time.

Industry Growth

During the public comment periods for the 1990 DEIS and 1991 Supplement, much concern was expressed by the public, industry, and state over the future of the tourism industry. Some of the commenters were concerned that modification of the Forest, primarily through timber harvest and road construction, would negatively impact the industry. Other comments indicated concern for restricting development opportunities. The recent AVA study expressed concern for access to public lands, and development of the facilities needed to offer opportunities, while being sensitive to the natural character of the area. Some important changes were made in response to these concerns. Goals and objectives for tourism are now identified in the Forest Plan to emphasize the importance of the industry, and the role of the Forest Service in working with the industry. They acknowledge the legitimate use of the Forest for commercial operations, and promote a cooperative partnership relationship, to provide for an array of opportunities.

The Recreation and Tourism Forest-wide standards and guidelines for the Forest Plan were changed in response to these concerns, as were the management prescriptions. These changes provide a framework for the industry and the Forest Service, by identifying the appropriateness of the Land Use Designation for development of opportunities. The Recreation and Tourism Forest-wide standards and guidelines address commercial development of facilities and opportunities, which are defined as either "major" or "minor." See Table 3-51. Abbreviated definitions of these terms follow:

Major Development. Major recreation and tourism developments provided by the private sector involve long-term commitment of the land base, with a moderate to high level of site modification. They involve large buildings or complexes of buildings and facilities, and often provide several services in a concentrated area. Comfort and convenience are provided for guests, and facilities can generally accommodate more than 12 people. The proposals are typically Development Scale 3, 4, or 5, and Roaded Natural or Rural ROS settings. Site reclamation involves extensive removal of facilities and improvements, revegetation, recontouring, etc., and greater than 5 years to attain a natural appearance.

Examples include destination resorts and lodges, food and beverage services, downhill ski areas, marinas and gas stations, and full service campgrounds.

Minor Development. Minor recreation and tourism developments provided by the private sector involve only minor site modifications. They involve small rustic facilities and/or improvements, generally with a single purpose or service, and may involve several sites or an extensive area. Basic essentials are typically provided, and can generally accommodate 12 or fewer people per site. The proposals are typically Development Scale 1 and 2, with a Semi-Primitive ROS setting. Site reclamation involves simple removal of facilities and little or no revegetation; a natural appearance can be attained in a few years.

Examples include cabins, huts, small docks, cross-country ski trails with simple facilities, temporary or portable camps, simple and rustic campgrounds.

Table 3-51
Major and Minor Recreation-related Developments

	Major	Minor
Not Allowed	Wilderness Wilderness National Monument Research Natural Area Wild River	Wilderness Wilderness National Monument Research Natural Area
Discouraged	Nonwilderness National Monument Remote Recreation Municipal Watershed LUD II Experimental Forest	Municipal Watershed Experimental Forest
Case-by-Case	Special Interest Area Old-growth Habitat Scenic River Modified Landscape Timber production Minerals Transportation and Utility Systems	Nonwilderness National Monument Remote Recreation Special Interest Area Old-growth Habitat Wild River Modified Landscape Timber production Minerals Transportation & Utility System LUD II
Compatible	Semi-Remote Recreation Recreational River Scenic Viewshed	Semi-Remote Recreation Recreational River Scenic Viewshed Scenic River

Definitions

Not Allowed	Recreation special-use developments are not allowed by law or regulation or are not consistent with agency policy and regulations.
Discouraged	Recreation special-use developments are generally not consistent with the objectives of the Land Use Designation. Development proposals require scrutiny of magnitude and scope for LUD conformance.
Case-by-Case	Recreation special-use developments may be compatible with the LUD objectives depending upon the scope, purpose, and magnitude of the proposal. Proposals will be evaluated on a case-by-case basis.
Compatible	Recreation special-use developments are generally compatible with this LUD, and applicants are encouraged to examine these areas first where there is a public need and no private lands are available or suitable for development.

As previously mentioned, the entire Forest is accessible to the tourism industry for development opportunities, subject to existing laws. However, this strategy helps identify which areas on the Forest are most feasible for development, thus provides direction for the industry as well as the Forest Service.

This direction addresses many of the industry and state concerns to provide for “public access zones” or which allow for the “expansion of destination-oriented tourism facilities.” An analysis of Table 3-51, compared with the Land Use Designations by alternative, is shown in Table 3-52.

Table 3-52
Percent of Tongass Acres Available for Tourism Developments

	Alternative						
	1	2 & 4	3 & 10	5 & 6	7	9	11
Major Developments							
Not Allowed	34	34	34	34	34	34	34
Discouraged	32	18	18	18	12	20	18
Case-by-case	5	28	30	29	47	32	28
Compatible	29	19	18	19	7	15	20
Minor Developments							
Not Allowed	34	34	34	34	34	34	34
Discouraged	0.2	0.2	0.2	0.2	0.1	0.0	0.4
Case-by-case	37	46	48	47	59	51	46
Compatible	29	19	18	19	7	15	20

Source: Revision Data Base, Q3093a, 11/96.

Both Major and Minor Developments are prohibited by law in Wilderness and National Monument Wilderness. This accounts for around 34 percent of the Forest in all alternatives. Research Natural Areas and Wild River Land Use Designations also do not allow for Major Developments, but account for only one to two percent of the Forest in all alternatives. Minor Developments are not allowed in Research Natural Areas, and are discouraged in Municipal Watershed and Experimental Forest. Again, this accounts for less than one percent of the Forest in all alternatives.

In addition, the Transportation and Utility System Land Use Designation provides for the potential development of some future transportation systems in Southeast Alaska as identified by the State, in Alternatives 2-11. Development of highway interties with Canada may provide a big area of growth for the tourism industry in the region. In general, the Land Use Designations surrounding these corridors provide for a natural setting, but allow for certain developments such as lodges and facilities to support tourism. The Semi-remote Recreation Land Use Designation was often used along these corridors, and provides for these opportunities.

Development of tourism opportunities is a cooperative effort. Investments for developing facilities such as destination resorts is generally the role of the private sector. State and local agencies, and the Forest Service, all play a role in realizing the development of these opportunities. The various Land Use Designations and standards and guidelines provide a framework for directing the energies of these organizations in providing these opportunities. In addition, they provide direction for the Forest Service to better respond and address the growing needs of the industry.

Conclusion

Despite future projected changes, the overall condition and appearance of the Forest will still provide a vast, wildland area with numerous opportunities for various sectors of the industry.

The nature of the industry may change somewhat, however, depending on the level of development provided by the alternatives. Alternative 1 will benefit those industries dependent on primitive and semi-primitive recreation opportunities. Alternatives 2-11 will eventually shift more of the natural forest settings to modified development ones, at varying levels, although Alternative 7 does not provide for the tourism industry as well as the others. These alternatives will benefit those sectors of the industry requiring access and development of facilities. As the Forest changes in all of the alternatives over time, the need for changes in marketing strategies by the industry may evolve as well. This will best match expectations of visitors with the changing mix of opportunities.

Some individual businesses may be affected by site-specific changes. This includes those businesses promoting solitude, and vast areas of undeveloped country. They will either be displaced to other areas, forced to change their marketing or nature of operations, or be eliminated. Some opportunities will be enhanced by these changes. These include those businesses which benefit from ease of access, increased infrastructure opportunities, and a natural-appearing landscape.

Opportunities for industry growth are recognized and provided for in the development of standards and guidelines, and selection of Land Use Designations. These emphasize cooperative efforts to identify, promote, and facilitate development of various opportunities, and identify those areas on the Forest which are appropriate for various levels of development, as well as potential transportation links. This framework will assist in directing the efforts of industry, and the response of the Forest Service to proposals for development.

Use and Demand

Trends in recreation use and tourism discussed previously in this section indicate rapid growth in the past few years. This growth includes the number of arrivals, the modes of transportation, and the different types of activities in which people have participated. Past and current studies indicate the main attractions for recreationists and tourists include scenery, wildlife, feelings of remoteness, and a sense of vastness. These trends are likely to continue. The marine and undeveloped character of the Forest plays an important role in attracting recreationists and tourists and in meeting their expectations.

As the Forest changes over time, so may the makeup of Forest visitors and the activities in which they engage. As the complexion of the forest setting and associated recreation places changes, recreationists will have three general options. Many will adapt to the new situations. Setting changes will have little or no impact to these current Forest users. For others, the changing scenario may not be acceptable, and these users will be displaced to other areas where the setting and use patterns are more in line with their expectations and needs. The third group will find they can neither adapt to the new situation nor find suitable substitute areas, and thus may substitute other activities in their leisure time and eliminate recreating on the Forest.

The projected use and capacity analysis for recreation and tourism found in the Regional Economy section of this chapter indicates several things. The largest component of use is associated with the Semi-primitive Motorized ROS class setting. The second largest component of use is that associated with the Primitive and Semi-primitive Non-motorized settings. The smallest component, but one which is also growing, is associated with Roaded settings.

Setting changes are generally recognized as a one-way street, moving toward the developed end of the ROS spectrum, though given enough time in this rainforest, settings can revert back to primitive and semi-primitive conditions. The analysis indicates that, as the Forest is developed over the next decade, an abundance of roaded settings will exist. At the same time, the Forest is large enough that an adequate supply of Primitive and Semi-primitive Non-motorized settings will also remain. However, projected use indicates that Semi-primitive Motorized settings, characteristic of the marine interface, will reach capacity within the decade.

Future Opportunities

There is an emerging concern among both land managers and some customer groups about the capacity of the recreation resource base on the Tongass. Each of the recreation places has been assigned a “theoretical capacity” based on its current ROS classification. Forest-wide this figure is slightly less than five million Recreation Visitor Days annually. These theoretical capacities serve only as a baseline for later determinations of actual capacity limitations or opportunities. As recreation place settings become more developed, their inherent capacity generally increases if connected to a community road system. Capacity and demand are tied to employment for each alternative, and a discussion of these impacts can be found in the Regional Economy section of this chapter.

Since capacity is based on the ROS classification, it will change over time. Areas which are inventoried as Primitive have a very low capacity. As the ROS classification moves toward the developed end of the spectrum, the capacity goes up. For instance new roads providing easier access to an area may create new semi-primitive opportunities, increasing the capacity of the recreation place, or creating a new recreation place. These types of changes will create new Semi-primitive Motorized opportunities. This will assist in making up some of the expected shortage of this opportunity. Roaded opportunities, which have an excess of supply, will increase in capacity too. Primitive opportunities which are currently in excess, will be reduced over time, but are still expected to meet demand at the end of the decade for all alternatives.

The projected shortfall of Semi-primitive Motorized settings has some important implications for residents, tourists, and land managers. The lifestyle and recreation activities of local residents is often tied directly to the natural marine setting Southeast Alaska offers. Tourism is also tied directly to the natural scenery, vastness, and remoteness of the area. Tourism opportunities from cruise ships and ferries will likely remain unaffected as scenery along critical travel routes is managed for scenic considerations. Scenery in many of the recreation places, such as anchorages, will also be managed for a scenic emphasis. In addition, the Beach Fringe and Estuary Forest-wide standard and guideline will provide for a natural transition zone along the shorelines from Roaded Modified areas in those Land Use Designations allowing timber harvest, except for Alternatives 7 and 9. This will assist in maintaining the natural character of marine areas, and temper the impact from management activities such as timber harvest. As the largest component and most demanded, the Semi-primitive Motorized setting may become more and more crowded until certain locations can no longer provide the setting that people want. Outfitters and guides may be more limited in where and when they can operate in these locations.

New recreation opportunities will be created in response to increased demands, especially to create additional Semi-primitive Motorized opportunities. Appendix L of the Forest Plan identifies proposed recreation and trail construction and reconstruction projects. This list will be added to and amended in response to public demand, as identified at the Administrative Area and Ranger District levels. Of note on this list are numerous recreation cabins, campgrounds, and trails, which will increase the supply or capacity of recreation opportunities in the semi-primitive end of the opportunity spectrum.

The Recreation and Tourism Forest-wide standards and guidelines provide direction for additional recreation and tourism opportunities, especially regarding private sector development. A framework for identifying where facilities are appropriate has been developed for the Land Use Designations. It will provide direction for future investments which will create and add to the capacity of the Forest. Destination resorts, lodges, systems of huts or marine parks are all addressed in these guidelines. The identification of future state transportation needs assisted in the selection of Land Use Designations which allow for the development of support facilities along these routes, while often maintaining the natural character along the routes.

Competition and Distribution

Increasing trends for tourism, especially more independent visitors, may mean increased competition for recreation place capacity with residents. This will manifest itself primarily in those areas near communities, and those areas which provide high quality opportunities. Many residents and tourism operators will adapt to this situation. Some will not, and either be displaced to other areas or be eliminated. The existing home range may be extended in response to increased use with probable increased costs to the recreationists. Redistribution to lesser-used areas is a likely consequence, and is frequently a marketing strategy employed by the Forest Service and other service providers. Increased managerial controls such as use limits, party numbers, access restrictions, or permits may be necessary on a site-by-site basis. These impacts are likely for all alternatives, but are greatest for those alternatives with the greatest amount of change from the existing situation.

As use and demand increase over time, more competition for resources will occur. For some of these resources, such as fishing, substitute opportunities may be present in a different area, or the change in settings may make little difference as long as the sought-after resource is in ample supply. For other resources, such as solitude, there may be no substitute.

Social encounters will also increase over time. This may not have a great impact in modified settings. The impact will be felt the most in the undeveloped settings, especially in those alternatives which reduce them the most. As primitive and semi-primitive settings are reduced, conflicts between users will likely increase as well; the degree being relative to the amount of change in the alternatives. This conflict may be between user groups engaged in different activities, such as motorized versus non-motorized, or between residents and tourists vying for the same unique opportunities with few substitutes, such as bear viewing areas.

One result of shortages in Semi-primitive Motorized settings may be greater pressure on Wilderness, LUD II, and Monument areas. Some of these areas are already at or near capacity, while some are virtually unused. Thus a distribution factor comes into play. Those that are already heavily used generally have some attraction, such as a unique opportunity or easy access within a home range. Those that are not are generally difficult to access, or contain few attractions. Heavier use in some of the areas may bring about increased restrictions on user numbers or the activities they engage in. This problem of distribution could be somewhat resolved by identifying substitute opportunities, or new ventures for outfitters, guides, and providers of transportation services.

Effects by Alternative

This section will compare the nature of recreation settings for each alternative, relative to previous discussions on forest recreationists and the supply of recreation opportunities. The rate of change for these settings is correlated with projected road construction at the end of the first decade, then the next eight decades, at which time nearly all projected roads will have been constructed.

Alternative 1

This alternative provides the greatest amount of Primitive and Semi-primitive recreation opportunities both Forest-wide and within community home ranges. Conversely, it provides the least amount of road-accessible recreation opportunities. This alternative most closely maintains the current outdoor recreation setting conditions Forest-wide. Residents and visitors would essentially maintain existing use patterns and opportunities.

Almost none of the Forest would shift toward the developed end of the opportunity spectrum. Recreation place acres would essentially maintain their existing settings. Places identified as important would be maintained in natural and Wilderness settings in this alternative, at over 99 percent of existing acres.

No new timber harvest roads would be scheduled for construction.

Alternatives 2 and 4

These alternatives provide for a mix of setting opportunities. These two alternatives use the same land allocations, so over the long-term, effects would be similar. Over the short-term, changes from the natural end of the spectrum to the developed end would occur much more slowly in Alternative 4 because of the 200-year timber rotation.

Over 32 percent of the Forest would eventually shift to the developed end of the opportunity spectrum, while a 34 percent of the recreation place acres would be affected. Approximately 66 percent of the acres of recreation places with high values would remain in natural and Wilderness settings.

Implementation of Alternative 2 would schedule approximately 6,140 miles of road to be constructed during the next eight decades, with 1,900 miles being scheduled in the first decade. Implementation of Alternative 4 would schedule approximately 1,930 miles of road to be constructed during the next eight decades, with 520 miles being scheduled in the first decade. Nearly all these roads and affected acres would be outside recreation places.

Alternatives 3 and 10

These alternatives provide for a mix of setting opportunities. These two alternatives use the same land allocations, but different standards and guidelines so the acres developed would be less in Alternative 3 because of the additional beach fringe, the additional riparian protection, and the extra areas protected for deer habitat.

Over time, 27 percent of the Forest will shift to settings in the developed end of the opportunity spectrum. Thirty-two percent of the home range place acres, and 26 percent Forest-wide would be in developed settings. Recreation places would be maintained in a natural setting or Wilderness to a greater degree than Alternatives 2, 4-7, and 9. Existing recreation users would not be impacted in this alternative to the degree of change experienced in these alternatives.

Implementation of Alternative 3 would result in a total of 3,722 miles of road constructed over the next eight decades, with 1,035 occurring in the first decade. Implementation of Alternative 10 would result in a total of 4,350 miles of road constructed over the next eight decades, with 1,200 miles constructed in the first decade.

Alternatives 5 and 6

These alternatives provide for a mix of setting opportunities. These two alternatives use the same land allocations, so over the long-term, effects would be similar. Over the short-term, changes from the natural end of the spectrum to the developed end would occur much more slowly in Alternative 5 because of the 200-year timber rotation.

Over time, 30 percent of the Forest will shift to settings in the developed end of the opportunity spectrum. Thirty-eight percent of the home range place acres, and 32 percent of Forest-wide recreation place acres would be in developed settings.. Existing recreation users would not be impacted in this alternative to the degree of change experienced in Alternatives 2, 4, 9 or 7.

Implementation of Alternative 5 would result in a total of 1,811 miles of road constructed over the next eight decades, with 488 occurring in the first decade. Implementation of Alternative 6 would result in a total of 4,705 miles of road constructed over the next eight decades, with 1,238 occurring in the first decade

Alternative 7

This alternative has the greatest effect on shifting undeveloped recreation places and opportunity settings toward the developed end of the spectrum. Over time, the alternative could provide the greatest amount of road-accessible recreation in the Roaded Modified recreation opportunity class. Conversely, the least amount of Primitive and Semi-primitive recreation settings, outside designated Wilderness, will be available. Over time, this alternative would result in the greatest change to current recreation use patterns for both residents and tourism.

Over 47 percent of the Forest would eventually shift to the developed end of the opportunity spectrum. Forty-eight percent of recreation place acres in the home range, and nearly 49 percent Forest-wide would be in developed settings. Nearly 51 percent of the recreation place acres Forest-wide would still remain in a natural/Wilderness condition.

During implementation of this alternative approximately 8,960 miles of new roads would be Land Use Designations constructed during the next eight decades, with 27 percent (2,627 miles) being built in the first decade. All recreation places with suitable timber scheduled for harvest would be in a roaded condition and capable of providing roaded recreation opportunities by the end of the eighth decade.

Alternative 9

In this alternative, a smaller amount of opportunity settings would shift toward the developed end of the spectrum than in Alternative 7 although still more than the other alternatives.

Nearly 38 percent of the Forest would eventually shift to the developed end of the spectrum. Forty-two percent of the home range recreation place Forest-wide would be in developed settings.

Timber harvest would require about 7,782 miles of new roads over the next eight decades, with 16 percent (1,208 miles) scheduled during the first decade. Numerous recreation places protected under this alternative might still be road-accessible or within the vicinity of roads.

Alternative 11

This alternative also provides a mix of setting opportunities.

Over time, 23 percent of the Forest will shift to settings in the developed end of the opportunity spectrum. Twenty-eight percent of the home range place acres, and 23 percent Forest-wide would be in developed settings. Recreation places with important facilities and marine recreation would be maintained in a natural setting or Wilderness to a greater degree than all alternatives except 1. Existing recreation users would not be impacted in this alternative to the degree of change experienced in these alternatives.

Implementation of this alternative would result in a total of 3,348 miles of road constructed over the next eight decades, with 1,122 occurring in the first decade.

Summary

Over time in most alternatives, the Forest will continue to shift toward the developed end of the Recreation Opportunity Spectrum, bringing about increased opportunities associated with roads, and decreased opportunities associated with primitive forms of recreation. The degree of change varies by alternative. Alternative 1 is best in maintaining the current character of recreation opportunities. Alternatives in order from least to most effect on the current character during the first decade are 1, 5, 4, 11, 3, 10, 6, 2, 9 and 7.

It appears the Forest has an ample supply of primitive and roaded opportunities to meet demand in the first decade. However, projected demand indicates the Semi-primitive Motorized opportunity class will be in short supply within the decade. This setting typifies the unique character of recreation in Southeast Alaska, that of a marine or fly-in nature to relatively remote areas.

Despite the change in settings to more modification, the Forest still maintains over half of the recreation place acres in areas protected through legislation or in natural Land Use Designations in all alternatives. Important recreation places Forest-wide also receive a higher degree of protection than recreation places in general, in all alternatives.

Tourism in the region has grown tremendously in the past two decades, and growth is expected in the future. The management prescriptions and standards and guidelines should assist in maintaining and facilitating future growth.

Marketing of the unique recreation opportunities on the Tongass and Southeast Alaska is already capturing new market segments. Recent increase in activities such as non-consumptive uses of wildlife, kayaking, and cruiseship arrivals suggest the trend will continue. One aspect of marketing is the recognition of changing preferences, as well as identifying new market segments. This will become more important as the character of the Forest changes over time.

Mitigation

The management prescriptions for several Land Use Designations are specifically designed to provide areas where primitive and semi-primitive types of recreation may occur (see Forest Plan, Chapter 3). Each prescription is designed to meet the objectives of one or more Recreation Opportunity Setting class. Each management prescription contains direction to manage the recreation settings to the standards established for their respective ROS classifications, and the purposes called for in the prescription. Standards and guidelines within the prescriptions, as well as the Forest-wide standards and guidelines (Forest Plan, Chapter 4) will be applied to ensure that appropriate recreation settings and opportunities are provided for a wide range of uses and activities. Standards and guidelines are also applied to developed sites (cabins, campgrounds), trails and other areas to provide opportunities for high-quality recreation experiences.

Some recreation place settings will change over time. For those that do, the recreation settings will always be managed to meet the established standards and guidelines for the resulting ROS classification. As authorized projects are implemented, the changes in current conditions in recreation places will be recorded, and inventory records periodically updated.

Research Natural Areas

Affected Environment

Research Natural Areas (RNA's) are part of a national network of field ecological areas designated for research and education and/or to maintain biological diversity on National Forest System lands. Research Natural Areas are used for non-manipulative research, observation, and study. They also may serve to carry out provisions of special acts, such as the Endangered Species Act and the monitoring provisions of the National Forest Management Act.

Existing RNA's

Six Research Natural Areas were currently established within the Tongass National Forest prior to 1996. Brief descriptions of each follow.

Pack Creek RNA. Established in 1951; size - 5,837 acres; located on Admiralty Island. This RNA was established to represent old-growth spruce/hemlock forest types in northern Southeast Alaska, and to represent productive coastal brown bear habitat. The Pack Creek RNA includes excellent examples of diverse alpine meadows, rockfalls, and snowfields representative of much of northern Admiralty Island.

Cape Fanshaw RNA. Established in 1965; size - 614 acres; located at the junction of Frederick Sound and Stephens Passage. This area was established to represent undisturbed old-growth Alaska yellow-cedar and western hemlock forests. It represents a good example of cedar decline on the mainland, and has been used for long-term monitoring of changes in species composition and stand dynamics.

Red River RNA. Established in 1980; size - 8,031 acres; located in Misty Fiords National Monument Wilderness. This RNA represents the northern range of silver fir (*Abies amabilis*).

Limestone Inlet RNA. Established in 1951 and expanded in 1971; size - 9,102 acres; located in Stephens Passage. This area represents typical vegetation types common to the Juneau mainland, including many avalanche chutes and a mainland stream with a good fish population. In 1951, Limestone Inlet was considered the most pristine drainage in the northern mainland coast, making it an excellent area for documenting baseline conditions on the mainland. However, Alaska Department of Fish and Game has altered the native salmon runs since 1980 by operating a hatchery in nearby Snettisham Lake; upland areas remain intact.

Dog Island RNA. Established in 1976; size - 705 acres; located on Dog Island. This RNA represents a small island ecosystem containing the northern limit of Pacific yew (*Taxus brevifolia*), associated scrub timber and low volume mixed conifer sites of southern Southeast Alaska.

Old Tom Creek RNA. Established in 1951; size - 4,544 acres; located on central Prince of Wales Island. Situated in a low-site, cedar-dominated watershed, this RNA was established as an example of cedar-hemlock old-growth forest. It also includes some examples of riparian spruce forest, extensive tidal meadows, and dense bald eagle and black bear populations.

One of the six, Pack Creek, is being recommended for declassification, due to a long history of human presence related to viewing brown bear. At the same time, Pack Creek would be re-designated as a zoological area, to be managed under the

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Special Interest Area LUD (see Special Interest Areas). With this designation the area will be increased in size to encompass the home range of the Pack Creek brown bear sows and coincide with the State of Alaska brown bear hunting closure. No significant changes in existing management are expected to result from this change, which is being made to prevent potential future conflicts between bear-viewing activities and the area's management direction.

The proposal to repeal Pack Creek's designation as a Research Natural Area requires approval by the Chief of the Forest Service. This proposal will be forwarded to the Chief upon approval by the Regional Forester of the Forest Plan. It will take effect upon approval by the Chief.

To compensate for the removal of Pack Creek from the RNA system, another area on Admiralty Island with similar characteristics (old-growth spruce/hemlock forest and brown bear habitat) is proposed. This area, on the West arm of Gambier Bay, is included as a replacement for Pack Creek in all alternatives. A nearby area on a different arm of Gambier Bay was previously considered, but as discussed below was not recommended for RNA designation due to potential conflicts with recreation use related to a cabin in that area. No conflicts are expected for West Gambier Bay. Establishment of this RNA will take effect upon approval of the Forest Plan by the Regional Forester, and of the designation order for this RNA.

Identification of Potential RNA's

The Alaska Regional Guide (USDA Forest Service, 1983) identified plant communities, shrub species, geologic landforms, and animal species to be included within a network of RNA's in Southeast Alaska. Not all the ecosystems identified in the Regional Guide are included in existing RNA's on the Tongass National Forest. National Forest Management Act Regulations provide the following direction for RNA's: "Forest planning shall provide for the establishment of RNA's. Planning shall make provision for the identification of examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special and unique characteristics of scientific interest and importance . . . and that are needed to complete the National network of RNA's."

In response to this planning direction, a Research Natural Areas Steering Committee was organized which included individuals from the Tongass Land Management Planning Team, the Forestry Sciences Lab in Juneau, and the University of Alaska Ecological Reserves Program.

The Committee established a framework within which to identify potential RNA's across the Tongass, based on broad ecological units and the representation of a number of vegetation, aquatic and wildlife types or habitats characteristic of each unit. This framework was presented in-depth in the SDEIS and is published in Juday et. al., 1988. The seven ecological units, termed "Geographic Provinces," are described below, and their boundaries shown in Figure 3-6. Using this framework the committee originally identified over 60 potential areas, and subsequently recommended 30 as their "priority potential RNA proposals." These 30 potential areas were used in the SDEIS to select the RNA proposals for the alternatives.

Geographic Provinces

Yakutat. (Map #1) Includes Glacier Bay north to Yakutat Bay. Recently uplifted beaches and active fluvial processes related to icefields, valley glaciers, and cold wet climate distinguish this region from the rest of Southeast Alaska.

Lynn Canal. (Map #2) The driest and one of the most continental environments in Southeast Alaska. Extreme rain shadow from the Chilkat and St. Elias Ranges allows extensive development of fire-dependent forests (lodgepole and birch), and the southern and westward extension of boreal forest and tundra plant species. Rugged scoured terrain with large vertical relief.

Coast Range. (Map #3) Rugged heavily glaciated terrain with extensive alpine and icefield environments. Productive forest land usually confined to river valleys and marine terraces. British Columbia batholith has major influence over the whole area. This province may be logically divided into two subzones, perhaps divided at the Bradfield Canal with more extensive alpine and active glaciation to the north and less extensive ice to the south.

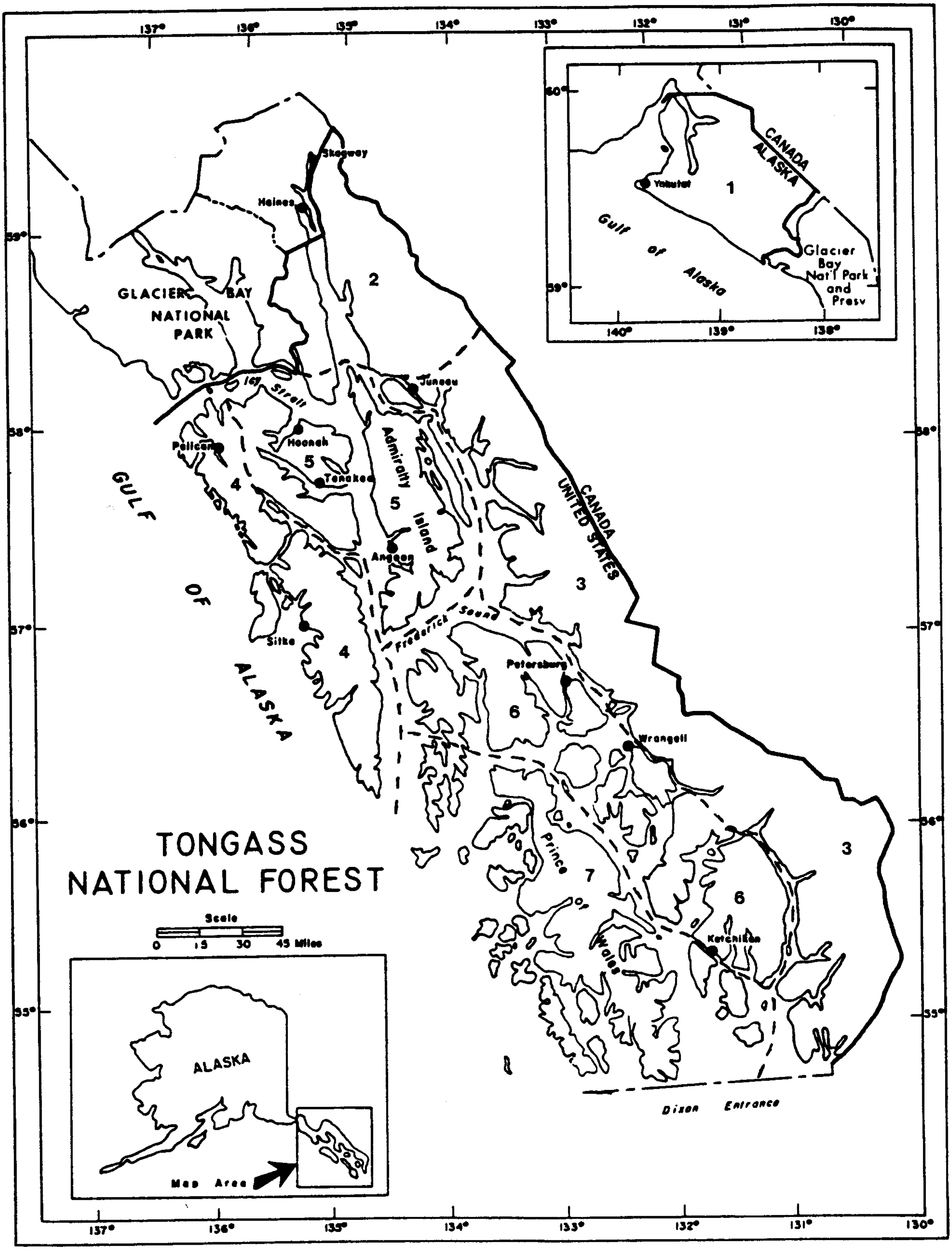
Northern Outer Islands. (Map #4) Rugged highly dissected topography exposed extremely wet outer coastal environment, and extensive alpine environments with productive forested areas highly fragmented and usually concentrated on oversteepened slopes and on valley bottoms.

Northern Interior Islands. (Map #5) Includes eastern Chichagof and Admiralty Islands. Protected from full force of storms off the outer coast, but with colder climate and more rugged topography than in the Central Interior Islands province. Also, with distinctive fauna. Originally considered to be a subprovince of the Northern Outer Islands, but because of its contrast in climate and geology with the outer coast and Baranof Island, it was redefined as its own province.

Central Interior Islands. (Map #6) Includes Kupreanof Island lowlands and surrounding areas protected from storms off of the outer coast and generally moderate in precipitation and temperature extremes. Includes several major rain shadow areas such as northwest Kupreanof and parts of Etolin Island. Generally subdued rolling topography and extensive muskeg areas.

Southern Outer Islands. (Map #7) Rolling subdued topography to north and localized rugged topography to the south. Includes many refugia, unique plant and animal populations at the northern extent of their natural range, and highly productive forests, especially on limestone and marble soils derived from ancient coral reefs.

Figure 3-6
Geographic Provinces of Southeast Alaska



Selection of Potential RNA's

Forest Service manual direction for Research Natural Area management includes, in part, the following management standards and guidelines from (FSM 4063):

1. RNA's are to be established in perpetuity (with some exceptions for catastrophic circumstances).
2. Generally, educational use of a Research Natural Area (RNA) by anyone below the upper class college or graduate student level is not authorized.
3. Entire drainages will be selected where possible.
4. Logging or wood gathering activities are not permitted.
5. Any form of recreational use is prohibited if such use threatens or interferes with the objectives or purposes for which the RNA was established.
6. Roads, trails, fences, or signs are not permitted on an established RNA unless they contribute to the objectives or to the protection of the area. Buildings are not permitted.
7. Exotic plant or animal life are removed if practical.
8. The Regional Forester may ask the Bureau of Land Management to withdraw a RNA from mineral entry.

Since publication of the SDEIS, the Forest Supervisors again reviewed each priority potential RNA, considering Forest Service manual direction, and additional resource information for minerals, timber, State and Native land selections, fish improvement projects, developed and undeveloped recreation uses, existing and likely future transportation needs, and other pertinent information affecting the suitability of each area for consideration as an RNA. Of the 30 priority potential RNA's recommended by the RNA Steering Committee, only six were found to be suitable for designation given the balance between competing Forest uses and objectives, and conflicts with Forest Service manual direction. Conflicts with manual direction could be either conflicts occurring now, or anticipated conflicts. In some cases, proposed boundaries were modified in order to reduce anticipated conflicts, or an area was proposed for classification as a Special Interest Area.

The six RNA's considered suitable for designation are: Warm Pass (Lynn Canal Province); Marten River and Robinson Lake (Coast Range Province); Tonalite Creek (N. Interior Islands Province); Kadin Island (C. Interior Islands Province); and Rio Roberts (S. Outer Islands Province). How these were recommended by alternative is discussed under "Environmental Consequences." The reasons for not selecting or modifying the other 24 priority potential RNA's recommended by the RNA Steering Committee follow.

Yakutat Geographic Province

Akwe Beach - Existing cabins and commercial fish use in this area are uses incompatible with this RNA proposal (Item #6, above).

Akwe-Ustay Lakes - Existing recreation use, although primitive in nature, is incompatible with this RNA proposal (Item #5, above). The Akwe-Ustay Lakes are in the Yakutat Forelands LUD II Area, and are therefore protected from many forms of development.

Mountain Lake - Existing recreation use, although generally primitive in nature, is incompatible with this RNA proposal (Item #5, above). The Mountain Lake is in the Russell Fiord Wilderness, and is therefore protected from many forms of development.

Pike Lakes - Pike Lakes are currently known for their pike fishing and considerably more pike fishing is expected in the future. Because of this use Pike Lakes was not recommended as an RNA (Item #5, above). However, because of the special attributes of the Pike Lakes, they are designated as the Pike Lakes Recreation Area (Special Interest Area) in the preferred alternative.

Upper Situk - An existing Forest Service public recreation cabin and high recreational fishing use are incompatible with this RNA proposal (Items #5 and #6, above). Much of the Upper Situk Area is in the Russell Fiord Wilderness, and is therefore protected from many forms of development.

Lynn Canal Geographic Province

Warm Pass - Warm Pass includes an existing Forest Service public recreation cabin and trail, which would have made it incompatible with designation as an RNA as proposed by the Steering Committee (Items #5 and #6, above). However, the boundary of the proposed RNA was modified to avoid the recreational developments; Warm Pass with the modified boundary is recommended as an RNA in the preferred alternative.

Dayebas Creek - This site has been identified as a potential hydropower development area for the City of Haines. A potential transportation route up the east side of Lynn Canal could also affect portions of this proposed RNA. The potential uses would be incompatible with this RNA proposal (Item #6, above) and, therefore, this proposed RNA is not recommended.

Coast Range Geographic Province

Blue Lake Lava - The Blue Lake Lava site has unique geological attributes. It is a recreation place important for tourism, primarily used for viewing scenery from the air. Because of its special geological attributes, it is designated as the Blue River Lava Flow Geological Area (Special Interest Area) in the preferred alternative, rather than a Research Natural Area.

Twin Lakes - Twin Lakes includes an existing Forest Service public recreation cabin and has high recreation use (including hunting, fishing, hiking, viewing scenery, and camping). A short trail connects the cabin to the lake. Hiking is limited by the fluctuating water level and the rather thick brush in the area. Off-Highway Vehicle (OHV) use has occurred in the area, but to date, has not occurred in the proposed RNA. OHV use is generally not allowed in Wilderness, and it often is hard to regulate. The lakes are also used for water skiing during high water levels. Moose Hunting occurs. Designation as an RNA would be incompatible with the cabin and the recreation uses (Items #5 and #6, above).

North Outer Islands Province

Crater Ridge-Freds Creek - Recreation use of the Crater Ridge-Freds Creek area is very high. A Forest Service public recreation cabin and the Mount Edgecumbe National Recreation Trail exist in the proposed area. Designation as an RNA would be incompatible with the cabin, trail, and the recreation uses (Items #5 and #6, above). Because of its special geological attributes and high recreation (and tourism) use, Crater Ridge-Freds Creek is designated as the Mount Edgecumbe Geological Area (Special Interest Area) in the preferred alternative, rather than a Research Natural Area.

Myriad Islands - The Myriad Islands are a popular recreation area. They are one of the very few areas that are on the open ocean in the Baranof, Chichagof, Yakobi Island Area and have sand beaches and good anchorages. They are popular for picnicking and beachcombing, with some overnight camping as well as being a popular destination for sea kayakers, including permitted outfitter/guides. The Sitka Coastal District has identified the Myriad Islands as one of the “outstanding recreation or subsistence areas” in their draft Public Use Management Plan. One “consumptive” use that may conflict with an RNA designation is the collection and use of wood for fires. Therefore, designation as an RNA would be incompatible with recreation uses and wood gathering (Items #4 and #5, above). The Myriad Islands are located in the West Chichagof-Yakobi Wilderness.

Plotnikof-Port Banks - The Plotnikof-Port Banks area is one of the most popular recreation sites in the South Baranof Wilderness, and is another of the outstanding recreation sites designated in the Sitka Coastal District Draft Plan. Use is largely due to the presence of the two cabins and trail system along the lower stream. Because it is not feasible to modify the boundaries of the RNA to exclude the recreation use areas, and it is not reasonable to remove the cabins and preclude current and potential recreational use, an RNA designation is not recommended.

Northern Interior Islands Geographic Province

Gambier Bay - Gambier Bay is a popular area for viewing scenery and wildlife, hiking, fishing, camping and hunting. Facilities at the site include a Forest Service public cabin. Past firewood gathering has affected a portion of the potential RNA. The RNA designation is in conflict with these uses (Items #4 and #5, above). The Wilderness/Monument (Kootznoowoo/Admiralty) status of the Gambier Bay Area should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Tiedeman Island - Tiedeman Island is a popular deer hunting area for Juneau. The island has primitive camps with campfires and/or warming fires, for which considerable wood gathering is necessary. Virtually all use of the Tiedeman Island is along the shoreline or in the beach fringe. The primary purpose for potential designation is the unusual concentration of eagles which use the beach fringe; therefore, the recreation use, unless controlled, would probably be incompatible with the purpose of the RNA. Considering the general increase of all recreational uses in Seymour Canal, it is also reasonable to expect increased use on Tiedeman Island. Therefore, designation as an RNA would be incompatible with the recreation and wood gathering (Items #4 and #5, above). The Wilderness/ Monument (Kootznoowoo/Admiralty) status of the island should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Pleasant Island - Residents of Gustavus, as well as sea kayakers, make Pleasant Island a popular recreational use area . Several outfitter/guides use the island as one of their destinations for kayak and small boat trips. RNA designation would conflict with these uses (Item #5, above). The wilderness status of the island (Pleasant/Lemesurier/Inian Islands Wilderness) should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Upper Tenakee Hot Springs - Not very much is known about the plant communities of this hot springs. Depending on the location of a potential road corridor and the location of the RNA, a road may conflict with the management objectives of the RNA. One recreation place exists in the area. Primary activities there are viewing scenery, fishing, camping, and hunting. Therefore, designation as an RNA would be incompatible with the recreational use and the potential road corridor (Items #5 and #6, above).

Swan Cove - Swan Creek is an overflow area for Pack Creek, and the use is generally associated with a "primitive" bear-watching experience. In 1991, there were more than 500 visitors to Swan Cove. The area is also part of the 1935 ADF&G hunting closure; the influx of visitors over the years have habituated the bears to human presence. Because of the restriction of numbers of visitors at Pack Creek, it is expected that use in Swan Cove will continue to increase. The Swan Cove area also is used by outfitter/guides and has two pre-ANILCA special use cabins. These uses are incompatible with the RNA designation; therefore, rather than restrict the existing use, Swan Cove is considered incompatible with management as an RNA (Items #2 and #5, above). The Wilderness/Monument (Kootznoowoo/Admiralty) status of Swan Cove should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Interior Islands Province

Bailey Bay Hot Springs - Current development in the Bailey Bay Hot Springs area includes a CCC constructed three-sided shelter, and a 2.2 mile trail which extends from Bailey Bay past Lake Shelokum and on to the shelter near the springs. The springs, themselves, have not been developed yet. Lake Shelokum is stocked with eastern brook trout. There are also plans to upgrade the facilities at Bailey Bay. Existing and potential future recreation use of this area would conflict with the direction for managing RNA's; therefore, rather than restrict the existing use, Bailey Bay Hot Springs is considered incompatible with management as a RNA (Items #2, #5, and #6, above). However, in recognition of some of the outstanding recreation opportunities, scenic values, and unique features of the hot springs, Bailey Bay is designated as a Special Interest Area (Bailey Bay Hot Springs Recreation Area) in the preferred alternative.

Falls Creek Windthrow - Falls Creek Windthrow is on the Mitkof Island road system and is an area of planned recreational development, partly for educational purposes, for all types of people traveling the road system. With the proposed RNA directly adjacent to the road system, it is very likely that forest products (such as firewood) will be gathered within the proposed RNA. These uses are incompatible with the RNA designation; therefore Falls Creek Windthrow is considered incompatible with management as a RNA (Items #2, #4, #5, and #6, above). However, in recognition of the recreation and education opportunities, and the ecological values of the Falls Creek Windthrow, it is designated a Special Interest Area (Falls Creek Windthrow Botanical Area) in the preferred alternative.

South Etolin Island - This area was chosen for RNA designation primarily because of its past fire history. No other locations on the Stikine Area are known to have this influence in their stand development. However, Roosevelt elk were introduced on the south end of the island in 1987 and have spread to the entire island. The Forest Service manual directs that exotic plant or animal life be removed, if practical. Eradication of the elk would not be practical, and would probably meet with considerable public controversy. One recreation place important for marine recreation is inventoried in the proposed RNA. Boating and hunting are the primary activities. These conditions are incompatible with the RNA designation; therefore, South Etolin Island is considered incompatible with management as an RNA (Items

#5 and #7, above). The wilderness status of the area should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Southern Outer Islands Geographic Province

Klakas Lake - Klakas Lake is recognized in inventories as containing four primitive recreation places. Two of these are important to tourism, and one is important for marine recreation. Activities incompatible with RNA designation include boating, hiking, fishing, and kayaking (Item #5, above). The Wilderness status of the Klakas Lake area should prevent any unacceptable modification of the site that would reduce its value for research, but would not prevent scientific investigation from occurring.

Mt. Calder-Virginia Mountain - This potential RNA includes within its boundaries harvest units approved for future harvest for the KPC Long-term Timber Sale, and has, in the past, been partially roaded and logged. Another portion of the potential RNA is included in the Mt. Calder/Mt.Holbrook LUD II area, as a result of the Tongass Timber Reform Act of 1990. The portion of the potential RNA within the LUD II does not have the main characteristics for which the RNA was identified (subalpine fir). Because of these potential conflicts with RNA designation (Items #4 and #6, above), and the absence of an objective for redefining the boundaries of the RNA to only within the LUD II, the area is not being recommended for designation as a Research Natural Area. A portion of the area with karst development is included in the Karst Area Geological Area (Special Interest Area).

Sarkar Lakes - Sarkar Lakes have a large amount of recreation use. A Forest Service public recreation cabin, a parking area at the Lakes, and easy road access all contribute to the high use of the lakes. Additional recreational development is planned, including a canoe route consisting of a trail, toilets, and tent platforms. Some outfitter/guiding use of the area currently exists, and applicants have requested additional use. These conditions are incompatible with the RNA designation; therefore Sarkar Lakes is considered incompatible with management as a RNA (Items #2, #5, and #6, above).

Thunder Mountain - One recreation place important for marine-oriented recreation is included in the area; the main activities are viewing scenery, hiking and camping. The area also includes karst formations. These recreation uses, along with the desirability of including this area in the Karst Areas Geological Area (Special Interest Area), make the Thunder Mountain a much lower priority for RNA designation. In the preferred alternative, this area is included in the Karst Areas Geological Area.

El Capitan - Like the Thunder Mountain proposal, this area includes limestone and karst features. Rather than designating it as a Research Natural Area, El Capitan has been incorporated into the Karst Areas Geological Area (Special Interest Areas). This designation allows the development of a suitable (and planned) amount of recreation spelunking development which would most likely be incompatible with RNA designation (Items #5 and #6, above).

The six areas considered for RNA designation (Warm Pass, Tonalite Creek, Marten River, Robinson Lake, Rio Roberts, and Kadin Island) are included in most alternatives, including the preferred alternative. The Alaska Region and the Tongass National Forest, working with the Pacific Northwest Research Station, has completed the documentation needed for designation (know as establishment reports) for all six. Each of these will be formally established as an RNA upon approval by the Regional Forester of the Forest Plan through the Record of Decision, and by a designation order for each RNA.

Methodology and Scientific Accuracy

The original methodology used for identifying the potential RNA's is described In Juday et al., 1988. The natural resource scientists and managers involved with this methodology represent the best knowledge base available for RNA considerations and recommendations at this time. However, it is recognized that they do not have the complete understanding of natural resources in Southeast Alaska. Although recommendations were made for potential areas to fill the "cells," there may be other areas which could also fill the cells which the resource scientists and managers were unaware of at this time.

Most of the knowledge and emphasis is centered around the forested plant communities. There is an acknowledged lack of information for the non-forested plant communities, such as the alpine plant communities, in Southeast Alaska.

Existing natural resource inventories are not perfect and do not answer all of the questions which could be asked about "cell types" in Southeast Alaska. As new natural resource inventories are completed, more knowledge and information will be gained and additional ideas and needs for RNA's will be identified.

Research Natural Areas

Environmental Consequences

Direct and Indirect Effects

This section focuses on the effect that each alternative will have on the present or future establishment of a representative system of Research Natural Areas for the Tongass, and the possible effects of RNA designations on other resources.

The proposed repeal of RNA designation for Pack Creek is expected to have no noticeable managerial or environmental effects. Pack Creek will be designated as a zoological area, with expanded boundaries, to be managed under the Special Interest Area LUD. It also remains a part of Admiralty Island National Monument and Kootznoowoo Wilderness.

All alternatives except Alternative 9 recommend Warm Pass, Marten River, Robinson Lake, and Tonalite Creek for Research Natural Area designation. In Alternative 9, these four areas are either within Wilderness, LUD II-Legislated, or other LUD II; the values of none are likely to be affected by these designations. The other two potential RNA's, Kadin Island and Rio Roberts, are recommended in Alternatives 1 through 6, 10 and 11. In Alternatives 7 and 9, both Kadin Island and Rio Roberts would over time be subject to alterations from timber harvest and possibly road construction, and as such would lose the natural values associated with an RNA.

Table 3-53 includes the 24 (of the original 30) priority potential Research Natural Areas not recommended for establishment, and shows what management they would receive by alternative. Since the location of Gambier Bay as a replacement for Pack Creek changed, the original Gambier Bay is included in the table.

Seven of these areas were seen as better suited to Special Interest Area designation. These are: Pike Lakes, Blue Lake Lava (also called Blue River), Crater Ridge-Fred's Creek (also referred to as Mt. Edgecumbe), Bailey Bay Hot Springs, Mount Calder-Virginia Mountain, Thunder Mountain, and El Capitan.

Over time, potential Research Natural Areas that are not designated may lose the natural qualities which qualified them for Research Natural Area consideration. This will occur primarily where land-altering activities take place. As potential but undesignated areas are changed in this way, the opportunities for non-manipulative research on natural changes within various ecological systems and their cell types will diminish. It can be seen from the table that the majority of the potential RNA's not considered suitable for recommendation at this time (15 of 24) are in the Wilderness or Natural Setting LUD groups in all alternatives. Alternative 1 protects the values of all the rest. Alternatives 2-6, 10 and 11 fully protect four others, and include at least portions of the rest in non-disturbance LUD's, with their core values likely to be maintained. Alternatives 7 and 9 are similar to the others for most of the remaining non-suitable proposed RNA's, and would likely alter only one significantly over time (Falls Creek Windthrow).

Table 3-53
Summary of how the priority potential RNA proposals are allocated in each alternative

	Alternatives[1]			
	1	2-6, 10, 11	7	9
Akwe Beach	N	N	N	N
Akwe-Ustay Lakes	N	N	N	N
Mountain Lake	W	W	W	W
Pike Lakes	W/N	W/N/M	W/M/I	W/M/I
Upper Situk	W/N	W/N	W/N/I	W/N/I
Dayebas Creek	N	N	N	N
Blue Lake Lava	W	W	W	W
Twin Lakes	W	W	W	W
Crater Ridge-Freds Creek	N	N	N/M	M
Myriad Islands	W	W	W	W
Plotnikof-Pt Bank	W	W	W	W
Gambier Bay	W	W	W	W
Tiedeman Island	W	W	W	W
Pleasant Island	W	W	W	W
Upper Tenakee Hot Springs	N	N/M/I	N/M/I	N/M
Swan Cove	W	W	W	W
Bailey Bay Hot Springs	N	N	N	N
Falls Creek Windthrow	N	N	I	I
South Etolin Island	W	W	W	W
Mt. Calder-Virginia Mt.	N	N/I	N/I	N/I
Sarkar Lakes	N	N/I	I	N/I
Thunder Mountain	N	N	I	I
Klakas Lake	WN	W/N/I	W/I	W/N
El Capitan	N	N	N	N

[1] Letter symbols represent the following: W= Wilderness LUD group; N= Natural Setting LUD group; M= Moderate Development LUD group; I= Intensive Development LUD group.

Land-altering activities such as timber harvest and road construction are not allowed in RNAs. For those areas already designated by law as national monument wilderness, including West Gambier, Marten River, and Robinson Lake, timber harvest and road construction are already prohibited, so the effects of RNA designation would be limited to a prohibition on construction of facilities and potential limitations on recreational use that might impair research use of an area.

The effect of designating Tonalite Creek as an RNA would also be minimal because this area has already been designated by Congress as a "LUD II" area, in which timber harvest is prohibited and road construction limited. RNA designation would prohibit road and facility construction and limit recreational use as described above. For Warm Pass, because it would be allocated to the Natural Setting LUD group under all alternatives, the effects of RNA designation are also limited to facility construction and recreational use as discussed above.

No significant changes in management or environmental effects are expected from designation of these five areas as RNAs. While Tonalite Creek and Warm Pass are inventoried recreation places, RNA designation is not expected to conflict with current recreation uses of these areas.

Designating Rio Roberts and Kadin Island as RNAs could have additional effects. These two areas have a total of less than 1,700 acres of tentatively suitable forested land that would not be available as a consequence of RNA designation. This would have a negligible effect on the Forest's timber program and its associated environmental and economic effects. Kadin Island is also an inventoried recreation place, but as is the case for Tonalite Creek and Warm Pass, RNA designation is not expected to conflict with existing recreation use.

None of the seven new RNAs included in the preferred alternative is known to have high mineral potential, and none is likely to conflict with future transportation or recreation needs.

Roadless Areas

Affected Environment

Introduction

This section identifies the roadless areas which meet the minimum criteria for potential inclusion in the National Wilderness System. Identifying this potential does not imply that areas should or should not be recommended for designation as Wilderness, but is intended to portray the remaining undeveloped portions of the National Forest for which Wilderness is a future option.

Once an area is roaded it is generally no longer available for Wilderness consideration. Depending on when and how the activity was conducted, evidence of previous timber harvest, abandoned habitations, and historic mining may not necessarily result in an irreversible removal of land from future Wilderness consideration.

The minimum criteria for considering a roadless area in the evaluation of Wilderness potential was established by the Wilderness Act of 1964 and in subsequent regulation and policies. To qualify, an area must contain at least 5,000 acres of undeveloped land which does not contain improved roads maintained for travel by passenger-type vehicles. However, areas less than 5,000 acres may qualify if they are a self-contained ecosystem such as an island, are contiguous to existing Wilderness, or are ecologically isolated by topography and manageable in a natural condition.

The roadless inventory displays the extent of the roadless resource, and provides data for use by managers, legislators, and others to formulate land management proposals. Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped or natural areas, such as usually required for old-growth habitat, scenic backdrops or for primitive recreation. Roadless areas identified in the inventory which are outside of existing designated Wilderness may be considered for Wilderness recommendation or may be managed for a wide range of other resource management activities.

In November 1990 five new Wilderness areas and one addition to an existing Wilderness area, totaling 300,473 acres (including non-National Forest lands totaling 776 acres), were designated on the Tongass as a result of the Tongass Timber Reform Act. They are described in the Wilderness section of this chapter. The Act also established 12 permanent “LUD II” areas totaling 727,765 acres (includes 3,477 acres of non-National Forest lands), a designation that will maintain, in a primarily roadless state, their wildland characteristics. Because LUD II areas are still available for future consideration as Wilderness and meet the minimum criteria for consideration, those parts which are unroaded are included within the roadless areas described in Appendix C and in the tables of this section.

The Roadless area environmental consequences section describes in tables and narrative format how specific roadless areas are affected by their designation as either Wilderness or legislated LUD II as a result of the Tongass Timber Reform Act, as well as the consequences of the other Land Use Designations of the various alternatives. The consequences section also describes how the areas within the various legislative proposals not included in TTRA are affected by the alternatives.

Current Situation

The Tongass National Forest, the largest in the National Forest System, is 89 percent roadless, including Wilderness. Only small areas where communities are developing, or where road construction and timber harvest have occurred, are "developed" to any noticeable degree. At various times in the past, "boom and bust" development (associated with fox farming, salmon canneries, mining, and military activity) resulted in the temporary development and occupation of many small areas that have since been largely reclaimed by nature. Developed areas total 1.8 million acres, or 11 percent of the Tongass. Southeast Alaska residents, who number about 60,000, are virtually surrounded by land they consider "wilderness." Routine travel and ordinary outdoor recreation activities may require a higher degree of skill, risk-taking and self-reliance than are typically required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike.

The second Roadless Area Review and Evaluation (RARE II), completed in 1979 concurrent with the 1979 Tongass Land Management Plan, identified over 700 individual watersheds as completely roadless, totaling some 13 million acres. In December 1980, the Alaska National Interest Lands Conservation Act (ANILCA) designated 5.45 million acres as Wilderness.

The 110 roadless areas identified in the Forest Plan Revision total about 9.4 million acres of National Forest lands. Their size, and the amount of each area that is tentatively suitable timber land, is shown in Table 3-54. Their location and relative size is depicted in the "Roadless areas" map in the map packet. Details regarding each roadless area are displayed in Appendix C. Since publication of the 1991 Supplement, roadless areas and their acres have changed due to better inventory information, land status updates, and some previously unroaded areas being developed.

Several characteristics of roadless areas on the Tongass represent potentials unavailable elsewhere in the National Forest System. The Tongass has very large undeveloped land areas that could potentially be managed as Wilderness or in an unroaded condition. Several portions of the Forest constitute contiguous roadless areas exceeding one million acres, and thus represent large, unfragmented wildlife habitats and outstanding opportunities for solitude.

Many of the Tongass roadless areas represent wildlife habitats, ecosystems, and visual character that exist nowhere else in the National Forest System, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forests, ice fields, and glaciers. All of these features are represented in the existing 5.75 million acres designated as Wilderness. Many of these areas are remote, difficult to access for primitive recreation, and many contain other important resources such as timber, minerals, and salmon-producing streams. Of the 2.4 million acres of tentatively suitable forest land on the Tongass outside Wilderness and legislated LUD II areas, 1.48 million acres, or 64 percent, is within roadless areas. For comparison, existing Wilderness on the Tongass contains approximately 1.33 million acres of Forest land that would be considered tentatively suitable for timber harvest if they were not located within Wilderness.

Table 3-54
Tongass National Forest Roadless Areas

Roadless Area Number	Name	National Forest Acres	Tentatively Suitable Forest Lands Acres	Tentatively Suitable Percentage
201	Fanshaw	47,800	18,514	0.39
202	Spires	538,670	31,354	0.06
204	Madan	69,757	22,746	0.33
205	Aaron	78,863	6,759	0.09
206	Cone	128,574	3,788	0.03
207	Harding	175,139	19,586	0.11
208	Bradfield	197,228	5,697	0.03
209	Anan	37,893	-	0
210	Frosty	41,591	7,189	0.17
211	North Kupreanof	114,246	18,315	0.16
212	Missionary	16,705	4,662	0.28
213	Five Mile	19,198	4,959	0.26
214	South Kupreanof	217,206	46,659	0.22
215	Castle	49,799	11,112	0.22
216	Lindenberg	25,716	8,939	0.35
217	Green Rocks	10,699	3,560	0.33
218	Woewodski	10,176	5,118	0.50
220	East Mitkof	8,829	2,162	0.25
223	Manzanita	8,391	2,944	0.35
224	Crystal	18,613	5,684	0.31
225	Kadin	1,983	1,422	0.72
227	North Wrangell	7,863	2,861	0.36
229	South Wrangell	14,034	3,958	0.28
231	Woronkofski	11,095	4,286	0.39
232	North Etolin	41,423	14,205	0.34
233	Mosman	53,664	17,495	0.33
234	South Etolin	26,679	6,939	0.26
235	West Zarembo	6,666	1,696	0.25
236	East Zarembo	10,947	3,716	0.34
237	South Zarembo	36,238	10,150	0.28
238	Kashevarof Islands	4,697	-	0
239	Keku	8,538	3,307	0.39
240	Security	31,239	9,197	0.29
241	North Kuiu	6,273	3,688	0.59
242	Camden	36,888	13,656	0.37
243	Rocky Pass	77,179	26,919	0.35
244	Bay of Pillars	27,535	14,892	0.54
245	East Kuiu	27,576	10,322	0.37
246	South Kuiu	61,696	25,234	0.41
247	East Wrangell	7,721	3,320	0.43
288	West Wrangell	10,300	4,260	0.41
289	Central Wrangell	13,479	3,740	0.28
290	Southeast Wrangell	18,542	3,940	0.21
301	Juneau-Skagway Icefield	1,191,195	25,826	0.02
302	Taku-Snettisham	682,624	56,713	0.08
303	Sullivan	56,237	7,365	0.13
304	Chilkat-West Lynn Canal	200,527	34,927	0.17
305	Juneau Urban	102,350	30,673	0.30
306	Mansfield Peninsula	54,773	22,742	0.42
307	Greens Creek	27,476	3,640	0.13
308	Windham-Port Houghton	162,390	73,864	0.46
310	Douglas Island	28,149	12,874	0.46
311	Chichagof	556,271	65,387	0.12
312	Trap Bay	13,359	1,655	0.12
313	Rhine	23,015	4,807	0.21
314	Point Craven	10,978	4,216	0.38
317	Point Augusta	15,399	7,679	0.50
318	Whitestone	5,720	2,240	0.39
319	Pavlof-East Point	5,500	3,740	0.68
321	Tenakee Ridge	20,562	3,920	0.19
323	Game Creek	54,434	15,916	0.29

Roadless Area Number	Name	National Forest Acres	Tentatively Suitable Forest Lands Acres	Tentatively Suitable Percentage
325	Freshwater Bay	45,186	11,801	0.26
326	North Kruzof	32,687	9,992	0.31
327	Middle Kruzof	14,720	5,627	0.38
328	Hoonah Sound	80,868	4,756	0.06
329	South Kruzof	55,057	9,798	0.18
330	North Baranof	316,862	50,975	0.16
331	Sitka Urban	113,915	6,602	0.06
332	Sitka Sound	13,456	4,539	0.34
333	Redoubt	68,056	18,937	0.28
334	Port Alexander	125,051	18,167	0.15
338	Brabazon Addition	500,535	-	0
339	Yakutat Forelands	328,621	20,072	0.06
341	Upper Situk	18,224	4,544	0.25
342	Neka Mountain	6,186	1,141	0.18
343	Neka Bay	7,128	2,622	0.37
501	Dall Island	106,447	45,815	0.43
502	Suemez Island	19,489	7,446	0.38
503	Outer Islands	100,146	6,662	0.07
504	Sukkwan	44,806	12,245	0.27
505	Soda Bay	78,483	25,590	0.33
507	Eudora	195,884	61,547	0.31
508	Christoval	9,031	4,394	0.49
509	Kogish	65,500	19,215	0.29
510	Karta	49,799	12,075	0.24
511	Thorne River	74,372	21,347	0.29
512	Ratz	5,184	781	0.15
514	Sarkar	56,488	11,537	0.20
515	Kosciusko	64,936	8,791	0.14
516	Calder	10,438	1,084	0.10
517	El Capitan	27,126	5,249	0.19
518	Salmon Bay	23,763	2,112	0.09
519	McKenzie	84,284	21,792	0.26
520	Kasaan	7,593	2,546	0.34
521	Duke	44,818	5,750	0.13
522	Gravina	37,200	14,203	0.38
523	South Revilla	52,209	11,574	0.22
524	Revilla	30,896	5,256	0.17
525	Behm Islands	5,166	2,843	0.55
526	North Revilla	217,818	51,470	0.24
528	Cleveland	190,230	78,555	0.41
529	North Cleveland	109,004	31,547	0.29
530	Hyder	121,664	9,522	0.08
531	Nutkwa	52,961	15,690	0.30
532	Fake Pass	618	559	0.90
533	Hydaburg	11,350	1,020	0.09
534	Twelvemile	38,176	9,982	0.26
535	Carroll	11,671	3,318	0.28
536	Kasaan Bay	7,247	1,802	0.25
577	Quartz	143,121	-	0
	Total Acres	**9,392,777**	**1,480,026**	**0.16**

Source: Revision database, Query #QRDLSTS, 10/96

Historic Trends

Until the Second World War, the entire Tongass National Forest was virtually unroaded and undeveloped with the exception of a few small communities and isolated fox farms and canneries. Small scale "hand logging" along shorelines had occurred in many areas, but was not accompanied by roads and other development. Significant industrial timber harvest did not begin until the early 1950's with the opening of pulp mills and the advent of the long-term timber sale contracts. Since 1900, about 415,000 acres have had timber harvest activities, with 88 percent of the harvest occurring since 1952. Since the approval of the Tongass Land Management Plan in 1979, about 106,000 acres of National Forest land have been

Glossary

altered by timber harvest. Currently, 84 percent of nonwilderness National Forest lands are roadless.

Appendix C describes the attributes and resource potentials of each roadless area, evaluates the area's capability and availability for management as Wilderness or allocation to other roadless management prescriptions, and displays the effects of the alternatives on each.

Future Trends

Recreation and tourism use of Southeast Alaska's roadless undeveloped lands is light but increasing. Modern technology has made available improved rainwear, camping equipment, high quality ocean kayaks, portable marine radios, and other gear which respond to new trends, or lead to increased use. Continued tourism marketing may also lead to increased public use of wilderness and roadless area recreation opportunities. Demand for natural areas to provide clean water and air, reduce effects of global warming, and to counter deforestation in other countries is also increasing as these global issues increase in importance.

Effects of Tongass Timber Reform Act

The Tongass Timber Reform Act which passed in November 1990, created five new Wilderness areas, one Wilderness addition, and 12 Legislated LUD II areas totaling 1,027,459 acres. These 18 areas are all or part of most of the areas proposed as Wilderness in 1989 in House of Representatives Bill H.R. 987. Because these Legislated LUD II areas are designated by law, they are common to all alternatives. Table 3-55 displays the new Wilderness and legislated LUD II areas, their acreages, and the roadless areas they are a part of. They can be located on the alternative maps in the map packet. The five new Wilderness areas and one Wilderness addition are described in detail in the Wilderness section of this chapter. The following paragraphs describe the Legislated LUD II areas.

Yakutat

Of the Yakutat Forelands Roadless Area (No. 339), 139,035 acres (42 percent) are designated as the Yakutat legislated LUD II area. It includes all the VCU's in this area (379C, 382C, 386C, 387C, 388C, and 389C) that are surrounded for the most part by LUD II areas in the 1979 Tongass Land Management Plan. It is bordered on the northwest by the Russell Fiord Wilderness and on the southeast by Glacier Bay National Park and Preserve, and is roughly 20 miles east of Yakutat.

Berners Bay

Of both the Juneau-Skagway Icefield Roadless Area (No. 301) and the Juneau-Urban Roadless Area (No. 305), 45,233 acres (3 percent) are designated as the Berners Bay legislated LUD II area. This legislated LUD II on the east side of Lynn Canal, includes the lower valleys of the Berners, Lace and Gilkey Rivers, and the east side of Berners Bay. The area includes the southern ends of VCU's 12C and 13C, and the east side of 16C (Berners Bay). This LUD II is 40 miles north of Juneau and about five miles north of the terminus of the existing Juneau road system.

Table 3-55
National Forest, non-National Forest, Productive Old growth, Tentatively Suitable Forest Lands within each of the Legislated Tongass Timber Reform Act areas and the acreage of the corresponding Roadless Area

Name	Total (Acres)	National Forest (Acres)	Non-National Forest (Acres)	Productive Old growth (Acres)	Tentatively Suitable Forest Lands Withdrawn (Acres)	Corresponding Roadless Area at Time of Passage of TTRA	Total (Acres)
New Legislated Wilderness Areas							
Pleasant/Lemesurier/ Inian Islands	23,151	23,096	55	11,737	9,318	Chichagof	561,042
						Pleasant	12,239
Kuiu	60,581	60,581	0	39,057	27,447	South Kuiu	62,983
Young Lake Addition	18,486	18,462	24	9,151	7,849	Greens Creek	27,736
Chuck River	74,990	74,298	692	43,511	32,618	Windham-Pt. Houghton	165,896
Karta	39,894	39,889	5	22,594	21,634	Karta	59,489
South Etolin	83,371	83,371	0	36,856	27,576	South Etolin Island	29,240
Total	**300,473**	**299,697**	**776**	**162,906**	**126,442**		
New Legislated LUD II Areas							
Yakutat	139,045	139,035	10	72,312	45,948	Yakutat Forelands	319,107
Berners Bay	45,223	45,233	0	15,390	8,944	Juneau-Skagway Ice	1,196,837
						Juneau-Urban	102,410
Anan	38,313	38,313	0	16,426	8,363	Anan	37,953
						Harding	177,559
Kadashan	34,441	34,281	160	20,609	13,493	Chichagof	561,042
Lisianski/Upper Hoonah	149,088	147,132	1,956	44,178	29,312	Hoonah Sound	93,880
						Chichagof	561,042
Mt. Calder-Holbrook	60,863	60,863	0	38,682	36,420	Calder	11,041
						Kosciusko	65,598
Nutkwa	21,723	21,723	0	13,102	11,102	Nutkwa	57,978
Outside Islands	75,720	75,342	378	45,999	38,890	Outer Islands	100,037
Trap Bay	6,595	6,595	0	4,297	3,178	Trap Bay	14,178
Pt. Adolphus/Mud Bay	117,877	116,695	182	38,249	25,178	Chichagof	561,042
Naha	31,365	31,350	15	17,875	15,955	North Revilla	158,931
Salmon Bay	11,200	11,200	0	4,811	4,471	Salmon Bay	25,229
Total	**730,463**	**727,762**	**2,701**	**331,930**	**241,254**		
Grand Total	**1,030,936**	**1,027,459**	**3,477**	**494,836**	**367,696**		

Source: Revision Data Base, Q1006B and QTent, October, 1992, and RO-Geometronics, June, 1991.

Anan

This 38,313-acre LUD II has common boundaries with the Anan Roadless Area (No. 209). This area includes all of VCU 522S and is located on Cleveland Peninsula adjacent to Bradfield Canal and Ernest Sound about 30 miles southeast of Wrangell. It includes the Anan Creek drainage which contains Anan Lake, Boulder Lake and numerous other small lakes.

Kadashan

Of the Chichagof Roadless Area (No. 311), 34,281 acres (6 percent) are designated as the Kadashan Legislated LUD II area. It occupies the entire Kadashan River drainage (VCU 235C) on Chichagof Island. The area is approximately five miles south of the community of Tenakee Springs.

Lisianski River/Upper Hoonah Sound

Of the Chichagof Roadless Area (No. 311), 147,132 acres (26 percent) are designated as the Lisianski River/Upper Hoonah Sound Legislated LUD II area. This area includes all of the 1979 TLMP Management Area C35 encompassing the upper part of Hoonah Sound and the upper reaches of the Lisianski River, VCU's 250C, 251C, and 252C around the village of Pelican, VCU's 282C and 283C on the west side of Upper Hoonah Sound, and VCU 247C on the east side of Upper Hoonah Sound. Much of the west side of this LUD II borders on the West Chichagof-Yakobi Wilderness.

Mt. Calder/Holbrook

Of the Kosciusko Roadless Area (No. 515) and the Calder Roadless Area (No. 516), 60,863 acres (81 percent) are designated as the Mt. Calder/Holbrook Legislated LUD II area. It encompasses much of the roadless portion of Kosciusko Island except those portions of VCU's 537K and 542K along the west side of El Capitan Pass. It also includes the islands within Shakan Bay (part of VCU 531K), roughly the west face of Calder Mountain from Calder Bay to just north of Hole-in-the-Wall on Prince of Wales Island (western portion of VCU 528), and the group of islands that lie primarily in Sumner Strait between Port Protection and the east side of Kuiu Island (portions of VCU's 416S and 417S).

Nutkwa

Of the Nutkwa Roadless Area (No. 531), 21,723 acres (41 percent) are designated as the Nutkwa Legislated LUD II area. It is about 16 miles east of the village of Hydaburg and borders the northwestern corner of the South Prince of Wales Wilderness. It includes all of VCU 686K which takes in all the Nutkwa drainage system, and all of Nutkwa Lagoon except the area near the outlet which is Native land. This latter portion represents the northern part of VCU 685K.

Outside Islands

This LUD II includes 54 percent of the Outer Islands Roadless Area (No. 503) (with the exception of San Fernando Island). This 75,342 acre area consists of Noyes, Baker, and Lulu Islands and several smaller islands west of Prince of Wales Island. It includes VCU's 567K, 568K and 569K. Noyes and Baker Islands face the Pacific Ocean. The area is about 16 miles west of the villages of Craig and Klawock.

Trap Bay

This LUD II is a 6,595 acre (49 percent) portion of the Trap Bay Roadless Area (No. 312). It includes all of VCU 237C, and is located on Chichagof Island south of the entrance to Tenakee Inlet, about 10 miles from Tenakee Springs.

Point Adolphus/Mud Bay

Of the Chichagof Roadless Area (No 311), 116,695 acres (20 percent) are designated as the Point Adolphus/Mud Bay LUD II area. It encompasses much of the northern end of Chichagof Island along Icy Strait across from the entrance to Glacier Bay. The area includes all or portions of the VCU's surrounding Mud Bay (all of VCU's 191C and 192C and parts of VCU's 193C, 194C and 195C), and all of VCU 189C around the head of Elfin Cove. This newly legislated LUD II area expands the existing LUD II area around Idaho Inlet on the west and east side.

Naha

This LUD II includes a 31,350 acre (14 percent) portion of the North Revilla Roadless Area (No. 526). It takes in all of the Naha River drainage (VCU 742K) on the west side of Revillagigedo Island. The area is about 20 miles north of Ketchikan and directly adjacent to the small community of Loring. This area includes a saltwater lagoon, river and several lakes.

Salmon Bay

This LUD II area includes a 11,200 acre (47 percent) portion of the Salmon Bay Roadless Area (No. 518). It encompasses the west side of VCU 534.1K at the extreme northeastern tip of Prince of Wales Island. It also incorporates the portion of VCU 534K that includes most of the islands, estuarine area and channels around the mouth of this drainage, and the land area that is part of the lower watershed around Salmon Bay Lake. The area is about 16 miles north of the community of Whale Pass on Prince of Wales Island, and 30 miles west of Wrangell.

Roadless Areas

Environmental Consequences

Direct, Indirect, and Cumulative Effects

No additional Wilderness is proposed in any alternative. Congress recently considered the Wilderness issue for the Tongass, and designated 300,473 acres (299,697 National Forest acres) as Wilderness through the Tongass Timber Reform Act.

Table 3-56 displays how the roadless lands were allocated to individual Land Use Designations in each alternative. Subtitles indicate groupings into categories of natural setting, moderate development and intensive development. The groupings indicate the potential for development or for maintaining the natural setting and, therefore, a future Wilderness option. Implementation will determine the location, timing or intensity of actual project activities within any particular area.

Table 3-56
Allocation of total Roadless Area (9,392,777 acres) to LUD's by Alternative

Land Use Designation	Alternative 1	2 & 4	3 & 10	5 & 6	7	9	11
Natural Setting Group							
Non-Wild. Monument	147,422	155,068	155,068	155,068	155,068	158,950	158,850
RNA	24,144	26,391	26,391	26,391	23,208	0	25,491
Special Interest Area	155,809	166,074	166,074	219,740	20,744	0	168,680
Remote Recreation	4,405,664	2,205,229	2,205,223	2,161,295	1,123,948	0	2,125,186
Municipal Watershed	8,135	8,135	8,135	8,135	1,320	0	39,760
Old-growth Habitat	62,157	49,405	790,298	349,206	0	0	938,179
Semi-Remote Recreation	3,482,078	2,401,410	2,401,410	2,371,343	1,156,904	0	2,729,288
Legislated LUD II	703,000	703,000	703,000	703,000	703,000	703,000	703,000
Wild, Scenic, and Rec. Rivers	280,080	72,842	72,842	72,822	0	0	105,941
ANILCA Additions	0	0	0	0	0	1,108,020	0
LUD I Release	0	0	0	0	0	302,387	0
LUD II	0	0	0	0	0	2,441,665	0
Total Natural Setting	**9,268,489**	**5,787,554**	**6,528,441**	**6,067,000**	**3,184,192**	**4,714,022**	**6,994,374**
Moderate Development Group							
Experimental Forest	12,802	12,782	12,782	12,782	12,902	0	12,802
Scenic Viewshed	739	597,623	392,769	558,296	0	0	342,484
Modified Landscape	0	538,446	398,816	462,717	1,422,714	0	341,977
LUD III	0	0	0	0	0	1,859,158	0
LUD III Special	0	0	0	0	0	141,271	0
Total Moderate Development	**13,541**	**1,148,851**	**804,367**	**1,033,795**	**1,435,616**	**2,000,429**	**697,263**
Intensive Development							
Timber production	104,690	2,447,675	2,051,272	2,282,541	4,752,595	0	1,696,310
LUD IV	0	0	0	0	0	2,674,475	0
Total Intensive Development	**104,690**	**2,447,675**	**2,051,272**	**2,282,541**	**4,752,595**	**2,674,475**	**1,696,310**
Other[1]	6,057	8,697	8,697	9,441	20,374	3,851	4,830
Grand Total	**9,392,777**	**9,392,777**	**9,392,777**	**9,392,777**	**9,392,777**	**9,392,777**	**9,392,777**

[1] These acres represent areas where the point coverage and polygon coverage did not match
Source: Revision Data Base, QRDLS96, 11/96.

In general, management prescriptions for Land Use Designations which allow moderate to intensive development include timber harvest with associated road and Log Transfer Facility construction. There are guidelines for the extent and visual impact of such activities. The Land Use Designations which emphasize maintaining the natural setting and undeveloped character of the area generally do not allow timber harvesting or the development of major recreation facilities, although roads linking transportation systems, particularly major State corridors, may occur.

Not all areas subject to development allowed by the Land Use Designation would actually be developed. Development will occur mainly in areas with tentatively suitable forest lands. Some of the road construction will occur in areas already roaded. Some of the road construction will fragment existing roadless areas, either creating new roadless areas (if more than 5,000 acres remains) or simply resulting in small blocks of undeveloped land surrounded by roads and harvest areas.

The analysis at the Forest-wide level serves primarily as a general indication of the effects of the alternatives on the future potential to recommend roadless areas for designation as Wilderness. In addition, not all of the effects of the alternatives occur at once. The maximum amount of road construction and timber harvest that would occur in the first decade in any alternative is estimated to be about 2,600 miles of road and 203,000 acres of timber harvest (Alternative 7). Assuming that roadless acres become roaded in the same proportion as in the past, about 913,000 acres of current roadless area are estimated to become roaded by the end of the first decade. This indicates that about 90 percent of the currently unroaded lands on the Forest (or 84 percent of total Forest acres) would still be roadless at the time of the next Forest Plan revision, when potential Wilderness may be considered again.

Effects of Alternatives

The roadless lands allocated to Natural Setting Land Use Designations will essentially remain roadless for the life of this revision (10-15 years), therefore there will be no effect on roadless values unless a vital transportation linkage or major utility system is proposed (see alternative maps in the map packet for potential locations). Should any major road or power transmission corridor study be undertaken, appropriate site-specific environmental analysis would occur. At this time, the Juneau-Skagway corridor, Swan-Tyee Power Intertie, and the East Bradfield Canal corridor are the most likely corridors to be developed.

Those roadless lands within Moderate and Intensive Development Land Use Designations would change over time. The amount of acreage that would change from a roadless to a “roaded” status by alternative is estimated in Table 3-57.

Alternative 1: Although some acres are allocated to Moderate and Intensive Development Land Use Designations, none of the acres are scheduled for timber harvest. Some acres may be developed through other activities, but the effect on wilderness potential would be minimal. Alternative 1 has the least adverse effect on the roadless resource of any of the alternatives.

Alternative 2: 5,787,554 roadless acres (or 62 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 3,596,526 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

Table 3-57
Current Roadless Acreage within Moderate and Intensive development Land Use Designations that would likely change to "Roaded" after 10, 20 and 50 Years by Alternative[1].

Alternative	After 10 Years	After 20 Years	After 50 Years
1	0	0	0
2	661,734	1,338,494	3,262,995
3	427,757	859,275	2,183,346
4	218,804	438,345	1,095,827
5	204,728	410,180	1,025,528
6	518,621	1,039,937	2,647,197
7	913,374	1,841,211	4,677,849
9	784,314	1,588,302	3,945,537
10	502,565	1,009,269	2,566,868
11	383,810	769,869	1,828,755

[1] Based on the assumption that roadless acres become roaded in the same proportion as in the past.

By the end of the first decade, Alternative 2 would schedule timber harvest on about 147,000 acres of productive old growth and would construct about 1,900 miles of new road. Over 150 years, this alternative would schedule harvest on about 862,400 acres of productive old growth and would construct a cumulative total of about 6,344 miles of road in the Moderate and Intensive Development Land Use Designations.

If Alternative 2 were implemented, roadless areas might also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 6,344 miles of new roads, other development, or where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 2 would affect the wilderness potential on 3,262,995 acres at the end of 50 years of plan implementation. Alternative 2 has adverse effects on the roadless resource less than alternatives 7 and 9, but more than 3, 4, 5, 6, 10 and 11 after the first 10 years.

Alternative 3: 6,528,441 roadless acres (70 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 2,855,639 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 95,057 acres of productive old-growth and would construct about 1,035 miles of new road. Over 150 years, this alternative would schedule harvest on about 575,168 acres of productive old growth and would construct a cumulative total of about 3,778 miles of road in the Moderate and Intensive Development Land Use Designations.

Roadless areas might also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 3,778 miles of new roads, other development, or where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 3 would affect the wilderness potential on about 2,183,346 acres at the end of 50 years of plan implementation. Alternative 3 would likely have a higher adverse effect on the roadless resource than Alternatives 1, 5, 4 and 11 and higher effect than Alternatives 10, 6, 2, 9 and 7 after the first 10 years.

Alternative 4: 5,787,554 roadless acres (or 62 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 3,596,526 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 48,623 acres of productive old growth and would construct about 523 miles of new road. Over 150 years, this alternative would schedule harvest on about 749,756 acres and would construct a cumulative total of about 5,019 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas might also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 5,019 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 4 would affect the wilderness potential on about 1,095,827 acres at the end of 50 years of plan implementation. Alternative 4 would likely have a higher adverse effect on the roadless resource than Alternatives 1 and 5, and a lower effect than Alternatives 11, 3, 10, 6, 2, 9 and 7 after the first 10 years.

Alternative 5: 6,067,000 roadless acres (or 65 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 3,316,336 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 45,495 acres of productive old growth and would construct about 488 miles of road. Over 150 years, this alternative would schedule harvest on about 3,154,118 acres of productive old growth and would construct a cumulative total of about 4,668 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 4,668 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 5 would affect the wilderness potential on about 1,025,528 acres at the end of 50 years of plan implementation. Alternative 5 would likely have a higher adverse effect on the roadless resource than Alternative 1 and lower than Alternatives 4, 11, 3, 10, 6, 2, 9 and 7 after the first 10 years.

Alternative 6: 6,067,000 roadless acres (or 65 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 3,316,336 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 115,249 acres of productive old growth and would construct about 2,627 miles of road. Over 150 years, this alternative would schedule harvest on about 741,156 acres of productive old growth and would construct a cumulative total of about 4,820 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 4,820 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 6 would affect the wilderness potential on about 2,647,197 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative 6 would likely have a higher adverse effect on the roadless resource than Alternatives 1, 5, 4, 11, 3 and 10, and lower than Alternatives 2, 9 and 7 after the first 10 years.

Alternative 7: 3,184,337 roadless acres (or 34 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 6,188,066 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 202,972 acres of productive old growth and would construct about 2,253 miles of road. Over 150 years, this alternative would schedule harvest on about 1,199,635 acres and would construct a cumulative total of about 8,964 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 8,964 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 7 would affect the wilderness potential on about 4,677,849 acres at the end of 50 years of plan implementation. Alternative 7 would likely have a higher adverse effect on the roadless resource than all other alternatives after both 10 years and 150 years.

Alternative 9: 4,714,156 roadless acres (or 50 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 4,674,770 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 174,292 acres of productive old growth and would construct about 2,253 miles of road. Over 150 years, this alternative would schedule harvest on about 1,522,000 acres and would construct a cumulative total of about 7,865 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 7,865 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 9 would affect the wilderness potential on about 3,945,537 acres at the end of 50 years of plan implementation. Alternative 9 would likely have a higher adverse effect on the roadless resource than Alternatives 1, 5, 4, 11, 3, 10, 6 and 2, and lower than Alternative 7 after the first 10 years

Alternative 10: 6,528,441 roadless acres (or 70 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 2,855,639 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 111,681 acres of productive old growth and would construct about 1,208 miles of road. Over 150 years, this alternative would schedule harvest on about 675,349 acres of productive old growth and would construct a cumulative total of about 4,457 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 4,457 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 10 would affect the wilderness potential on about 2,566,868 acres at the end of 50 years of plan implementation. Alternative 10 would likely have a higher adverse effect on the roadless resource than Alternatives 1, 5, 4, 11 and 3, and lower than Alternatives 6, 2, 9 and 7 after the first 10 years.

Alternative 11: 6,994,374 roadless acres (or 74 percent of the currently remaining roadless areas) are allocated to the Natural Setting Land Use Designations and would remain essentially in their natural condition; 2,393,573 roadless acres are allocated to the Moderate and Intensive Development Land Use Designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 85,291 acres of productive old growth and would construct about 1,122 miles of road. Over 150 years, this alternative would schedule harvest on about 482,341 acres and would construct a cumulative total of about 3,380 miles of road in the moderate and intensive development Land Use Designations.

Roadless areas may also lose their potential for future consideration as Wilderness over the 150 year planning horizon as a result of fragmentation by the 3,380 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative 11 would affect the wilderness potential on about 1,828,755 acres at the end of 50 years of plan implementation. Alternative 11 would likely have a higher adverse effect on the roadless resource than Alternatives 1, 5 and 4, and lower than Alternatives 3, 10, 6, 2, 9 and 7 after the first 10 years.

Summary: After 10 years of plan implementation, the order of alternatives from least effect on the roadless resource to most effect is 1, 5, 4, 11, 3, 10, 6, 2, 9 and 7. After 150 years of implementation, the order from least effect to most effect is 1, 11, 3, 10, 5, 6, 4, 2, 9 and 7. The estimated effects over the very long term are more influenced by the allocation of Land Use Designations than by the rate of timber harvest. The effects over the short term are different from the long term because some alternatives limit the rate of timber harvest more than others. By the 15th decade, all of the harvesting of productive old growth would be done.

Scenery

Affected Environment

The Tongass National Forest offers a variety of scenery to its visitors, from spectacular mountain ranges and the glaciers of the mainland to low-lying marine landscapes composed of intricate waterways, bays and island groups.

The Forest is viewed from a variety of vantage points: the communities of Southeast Alaska; the Alaska Marine Highway ferry route, cruiseship routes, existing road systems, and popular small boat routes; and anchorages, developed recreation sites and facilities, and remote hiking trails. Tourist-related "flightseeing" via small aircraft is on the increase and provides aerial views of the forest landscape. (See also the "tourism" discussion under Recreation and Tourism.)

Inventoried Visual Quality Objectives (VQO's) are assigned for each area or landscape of the Forest. The four VQO's used for the Tongass are retention, partial retention, modification, and maximum modification; each, in that order, allows an increasing amount of alteration of the natural landscape character. (A fifth category, preservation, typically assigned to wilderness, is not used for Tongass wilderness due to the potential alterations allowed under the Alaska National Interest Lands Conservation Act. See Wilderness.) In terms of forest management, the Visual Quality Objectives can be defined as follows:

> Retention - Activities are designed so as not to be visually evident to the casual forest visitor.
>
> Partial Retention - Activities may be evident, but will remain visually subordinate to the characteristic landscape.
>
> Modification - Activities may dominate the characteristic landscape, but will borrow from existing form, line, color and texture. Alterations appear to be natural when viewed as foreground or middleground.
>
> Maximum Modification - Activities may dominate the characteristic landscape. Alterations appear to be natural when viewed as background.

Throughout this section, the categories and objectives displayed in the tables do not include areas within Wilderness. There has been no formal scenery inventory conducted in Wilderness, although from the inventory standpoint, every acre of Wilderness would have a preservation VQO, and almost every acre would have a Type I Existing Visual Condition (discussed below). From the management standpoint, all Wilderness has been assigned a VQO of retention to cover the few areas where development may be allowed by the Alaska National Interest Lands Conservation Act. In reality the vast majority of Wilderness acreage will be managed through the specific Wilderness plans with a preservation VQO. All alternatives include all the same Wildernesses, approximately 5.7 million acres. Therefore, since the intent of this section is to display what is happening on the potentially developed areas of the forest, and to highlight the differences in the effects of the alternatives, Wilderness acres are not included.

The current Forest-wide breakdown of inventoried VQO's is shown in Table 3-58. In this and succeeding tables, a breakdown between "seen" and "seldom-seen" areas is presented. Seen areas are those areas that can be viewed in the foreground, middleground, or background from the inventoried sensitivity level 1 or 2 use areas and travel routes (these are discussed at the end of this section). Seldom-seen areas are all the rest of the Forest outside Wilderness.

Table 3-58
Current ("Inventory") Visual Quality Objectives for the Tongass, in acres excluding Wilderness(1)

	Visual Quality Objective Retention	Partial Retention	Modification	Maximum Modification
Chatham Area				
Seen Areas	925,066	1,541,831	455,482	2,799
Seldom-seen	560	841,583	1,108,164	330,960
Stikine Area				
Seen Areas	161,341	564,330	305,659	11,021
Seldom-seen	740	896,621	310,391	614,208
Ketchikan Area				
Seen Areas	220,887	546,959	227,595	4,815
Seldom-seen	8,950	219,906	427,044	1,042,065
Tongass Total				
Seen Areas	1,307,294	2,653,120	988,736	18,635
Seldom-seen	10,250	1,958,110	1,845,599	1,987,233

[1] Wilderness totals 5,723,253 acres forest-wide that have not been inventoried.

The Tongass is characterized by everything from vast tracts unmodified by human activity to extensive areas of heavily modified landscapes. An inventory of the Existing Visual Condition (EVC) is used to document the degree of alteration that presently exists within an area. These ratings apply to the broad landscape affected, not just the acres altered. EVC types, and their relation to the VQO's, are described in Table 3-59. Since timber harvesting and some other management activities can affect the visual character of an area beyond the acres actually altered, EVC can provide a baseline against which to measure potential changes. Mapping methods and criteria are somewhat different for EVC and VQO's, but the correlation is close enough for use in comparing Forest Plan alternatives and their adopted VQO's to the Forest's Existing Visual Condition. EVC's are also used in this way in the effects analysis of specific viewsheds.

Table 3-60 displays the current Forest-wide breakdown of Existing Visual Condition ratings. Comparison of this table with the comparable table in the SDEIS reflects changes in the acres by EVC class due to management activities that have taken place since the SDEIS was released in 1991.

Table 3-59
Existing Visual Condition (EVC) definitions and related Visual Quality Objectives (VQO's)

EVC	Description	VQO
Type I	Ecological changes only	Preservation
Type II	Activity not evident	Retention
Type III	Activity may be noticed but subordinate to natural character	Partial Retention
Type IV	Activity easily noticed, dominant but blends well with landscape	Modification
Type V	Activities strong in contrast, easily noticed	Maximum Modification
Type VI	Activities in glaring contrast to natural landscape appearance	Exceeds minimum guides

Table 3-60
The Existing Visual Condition of the Tongass in acres excluding Wilderness(1)

EVC Rating	Type I	Type II	Type III	Type IV	Type V	Type VI
Chatham Area						
Seen	2,607,005	19,286	33,655	61,611	187,547	16,075
Seldom-seen	2,199,694	720	5,805	19,680	61,613	860
Stikine Area						
Seen	745,366	6,919	41,758	72,341	174,814	3,073
Seldom-seen	1,567,239	2,240	7,995	68,712	171,154	8,762
Ketchikan Area						
Seen	701,546	6,323	57,355	120,191	109,209	5,631
Seldom-seen	1,347,743	10,210	6,368	109,085	221,332	4,628
Tongass Total						
Seen	4,053,917	32,528	132,768	254,143	471,570	24,779
Seldom-seen	5,114,676	13,170	20,168	197,477	454,099	14,250

[1] Wilderness totals 5,723,253 acres forest-wide that have not been inventoried.

Demand for scenic quality can best be represented by the increase in tourist-related travel to the Tongass, as well as a heightened awareness and sensitivity of Alaskan residents to scenic resource values (see Recreation and Tourism). Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruiseship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The visitor to Southeast Alaska would, therefore, arrive with expectations and an image of the environment and scenery awaiting them. If current trends continue, demand for viewing scenic landscapes will increase. Lands adjacent to the Alaska Marine Highway, cruiseship routes, flightseeing routes, high use recreation areas, and other marine and land-based travel routes will be seen by more people, more frequently, and for greater durations.

Scenery

Environmental Consequences

Introduction

The current Forest Plan does not have definitive Visual Quality Objectives for all specific viewsheds on the Forest. For the most part, specific visual objectives have been developed by each Administrative Area on a project-by-project basis using the inventoried objectives as a starting point.

Revised Forest Plan alternatives, on the other hand, include prescribed VQO's for each proposed Land Use Designation, and the final revised Forest Plan will adopt the specific VQO's of each of its LUD's. These adopted VQO's will indicate the desired or acceptable level of human-induced alterations to the natural landscape character. Each alternative described in this FEIS, if implemented, would maintain, alter or enhance the visual character of the landscapes of the Tongass to varying degrees, according to the mix of LUD's.

The potential effects to the scenic resource are described in two ways:

1. A Forest-wide display of acres of each Visual Quality Objective adopted as a result of each alternative, discussed by alternative. This includes all acres of the Forest outside of designated Wilderness (Wilderness is common to all alternatives).

2. A display of the effects of each alternative on a selected group of key viewsheds spread throughout the Tongass.

Direct, Indirect, and Cumulative Forest-wide Effects

Table 3-61 displays Forest-wide the Visual Quality Objectives adopted for each alternative. Both seen and seldom-seen areas are included. The acres displayed in these tables include all the inventoried acres in all LUD's except the Wilderness LUD's, which do not vary by alternative. (Retention is the adopted VQO for all areas within Wilderness and Wilderness National Monument.) The alternatives vary in how the "timber harvest" LUD's (Scenic Viewshed, Modified Landscape, Timber Production) are distributed, and in the silvicultural practices (harvest methods) specified within these LUD’s. Non-clearcut methods are sometimes applied to meet retention or partial retention objectives, and in some alternatives to meet other resource objectives. In the latter case, Visual Quality Objectives higher than those adopted are likely to be met.

Another way in which alternatives vary is in the extent of allocation of old-growth forest reserves (the Old-growth Habitat LUD). In some alternatives old-growth forest reserves are assigned to portions of several visually sensitive areas, and thus the natural character within the reserves portions will be maintained. Discussions by alternative make note of this allocation.

It should be noted that the visual effects of timber harvest activities are not limited to the specific location of the activity. As seen from a travel route or use area, such alterations can affect the visual appearance of the entire viewed landscape (or "viewshed"). For this reason, the acreages of visual effect tend to be greater than the acres of suitable forest land within a given area. Conversely, these effects may be smaller because they will not happen all at once. While some viewsheds are likely to have significant alterations over the next decade, others may not be entered, or entered only lightly, for several decades. In this sense, the Forest-wide VQO's are best thought of as an indicator of long-term, cumulative effects.

Table 3-61
Visual Quality Objectives by alternative, Forest-wide

	Visual Quality Objective			
	Retention	Partial Retention	Modification	Maximum Modification
Alternative 1				
Seen Areas	2,337,325	2,893,975	1,180	741
Seldom-seen	3,583,642	1,983,636	0	220,171
Wilderness	5,723,253			
Alternative 2				
Seen Areas	1,822,706	1,653,882	452,668	1,307,249
Seldom-seen	1,728,367	1,425,858	0	2,637,386
Wilderness	5,723,253			
Alternatives 3 & 10				
Seen Areas	2,331,436	1,483,042	366,293	1,055,735
Seldom-seen	2,091,290	1,425,858	0	2,274,463
Wilderness	5,723,253			
Alternative 4				
Seen Areas	1,822,706	1,653,882	452,668	1,307,249
Seldom-seen	1,728,667	1,425,858	0	2,637,386
Wilderness	5,723,253			
Alternative 5				
Seen Areas	1,978,690	1,615,361	421,656	1,220,796
Seldom-seen	1,902,330	1,425,858	0	2,463,424
Wilderness	5,723,253			
Alternative 6				
Seen Areas	2,021,316	1,598,775	416,157	1,200,732
Seldom-seen	1,934,607	1,411,096	0	2,446,188
Wilderness	5,723,253			
Alternative 7				
Seen Areas	1,160,149	597,493	1,010,389	2,465,605
Seldom-seen	834,616	690,578	0	4,259,651
Wilderness	5,723,253			
Alternative 9				
Seen Areas	2,631,432	1,090,184	354,184	1,157,866
Seldom-seen	2,529,073	0	0	3,255,771
Wilderness	5,723,253			
Alternative 11				
Seen Areas	2,184,897	1,704,008	427,088	822,328
Seldom-seen	2,568,578	1,504,609	0	1,947,888
Wilderness	5,723,253			

Source: Q47D

Another way to assess relative effects on scenic quality is to compare, by alternative, the acreages allocated to the Scenic Viewshed, Modified Landscape, Timber Production, other development LUD's (Nonwilderness National Monument and Experimental Forest), Wild, Scenic or Recreational River (Scenic or Recreational Rivers could have some timber harvesting within their corridors), and the Natural Setting LUD group (which includes Remote and Semi-remote Recreation, Old-growth Forest, and LUD II). These comparisons are shown in Table 3-62, and discussed by alternative below.

Table 3-62
"Development" LUD and Natural Setting LUD Group acres (in 1,000's), by alternative[(1)]

Alt.	SV	ML	Development LUD's TM	OD	WSR	LUD III	LUD IV	Natural Setting LUD Group
1	1	0	222	174	330			10,757
2	810	851	3,477	181	91			5,841
3 & 10	572	676	2,977	181	91			6,755
4	810	851	3,477	181	91			5,841
5	754	750	3,276	181	91			6,199
6	754	750	3,276	181	91			6,199
7	0	1,478	6,301	181	0			3,200
9				184		2,334	3,818	4,891
11	488	619	2,543	168	109			7,035

[1] SV = Scenic Viewshed, ML = Modified Landscape, TM = Timber Production, OD = other development LUD's (see text), WSR = Wild/Scenic/Recreational River. For Alternative 9, LUD III is roughly equivalent to the total of SV and ML in the other alternatives, and LUD IV equivalent to TM. In addition, each alternative has 5,723 thousand acres of Wilderness. "Development" in terms of timber harvesting or road construction would only occur in Scenic or Recreational Rivers. Rivers proposed within Wilderness are not included.

The following paragraphs briefly summarize and compare the effects of each alternative based on the preceding tables:

Alternative 1. This alternative allocates all areas seen from all use areas and travel routes, recreation places, and other areas identified as important by the public, that are outside existing Wilderness and LUD II areas, to Remote or Semi-remote Recreation. Therefore all of the inventoried seen areas and recreation places will have an adopted VQO of retention or partial retention. This means in effect that any timber harvest or road construction will take place only outside the Forest's seen areas. The designated VQO's would primarily be applied to specific developments such as small-scale recreation facilities and resorts.

Alternative 2. This alternative allocates key viewsheds around communities, heavily used saltwater boating areas, anchorages and some sensitive viewsheds associated with popular Forest Service cabins, campgrounds, day-use areas and canoe routes primarily to either Scenic Viewshed or Modified Landscape. Along the saltwater boating routes, cruise ship routes and ferry routes, lands are allocated to a mix of LUD's, with the adopted VQO's ranging from retention to maximum modification. The adopted VQO's in viewsheds associated with recreation sites are generally retention or partial retention; in many of these areas, extended timber harvest rotations will be used. Some additional protection is given by the designation of 24 river segments as Wild, Scenic or Recreational Rivers. As indicated in Table 3-61, 3,480,000 acres, 66 percent of all seen areas on the forest outside Wilderness, will have a Visual Quality Objective of retention or partial retention (with 1,823,000 acres of retention).

Alternative 3. This alternative is similar to Alternative 2, but adopts a higher Visual Quality Objective (retention) in all or part of some viewsheds due to its Forest-wide old-growth reserve system (Old-growth Habitat LUD). For example, several saltwater boat routes allocated primarily to either Scenic Viewshed, Modified Landscape, or Timber Production in Alternative 2 are interspersed with Old-growth Forest allocations in Alternative 3. This alternative also includes an expanded

Glossary

beach fringe (only allowing uneven-aged harvest methods) that may enhance scenic protection in some foreground viewsheds. Alternative 3 has 3,814,000 acres with a VQO of retention or partial retention, 73 percent of all seen areas outside Wilderness. Of this total, 2,331,000 acres will have a retention VQO, about a half-million more than Alternative 2.

Alternative 4. Alternative 4 has the same LUD allocations as Alternative 2, and hence adopts the same VQO's for the same areas. However, Alternative 4 uses only extended rotation two-aged and uneven-aged timber harvesting, and is likely to result in greater scenic protection in some areas than called for by the adopted VQO. As in Alternative 3, the extended beach fringe may also afford greater scenic protection to some foreground areas. As indicated in Table 3-61, 3,480,000 acres, 66 percent of all seen areas on the forest outside Wilderness, will have a Visual Quality Objective of retention or partial retention (with 1,823,000 acres of retention).

Alternative 5. Alternative 5 is also based on Alternative 2, adding a more limited reserve system than did Alternative 3. These Old-growth Habitat LUD's are concentrated on Chichagof Island, Kupreanof Island, the north half of Prince of Wales Island, and Dall Island; the rest of the viewsheds on the Forest are allocated as they are in Alternative 2. This alternative may also afford greater scenic protection for some viewsheds due to the use of longer harvest rotations, uneven-aged or two-aged management, and an expanded beach fringe. Alternative 5 has 3,594,000 acres with a VQO of retention or partial retention, 69 percent of all seen areas on the forest outside Wilderness. Of this total, 1,979,000 acres will have a retention VQO. Forest-wide, Alternative 5 adopts the retention VQO for about 150,000 more acres than Alternative 2, but about 350,000 acres less than Alternative 3.

Alternative 6. Alternative 6 is identical to Alternative 5 with the exception of the timber harvest methods employed. Therefore, the additional scenic protection afforded by the longer harvest rotations, and uneven-aged or two-aged management, in Alternative 5 would not be realized in Alternative 6. Otherwise the effects would be as discussed for Alternative 5. Alternative 6 has 3,594,000 acres with a VQO of retention or partial retention, 69 percent of all seen areas on the forest outside Wilderness, and of this total, 1,979,000 acres will have a retention VQO. Like Alternative 5, Alternative 6 adopts the retention VQO for about 150,000 more acres than Alternative 2, but 350,000 acres less than Alternative 3.

Alternative 7. In Alternative 7 over half of the Forest's inventoried viewsheds (about 3,480,000 acres) are allocated to Timber Production with adopted VQO's of modification and maximum modification. The only viewsheds allocated to a scenic emphasis are those that are part of the legislated LUD II areas, and some areas adjacent or important to communities, primarily in the Chatham Administrative Area. Viewsheds with a VQO of retention or partial retention in Alternative 7 total 1,760,000 acres, 34 percent of all seen areas on the Forest outside Wilderness. Of this total about 1,160,000 acres will have a retention VQO.

Alternative 9. This alternative reflects the current Forest Plan. In addition to the retention VQO adopted for the legislated LUD II's, it establishes a retention and partial retention adopted VQO for LUD III's. These retention and partial retention VQO's are adopted for much of the same viewsheds as in Alternative 2. About 3,722,000 acres, 59 percent of all seen areas on the forest outside Wilderness, have an adopted VQO of retention or partial retention. Of this total, 2,631,000 acres will have a retention VQO.

Alternative 10. From a scenery resource standpoint Alternative 10 (the draft preferred alternative) is identical to Alternative 3 except that the "no-harvest" beach fringe zone is set at 500 feet rather than 1,000 feet.

Alternative 11. Alternative 11 is similar to Alternative 3 in that it protects to various degrees the natural character of many key viewsheds by the allocation of the Scenic Viewshed and Modified Landscape LUD's. In addition it affords a higher degree of scenery protection by allocating portions of some of these viewsheds to Old-growth Habitat where the adopted VQO is retention. However Alternative 11 allocates additional smaller Old-growth areas, many of which are portions of some of the Forest's key viewsheds. It also enlarges or modifies some of the larger Old-growth allocations in Alternative 3. In addition, Alternative 11 allocates the Semi-remote Recreation LUD to all or portions of a few viewsheds that were allocated to different timber harvest LUD's in Alternative 3. These viewsheds will therefore be managed for essentially a retention VQO. Alternative 11 has 3,866,000 acres with a VQO of retention or partial retention, which is about 75 percent of all seen areas outside of Wilderness. Of this total, 2,156,000 acres will have retention VQO.

Effects on Selected Viewsheds

The 1991 SDEIS primarily used a Forest-wide approach to analyzing the potential effects to scenic quality. For the Revised Supplement and this FEIS, an analysis by selected viewsheds has been added. The most critical specific viewsheds Forest-wide, based on intensity of public use and travel, are evaluated in terms of potential effects to the scenery. This helps focus the effects analysis on the more familiar areas. The discussions following the table also identify where the effects of past management on scenery may necessitate minimizing activities for a period of time if the adopted VQO's cannot be met.

Table 3-63 displays the acres of VQO's that would be adopted for each alternative in each of 22 selected viewsheds. The left-hand column displays the Existing Visual Condition (EVC) in each viewshed. Note that VQO and EVC terminology is combined in the far left column. The correlation between the two was displayed in the affected environment section. Each viewshed is discussed following the table. As previously mentioned, while some viewsheds are likely to have significant alterations over the next decade, others may not be altered, or entered only lightly, for several decades.

Table 3-63
Adopted VQO's for selected viewsheds by alternative (1) (2)

Travel Route/ Viewshed	EVC	Alternative 1	2	3 & 10	4	5	6	7	9	11
Behm Canal										
Type I EVC	28,797									
Retention(II)	160	25,979	2,645	9,674	2,645	2,645	2,645	120	3,985	12,478
Par. Ret(III)	3,729	13,776	9,252	7,710	9,252	9,252	9,252	420	6,009	6,588
Modific.(IV)	1,582		16,784	11,717	16,784	16,784	16,784	9,393	5,948	12,759
Max. Mod.(V)	5,487		11,075	10,654	11,075	11,075	11,075	29,822	23,813	1,930
Type VI EVC										
Chatham Strait										
Type I EVC	90,093									
Retention(II)	618	31,407	27,251	56,604	27,251	44,391	48,865	34,873	39,102	71,487
Par. Ret(III)	360	84,837	24,670	19,874	24,670	20,971	20,491		15,642	11,572
Modific.(IV)	700		8,173	3,733	8,173	4,993	4,754	5,768	1,819	2,115
Max.Mod.(V)	24,472		56,149	36,032	56,149	45,889	42,134	75,602	59,680	31,089
Type VI EVC	20									
Cholmondeley Sound										
Type I EVC	36,796									
Retention(II)		17,124		4,984					5,528	9,287
Part. Ret(III)		19,430	3,966	3,966	3,966	3,966	3,966		11,617	3,145
Modific.(IV)	360		11,567	11,567	11,567	11,567	11,567	11,018	6,771	11,375
Max. Mod.(V)	922		22,525	17,541	22,525	22,525	22,525	25,438	14,142	11,367
Type VI EVC										
Clarence Strait										
Type I EVC	46,498									
Retention(II)	782	21,047	4,800	23,126	4,800	14,032	14,032		5,080	26,131
Part.Ret.(III)	5,332	53,979	23,247	16,090	23,247	23,126	23,126		26,584	18,313
Modific.(IV)	13,603		27,419	18,008	27,419	18,408	18,408	12,177	5,479	17,152
Max.Mod.(V)	8,490		19,519	17,761	19,519	19,419	19,419	62,909	29,557	13,443
Type VI EVC	381									
Duncan Canal										
Type I EVC	16,547									
Retention(II)		5,614	1,219	6,275	1,219	6,275	6,275		3,895	9,252
Part.Ret(III)	300	22,106	10,952	7,375	10,952	7,375	7,375		7,075	6,276
Modific.(IV)	5,496		8,875	8,135	8,875	8,135	8,135	5,116	2,139	6,317
Max.Mod.(V)	5,397		6,674	5,934	6,674	5,934	5,934	22,604	14,611	5,845
Type VI EVC										
Eastern Passage										
Type I EVC	49,326									
Retention(II)	380	20,563	5,461	17,762	5,461	5,461	5,461		4,861	14,123
Part.Ret.(III)	7,802	51,169	48,869	37,347	48,869	48,869	48,869		30,965	39,327
Modific.(IV)	1,880		8,321	8,161	8,321	8,321	8,321	10,101	5,240	9,701
Max.Mod.(V)	12,903		9,081	8,461	9,081	9,081	9,081	62,191	23,863	8,561
Type VI EVC										

Travel Route/ Viewshed	EVC	Alternative								
		1	2	3 & 10	4	5	6	7	9	11
Ernest Sound										
Type I EVC	28,345									
Retention(II)		15,181	1,041	14,258	1,041	5,792	5,792		20	7,613
Part.Ret.(III)	20	16,202	7,302	6,583	7,302	6,883	6,883			6,562
Modific.(IV)	3,157		10,872	7,298	10,872	8,217	8,217	4,842	3,802	9,933
Max.Mod.(V)			12,287	3,363	12,287	10,610	10,610	26,540	22,999	3,461
Type VI EVC										
Frederick Sound										
Type I EVC	63,082									
Retention(II)	2,060	17,874	1,221	15,851	1,221	4,714	4,714		1,861	19,207
Part.Ret.(III)	120	63,007	34,571	27,438	34,571	34,531	34,531		20,378	21,906
Modific.(IV)	10,117		7,362	7,242	7,362	7,322	7,322	2,822	1,421	6,202
Max.Mod.(V)	5,562		37,767	30,390	37,767	34,354	34,354	77,419	57,261	27,586
Type VI EVC										
Helm Bay										
Type I EVC	9,299									
Retention(II)		3,499	2,321	4,599	2,321	4,599	4,599		2,321	
Part.Ret.(III)		5,900	6,678	4,420	6,678	4,420	4,420		6,937	9,299
Modific.(IV)								2,321		
Max.Mod.(V)			300	280	300	280	280	6,977	40	
Type VI EVC										
Hyder/Salmon River Highway										
Type I EVC	24,025									
Retention(II)		12,362	11,302	11,302	11,302	11,302	11,302		11,282	3,861
Part.Ret.(III)		11,662	12,722	12,722	12,722	12,722	12,722	24,025	12,742	20,164
Modific.(IV)										
Max.Mod.(V)										
Type VI EVC										
Icy Strait										
Type I EVC	36,237									
Retention(II)		5,607	220	14,623	220	260	1,021		80	6,204
Part.Ret.(III)	3,698	45,870	9,983	8,341	9,983	9,983	9,983	80	360	8,021
Modific.(IV)	280		560	560	560	560	560	1,740	1,380	
Max.Mod.(V)	11,322		40,754	27,993	40,754	39,953	39,953	49,657	49,717	37,311
Type VI EVC										
Lynn Canal										
Type I EVC	138,617									
Retention(II)	401	28,316	20,470	42,184	20,470	20,470	20,470	12,140	63,395	23,735
Part.Ret.(III)	2,422	112,963	92,072	74,376	92,072	92,072	92,072	19,167	43,218	89,549
Modific.(IV)			21,817	21,797	21,817	21,817	21,817	84,133		17,491
Max.Mod.(V)			6,961	2,963	6,961	6,961	6,961	23,302	18,681	5,341
Type VI EVC										
Mendenhall Glacier										
Type I EVC	252,987									
Retention(II)		163,540	163,780	163,780	163,780	163,780	163,780	163,520	140,604	163,780
Part.Ret.(III)	959	90,406	90,166	90,166	90,166	90,166	90,166	68,343	113,341	90,166
Modific.(IV)								11,505		
Max.Mod.(V)								10,578		
Type VI EVC										

Glossary

Travel Route/ Viewshed	EVC	Alternative 1	2	3 & 10	4	5	6	7	9	11
Peril Strait										
Type I EVC	120,582									
Retention(II)	720	1,744	24,014	69,371	24,014	24,074	29,206	20	27,447	57,451
Part.Ret.(III)	2,194	165,515	44,684	40,690	44,684	44,684	39,552	24,953	57,020	48,586
Modific.(IV)	13,793		11,276	4,374	11,276	11,256	11,256	15,566	220	3,517
Max.Mod.(V)	26,151		87,365	52,904	87,365	87,325	87,325	126,720	71,890	57,785
Type VI EVC	5,239									
Salmon Bay Lake										
Type I EVC	2,056									
Retention(II)	80	20	119	2,002	119	2,002	2,002		119	2,002
Part.Ret.(III)	1,761	4,174	3,162	1,499	3,162	1,499	1,499	20	3,778	1,460
Modific.(IV)			536	396	536	396	396	100		436
Max.Mod.(V)	296		377	296	377	296	296	4,074	296	296
Type VI EVC										
Stephens Pass										
Type I EVC	127,296									
Retention(II)	1,061	9,114	12,149	35,401	12,149	12,149	13,083	2,508	10,625	29,633
Part.Ret.(III)	1,060	118,789	90,986	69,307	90,986	90,986	90,847	17,464	55,898	83,880
Modific.(IV)	520		2,607	1,573	2,607	2,607	2,091	41,618	1,440	895
Max.Mod.(V)	3,932		22,180	21,641	22,180	22,180	21,902	65,534	33,682	19,441
Type VI EVC										
Stikine Strait										
Type I EVC	32,848									
Retention(II)		1,302	461	8,853	461	461	461		461	16,697
Part.Ret.(III)	921	53,169	43,475	35,423	43,475	43,475	43,475		51,270	30,577
Modific.(IV)	4,619		1,883	1,883	1,883	1,883	1,883	461		1,121
Max.Mod.(V)	16,083		8,652	8,312	8,652	8,652	8,652	54,010	2,740	6,075
Type VI EVC										
Sumner Strait										
Type I EVC	21,829									
Retention(II)	100	10,886	9,120	14,224	9,120	11,948	13,268	3,915	7,317	19,851
Part.Ret.(III)	4,553	54,905	17,508	17,408	17,508	17,408	17,408		23,853	22,680
Modific.(IV)	9,842		6,844	6,844	6,844	6,844	6,844	9,370	5,908	4,269
Max.Mod(V)	29,447		32,298	27,294	32,298	29,571	28,251	52,485	28,692	18,911
Type VI EVC										
Sweetwater Lake/Honker Divide										
Type I EVC	11,699									
Retention(II)	1,380	7,402	7,181	10,361	7,181	12,622	12,622		7,421	14,241
Part.Ret.(III)	4,881	14,859	7,060	5,620	7,060	4,699	4,699		8,821	2,780
Modific.(IV)	3,240		7,720	5,980	7,720	4,640	4,640	9,040	1,740	4,540
Max.Mod.(V)	1,080		420	420	420	420	420	13,221	4,400	300
Type VI EVC	100									

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Travel Route/ Viewshed	EVC	Alternative 1	2	3 & 10	4	5	6	7	9	11
Tenakee Inlet To Tenakee Springs										
Type I EVC	23,202									
Retention(II)		1,980	460	9,439	460	7,701	9,620		1,879	15,391
Part.Ret.(III)	780	41,288	1,400	20	1,400	20	20		4,700	2,159
Modific.(IV)	4,074		2,358	2,358	2,358	2,358	2,338	460	20	1,199
Max.Mod.(V)	14,772		39,049	31,450	39,049	33,189	31,289	42,788	33,548	24,578
Type VI EVC	440									
West Coast Waterway - P.O.W.										
Type I EVC	44,452									
Retention(II)	861	14,907	13,459	23,221	13,459	19,390	21,637	8,855	3,494	25,610
Part.Ret.(III)	7,527	67,726	11,215	10,835	11,215	11,054	10,733			16,393
Modific.(IV)	10,101		24,315	21,526	24,315	23,732	23,091	28,115	7,039	17,539
Max.Mod.(V)	19,671		33,624	27,031	33,624	28,436	27,152	45,664	16,230	22,707
Type VI EVC	100									
Wrangell Narrows										
Type I EVC	32,020									
Retention(II)	1,301	4,003	11,044	17,245	11,044	17,245	17,245		8,883	21,206
Part.Ret.(III)	920	38,785	25,022	19,542	25,022	19,542	19,542		28,686	16,840
Modific.(IV)	3,141		2,221	2,161	2,221	2,161	2,161	8,263		1,321
Max.Mod.(V)	7,045		4,700	4,040	4,700	4,040	4,040	34,725	4,280	4,090
Type VI EVC										
Zimovia Strait										
Type I EVC	27,641									
Retention(II)	80	841	5,179	14,064	5,179	5,179	5,179		2,980	18,905
Part.Ret.(III)	2,800	39,24	25,662	21,121	25,662	25,662	25,662		17,678	9,240
Modific.(IV)	1,941		5,106	1,021	5,106	5,106	5,106	5,761	2,781	4,681
Max.Mod.(V)	7,644		4,080	3,820	4,080	4,080	4,080	34,345	16,667	7,200
Type VI EVC										

Source: Queries 47F and Viscomy

[1] EVC and VQO terms are defined in the Scenery affected environment section. With two exceptions the Wilderness portions of viewsheds are not included. The Clarence Strait viewshed includes a portion of South Etolin Island Wilderness, and the Duncan Canal viewshed includes a portion of Duncan Salt Chuck Wilderness.

[2] The acres in the table are only those seen from a Visual Priority Travel Route and Use Area

Alternative effects are discussed below for each viewshed. Two points to keep in mind are:

1. Where an area is allocated to Semi-Remote Recreation, the resulting VQO is essentially retention since this LUD precludes commercial timber harvest. The formally adopted VQO of partial retention is primarily intended to provide a standard for recreation and tourism types of development, from small cabins to resorts, and the facilities associated with these developments. In most cases the effects would be confined to small, widely-scattered sites rather than spread over a broad landscape.

2. In Alternatives 3, 4, 5, 6 and 11, the use of uneven-aged management in an expanded beach fringe, and in Alternatives 4 and 5 the use of uneven-aged management elsewhere and expanded timber harvest rotations, may afford greater scenic protection than indicated by the adopted VQO.

Behm Canal (West). Alternative 1 will manage this waterway for a natural setting. A retention VQO will be adopted for most of this viewshed (Semi-Remote or Remote Recreation). Alternatives 3 and 10 will adopt retention, partial retention and modification VQO's along much of this waterway (Scenic Viewshed and Modified Landscape), except for a few segments along the Cleveland Peninsula side where Old-growth Habitat is allocated. This part of the waterway will maintain its natural setting. Alternatives 2, 4, 5 and 6 will adopt partial retention and modification VQO's (Modified Landscape) throughout the viewshed. Alternative 9 will adopt a modification and maximum modification VQO for most the waterway (LUD IV) except the northern and southern end which is allocated to LUD III. Alternative 7 adopts a modification and maximum modification VQO (Timber Production) for all of this waterway. Alternative 11 will adopt the same VQO's along the Revilla Island side as Alternatives 3 and 10. However most of the Cleveland Peninsula side, except for the western slopes of Port Stewart will have an adopted VQO of retention and hence maintain a natural setting due to the allocation of Semi-Remote Recreation and Old-growth in this area. Because in a few areas, particularly on the Revilla Island side, the impact of existing harvest has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Chatham Strait. Alternative 1 will manage all of this waterway in a natural setting. A retention and partial retention VQO will be adopted along this channel (Remote or Semi-Remote Recreation). Alternatives 3 and 10 will adopt a foreground retention and middleground maximum modification VQO along most parts of the west side of this waterway (Scenic Viewshed and Timber Production), while other scattered portions including all of the southern portion will remain in a natural setting due to Old-growth Habitat and Remote and Semi-remote Recreation allocations. Alternatives 2, 4, 5 and 6 will also adopt retention and maximum modification VQO's along much of the west side of this channel. Alternatives 7 and 9 will adopt modification and maximum modification VQO's (Timber Production in Alternative 7 and LUD IV in Alternative 9) in most areas along the west of side of this channel except in the scattered areas where LUD II's or III's are allocated in Alternative 9. Alternative 11 maintains much more of this waterway in a natural setting than the draft preferred alternative (10) due to the addition of a few small areas allocated to Old-growth and the relocation or redesign of the Old-growth areas in Alternative 10. These areas will all have an adopted VQO of retention. One portion of the waterway, just below Tenakee Inlet will remain in a Timber Production and Scenic Viewshed allocation where partial retention and maximum modification will be the adopted VQO's. In a few areas, particularly between Peril Strait and Tenakee Inlet, the impact of existing harvest has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Cholmondely Sound. Alternative 1 will essentially adopt a retention VQO throughout this bay (Semi-Remote Recreation) except where very extensive harvest has taken place on the private lands along the southern shores of this viewshed. Alternatives 2, 3, 4, 5, 6 and 10 all adopt partial retention and modification VQO's around Sunny Cove and the West Arm of the bay (Modified Landscape), and maximum modification throughout most of the rest of the bay (Timber Production - this portion also not a Priority Use Area). The exception to this is Alternative 3 where two Old-growth Habitat areas are allocated at the extreme southern portions of the Kitkun Bay and South Arm- Cholmondely Sound viewsheds. These segments of these viewsheds will remain in a natural setting. Alternative 9 would adopt retention and partial retention VQO's in the West Arm of the bay (LUD III) and maximum modification (LUD IV) in the remaining portions.

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Alternative 7 would adopt a maximum modification VQO in most of the bay (Timber Production). Alternative 11 is similar to Alternatives 3 and 10 except for the addition of two small old-growth areas in the West Arm area, and the addition of a large Old-growth area along the north shore of the outer part of the bay. These will result in the adoption of a retention VQO and the maintenance of a natural setting in small portions of the West Arm and along the north shore of the bay. Overall most of the outer part of the bay will be in an extensively altered condition due to harvest on private lands and the remaining National Forest lands being allocated to Timber Production.

Clarence Strait. Alternative 1 would adopt a retention or partial retention VQO for most of this viewshed (Remote or Semi-Remote Recreation). Alternatives 3, 5, 6 and 10 will result in the maintenance of a near natural setting along most of the east side of this waterway due to Wilderness or Old-growth Habitat allocations. The allocation of Modified Landscape and a few scattered Old-growth Habitat areas will result in the adoption of retention to modification visual objectives along the Prince of Wales side of this channel. Alternatives 2 and 4 will adopt a modification VQO on the Prince of Wales side of the waterway (Modified Landscape), and a retention or partial retention objective along most of the east side (Scenic Viewshed and Wilderness). Alternative 9 adopts a range of VQO's from partial retention to maximum modification along the west side (LUD III and LUD IV), and either retention or partial retention along the east side (LUD III and Wilderness). Alternative 7 will result in the adoption of the maximum modification VQO along most of this channel. Alternative 11 allocates virtually all of the east side of Clarence Strait to modified landscape and most of the east side to Wilderness, Old-growth or Semi-remote Recreation. Hence the westside will be managed for a modification VQO while the east side will be managed in a natural setting. Because the impact of existing harvest in a few areas has reached or exceeded the level allowed by the adopted VQO's, particularly along the Prince of Wales side, in Alternatives 2-6, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Duncan Canal. Alternative 1 in effect adopts a retention objective throughout the viewshed (Semi-Remote Recreation). Alternatives 3, 5, 6 and 10 adopt a retention VQO for much of the bay (Wilderness, Semi-Remote Recreation, two Old-growth Habitat areas). The rest of the viewshed has an adopted VQO of retention, partial retention, or modification (Scenic Viewshed or Modified Landscape). Alternatives 2 and 4 will result in a mix of allocations including Modified Landscape, Scenic Viewshed, Semi-Remote Recreation, and Wilderness. Adopted VQO's will range from modification in some timber harvest LUD's to retention in the Duncan-Salt Chuck Wilderness. Alternative 9 will adopt a range of objectives including retention in the Wilderness and retention through maximum modification (LUD III and LUD IV) in the rest of the bay. Alternative 7 adopt a modification or maximum modification objective throughout the bay (Timber Production) except in the Wilderness portion. A natural setting is maintained in all these areas. Alternative 11 allocates most of this waterway to either Wilderness, Old-growth, or Semi-Remote Recreation, thereby adopting a retention VQO and maintaining a natural setting for most of this viewshed. A relatively small middle portion of the east side of this waterway is allocated to modified landscape and hence will be managed for a partial retention and modification VQO.

Eastern Passage. Due to the Semi-remote Recreation allocation throughout this viewshed, Alternative 1 adopts a retention VQO and maintains the area's natural setting. Alternatives 3 and 10 adopts a retention VQO along most of this channel (Old-growth Habitat and Semi-Remote Recreation). Most of the rest of the viewshed has an adopted VQO of retention or partial retention (Scenic Viewshed).

Glossary

Alternatives 2, 4, 5 and 6 adopt retention and partial retention VQO's throughout most of the viewshed (Scenic Viewshed or Semi-Remote Recreation). Alternative 9 adopts a retention and partial retention VQO along the northern half of the channel (LUD III), and modification and maximum modification along the southern half (LUD IV). Alternative 7 adopts a modification and maximum modification VQO throughout the viewshed (Timber Production). Alternative 11 allocates a smaller portion of this viewshed to Old-growth than Alternatives 3 and 10. But in combination with the Semi-Remote Recreation allocation, about half of the viewshed will be managed for a natural setting. Most of the rest of this channel is allocated to scenic viewshed and hence will be managed for a retention and partial retention VQO. Because the impact of existing harvest in a few areas (particularly just outside the north entrance to Blake Channel) has reached or exceeded the level allowed by the adopted VQO's, in Alternatives 2-6, 9 and 10, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Ernest Sound. Alternative 1 will maintain all this viewshed in a natural setting (Wilderness, Remote or Semi-Remote Recreation). Alternatives 3 and 10 also adopts a retention VQO throughout much of this channel (three Old-growth Habitat areas and Wilderness). But the northern end adopts a range of VQO's from retention to maximum modification (Scenic Viewshed, Modified Landscape, Timber Production). Alternatives 5 and 6 adopts a range of VQO's from retention to maximum modification (Scenic Viewshed, Modified Landscape, Timber Production and one Old-growth Habitat area around Myers Chuck and Union Bay). Alternatives 2 and 4 adopt primarily a modification and maximum modification VQO along the south side of the channel (Timber Production), and retention on the north side of the channel due to the South Etolin Wilderness. Except for the Wilderness, Alternatives 7 and 9 adopt primarily a maximum modification VQO (Timber Production in Alternative 7 and LUD IV in Alternative 9). Alternative 11 allocates a smaller portion of the south side of this channel to Old-growth than Alternatives 3 and 10. (The area between Vixen Inlet and Union Bay is allocated to modified landscape and Timber Production). As with Alternatives 3 and 10, the north end of this channel is allocated to a mix of Scenic Viewshed, Modified Landscape and Timber Production and therefore is managed for a range of VQO's from retention to maximum modification.

Frederick Sound. Alternative 1 will maintain all this viewshed in natural setting (Semi-Remote Recreation). Alternatives 3 and 10 adopts VQO's of retention and partial retention for most of this waterway (four Old-growth Habitat areas and Scenic Viewshed and the Stikine LeConte Wilderness). A few areas along the water and other middle and background areas adopt a maximum modification VQO (Timber Production). Alternatives 5 and 6 also adopt a retention VQO in two Old-growth Habitat areas and one Wilderness, and partial retention in most of the rest of the viewshed (Scenic Viewshed). Other than the Wilderness Area Alternatives 2 and 4 adopt partial retention to maximum modification VQO's throughout the viewshed (Scenic Viewshed or Timber Production). Alternative 9 adopts primarily a maximum modification VQO (LUD IV) except for the Wilderness and the few portions that are allocated to LUD III where the VQO would be retention and partial retention respectively. Alternative 7 adopts a maximum modification VQO (Timber Production) for all of this viewshed except for the Wilderness. Alternative 11 allocates a few small Old-growth areas to portions of this waterway that were allocated to Scenic Viewshed in Alternatives 3 and 10. Hence a slightly larger portion of this viewshed will be managed for a natural setting than under Alternatives 3 and 10. Overall, a little over half this waterway is allocated to Wilderness or Old-growth where a natural setting will be maintained. Most of the rest of the waterway is allocated to Scenic Viewshed, and therefore managed for VQO's of retention and partial retention.

Helm Bay. Alternative 1 would adopt essentially a retention VQO throughout the viewshed (Semi-Remote Recreation) thereby maintaining a natural setting in this bay. Alternatives 3, 5, 6 and 10 adopt a retention VQO at the head of this bay (Old-growth) and retention and partial retention throughout the rest of the viewshed (Scenic Viewshed). Alternatives 2, 4 and 9 adopt a retention and partial retention VQO for the entire viewshed (Scenic Viewshed in Alternatives 2 and 4, and LUD III in Alternative 9). Alternative 7 adopts a modification and maximum modification VQO throughout the viewshed (Timber Production). Like Alternative 1, Alternative 11 adopts a retention VQO throughout the bay due to its allocation to Semi-Remote Recreation.

Hyder/Salmon River Highway. Alternatives 1-6, 9 and 10 allocate this area to Scenic Viewshed, and hence adopt VQO's of retention and partial retention. Alternative 7 allocate this area to Semi-Remote Recreation, and in effect adopt a VQO of retention throughout the viewshed. Alternative 11 allocates the west side of the Salmon River to Semi-Remote Recreation thereby maintaining a natural setting along this side of the corridor. The east side of the highway and river is allocated to scenic viewshed, and is therefore managed for retention and partial retention VQO's.

Icy Strait. All the alternatives allocate the western end of this channel to Wilderness or LUD II. Alternative 1 allocates the rest of this viewshed to Semi-Remote Recreation thereby adopting in effect a retention VQO for this area and maintaining the natural setting of the area outside the extensive private lands on the Chichagof Island side of the channel. Alternatives 3 and 10 adopt a retention VQO in four scattered Old-growth Habitat areas. The rest of the viewshed has an adopted VQO of partial retention to maximum modification (Scenic Viewshed and Timber Production). Alternatives 5 and 6 adopt a retention VQO in only one Old-growth Habitat area and a partial retention to maximum modification VQO in the rest of the viewshed (Scenic Viewshed and Timber Production). Alternatives 2 and 4 adopt primarily a partial retention VQO along the immediate shoreline and a maximum modification VQO in the middleground and background portions of this viewshed (Scenic Viewshed and Timber Production). Alternative 9 adopts primarily a maximum modification VQO on the south side of the channel (LUD IV) and a partial retention VQO on the north side of the channel (LUD III). Alternative 7 adopts maximum modification on the south side of the channel (Timber Production) and modification on the north side of the channel (Modified Landscape). Alternative 11 allocates most of the north shore of this channel to Scenic Viewshed and Timber Production therefore adopting VQO's ranging from partial retention to maximum modification. Along the southern shore, outside the private lands around Hoonah, this alternative adopts a retention VQO along more than half of this shoreline (Old-growth). VQO's ranging from partial retention to maximum modification are adopted for the rest of the viewshed along this shore (Scenic Viewshed along a thin strip and the remainder Timber Production).

Lynn Canal. Alternative 1 adopts a retention or partial retention VQO throughout the viewshed (Remote or Semi-Remote Recreation). In Alternatives 3 and 10 several large Old-growth Habitat areas along this channel result in an adopted VQO of retention. Most of the rest of this viewshed has an adopted VQO of retention or partial retention (Scenic Viewshed and Semi-Remote Recreation). Alternatives 2, 4, 5 and 6 adopt primarily a retention or partial retention VQO for this waterway (Scenic Viewshed or Semi-Remote Recreation) except for one portion (Berners Bay to Sullivan Island) that is allocated to Modified Landscape where the adopted VQO is modification. Alternative 9 adopts a retention VQO for more than half of the viewshed due to the LUD II allocation for much of this area. The adopted VQO for most of the rest of the channel is partial retention. Alternative 7 allocates almost all of this viewshed to Modified Landscape, and hence adopts a modification VQO for most of the area. Alternative 11 does not allocate any Old-growth areas in this viewshed. Most of this waterway is allocated to Semi-Remote or Remote Recreation where retention is the adopted VQO. The exceptions are a couple of areas just south of and across from Berners Bay that are allocated to Scenic Viewshed (adopted VQO's of retention and partial retention), a couple of areas north of Berners Bay allocated to Modified Landscape (adopted VQO's of partial retention and modification).

Mendenhall Glacier. Alternatives 1-6 and 10 allocate this viewshed to a combination of Special Interest Area, Semi-Remote and Remote Recreation, and hence adopt a retention VQO for most of this area. Alternative 9 allocates this area in a similar way and adopts a retention to partial retention objective. Alternative 7 allocates this area similarly to Alternatives 1-6 except for a small area around the Mendenhall Glacier Special Interest Area that is allocated to Timber Production where the adopted VQO is modification and maximum modification. Alternative 11, like Alternatives 1-6 and 10, allocates this viewshed to either a Special Interest Area, Remote or Semi-Remote Recreation. Hence under this alternative this area will be maintained in a natural setting.

Peril Strait - Olga Strait - Sitka. Alternative 1 in effect adopts a retention VQO for the entire viewshed (Semi-Remote Recreation). Alternatives 3 and 10 adopt a retention VQO in the four Old-growth Habitat areas along Peril Strait and the Remote Recreation allocation along the Neva Strait - Olga Strait portion of this waterway. Along the rest of this channel these alternatives adopt a retention or partial retention VQO along the immediate shoreline and maximum modification in the middleground and background zones (Scenic Viewshed and Timber Production). Alternatives 2, 4, 5 and 6, which have no Old-growth Habitat allocations in this area, adopt the retention, partial retention, and maximum modification VQO's along most of the waterway in the same way as Alternative 3. These alternatives also adopts the retention objective along the western narrow portion of the waterway (Remote Recreation). Alternative 9 adopts a maximum modification VQO along the wider eastern portion of this channel (LUD IV), and retention and partial retention along the Poison Cove to Sitka portion of this channel (LUD III). Alternative 7 adopts the maximum modification VQO throughout most of this viewshed (Timber Production) except the Neva Strait - Olga Strait portion where the adopted VQO is retention (Semi-Remote Recreation). Alternative 11's allocations along this waterway are similar to Alternatives 3 and 10, except that a few small, scattered Old-growth areas are allocated along Peril Strait and the narrow channel south of Poison Cove that in Alternatives 3 and 10 were allocated to a combination of scenic viewshed and Timber Production. Hence while most of this waterway will have adopted VQO’s ranging from partial retention to maximum modification, the scattered small Old-growth areas will be managed in a natural setting. The Neva-Olga Strait waterway will be managed in a natural setting as it is in Alternatives 3 and 10 (Semi-Remote Recreation as opposed to Remote Recreation in alternatives 3 and 10). Because the impact of existing harvest in a few areas (particularly the Sitkoh Bay/False Island areas) has reached or exceeded the level allowed by the adopted VQO's, in Alternatives 2-6, 9, and Alternative 7, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Salmon Bay Lake. Alternative 1 adopts a retention VQO (LUD II and Semi-Remote Recreation). Alternatives 3, 5, 6 and 10 would adopt retention and

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partial retention VQO's. In these alternatives much of the viewshed is allocated to LUD II or Old-growth Habitat and managed for a natural setting. The rest of the area is allocated to Scenic Viewshed. Alternatives 2 and 4 in effect adopt the same retention and partial retention VQO's (LUD II and Scenic Viewshed). Alternative 9 adopts a retention objective in the LUD II area around the lake and a partial retention VQO in the LUD III allocated to the rest of the viewshed. Alternative 7 also essentially adopt a retention VQO for most of the foreground (LUD II or Old-growth Habitat), and maximum modification for rest of the viewshed (Timber Production). Alternative 11, allocates this viewshed to the same mix of LUD's as does Alternatives 3 and 10. Hence it will result in managing most of the foreground for a natural setting, part of the middleground for a natural setting (Old-growth), and the rest of the middleground for a partial retention VQO (Scenic Viewshed).

Stephens Pass. Alternative 1 adopts a retention VQO along the east side of the channel (Semi-Remote Recreation). Alternatives 3 and 10 adopt retention objective in a few scattered areas along the east side (Old-growth Habitat) and partial retention in most of the remaining viewshed (Scenic Viewshed). Alternatives 2, 4, 5 and 6 adopt a partial retention objective along most of the east side of the channel (Scenic Viewshed). Alternative 9 adopts primarily a partial retention VQO along the northern half of this channel (LUD III), and primarily a maximum modification VQO along the southern half (LUD IV). Alternative 7 adopts a maximum modification VQO along the east side of the channel (Timber Production). In all alternatives a retention VQO is adopted along the west side (Kootznoowoo Wilderness). Alternative 11 allocates this viewshed to the same mix of LUD's as does Alternatives 3 and 10 except for the addition of a few small Old-growth allocations along the shoreline south of Tracy and Endicott Arms that in Alternatives 3 and 10 are allocated to Scenic Viewshed. These small Old-growth areas as well as the larger ones along this waterway will be managed for a natural setting. The rest of this viewshed will be managed for partial retention and maximum modification VQO's (Scenic Viewshed and Timber Production).

Stikine Strait. Alternative 1 adopts a retention VQO throughout this viewshed (Semi-Remote Recreation). Alternatives 3 and 10 adopt a retention VQO along part of the north side of this channel (Old-growth Habitat), and a partial retention VQO for the rest of the viewshed (Scenic Viewshed). Alternatives 2, 4, 5, 6 and 9 adopt a partial retention VQO for almost all this viewshed (Scenic Viewshed for Alternative 2, 4, 5 and 6; LUD III for Alternative 9). Alternative 7 adopts a maximum modification VQO for the entire viewshed (Timber Production). Alternative 11 allocates this viewshed to the same mix of LUD's as Alternative 3 and 10 except for the addition of a couple small Old-growth allocations along the southern shore of this channel. These and the larger Old-growth area on the north shore of this channel will have an adopted VQO of retention and essentially be managed for a natural setting. Most of the rest of this viewshed will have an adopted VQO of partial retention (Scenic Viewshed). Because the impact of existing harvest in a few areas (in particular, eastern Zarembo Island and western Woronkofski Island) has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Sumner Strait. Alternative 1 adopts a retention VQO along most of this waterway (Semi-Remote Recreation and LUD II). Alternatives 3, 5, 6 and 10 adopt a range of VQO's including retention (two Old-growth Habitat areas and LUD II's), modification in the middleground and background portions of the Prince of Wales side (Modified Landscape), and partial retention in the Mitkof/Zarembo Island area (Scenic Viewshed). They adopt a maximum modification VQO along most of the Kupreanof side of the waterway (Timber Production). Alternatives 2 and 4 adopt roughly the same set of VQO's as Alternatives 3, 5, 6 and 10 except that no Old-growth Habitat areas are allocated in these alternatives. Alternative 9 adopts a retention objective around the Calder Mountain/Shakan Strait area (LUD II), a partial retention VQO around Port Protection and Red Bay (LUD III), and a maximum modification VQO throughout the rest of the viewshed (LUD IV). Alternative 7 adopts a maximum modification VQO throughout the viewshed except in the LUD II areas where the VQO is retention. Alternative 11 allocates this viewshed to the same designations as Alternatives 3 and 10 except for the addition of a few Old-growth allocations primarily along the south shore of Kupreanof Island (north shore of Sumner Strait). These represent small areas that will be managed for a retention VQO within a larger area allocated to Timber Production with an adopted VQO of maximum modification. The rest of the viewshed adopts VQO's in a similar fashion to Alternatives 3, 5, 6 and 10. Because the impact of existing harvest in a few areas (particularly at the north end of Prince of Wales Island) has reached or exceeded the level allowed by the adopted VQO's, for all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Sweetwater Lake/Honker Divide. Alternative 1 in effect adopts a retention VQO for all of the Sweetwater Lake/Honker Divide area (Scenic River and Semi-Remote and Remote Recreation). Alternatives 5 and 6 adopt a retention VQO for most of this viewshed to just below Thorne Lake (Old-growth Habitat), and retention and partial retention for the Thorne River portion and a few small portions of the viewshed from Thorne Lake to Barnes (Scenic River, Recreational River, and Scenic Viewshed). Alternatives 3 and 10 adopt a retention objective for most of the central portion of the canoe route from Butterfly Lake to Thorne Lake (Old-growth Habitat) and retention and partial retention for most of the rest of the viewshed (Scenic River, Recreational River, Scenic Viewshed). Alternatives 2 and 4 adopt a retention VQO for most of the foreground portion of this viewshed (Scenic River) and a partial retention objective for most of the rest of the viewshed (Scenic Viewshed). Alternative 9 adopts a retention and partial retention VQO for most of the viewshed (LUD III). Alternative 7 adopts a modification and maximum modification objective for the entire viewshed (Timber Production). Alternative 11 allocates much of this viewshed, as in Alternatives 5 and 6, to Old-growth. Hence the adopted VQO would be retention and the area would be managed essentially in a natural setting. The exceptions are a small portion of the Sweetwater Lake viewshed which would have an adopted VQO of modification (Modified Landscape) and a few small portions of the Hatchery Lake and Thorne Lake viewsheds that would have a partial retention VQO (Scenic Viewshed). Because the impact of existing harvest in a few areas (in particular, portions of Sweetwater and Hatchery Lakes) has reached or exceeded the level allowed by the adopted VQO's, in Alternatives 2-6, 9 and 10, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Tenakee Inlet to Tenakee Springs. Alternative 1 in effect adopts a retention VQO for most of the viewshed (Semi-Remote Recreation). Alternatives 3, 5, 6 and 10 adopt a retention VQO for most of the viewshed (Old-growth and LUD II) except for a small portion of the south shore which is allocated to Timber Production and will have an adopted VQO of maximum modification. Alternatives 2 and 4 adopt a maximum modification VQO throughout most of the viewshed except for narrow shoreline strips that have an adopted VQO of partial retention (Scenic Viewshed) or modification (Modified Landscape) and the areas that are allocated to LUD II. Alternative 9 adopts a retention and partial retention objective for the north side of the inlet (LUD III) and primarily a maximum modification VQO for the south side (LUD IV) except where a LUD II is allocated. Alternative 7 adopts a maximum modification VQO throughout the viewshed (Timber Production) except where a

LUD II is allocated. Alternative 11 allocates this viewshed to the same LUD's as Alternatives 3, 5 6 and 10 except for the addition a Scenic Viewshed allocation around Corner Bay across from Tenakee Springs. This will result in most of this viewshed being managed in a natural setting, while the Corner Bay area will be managed for a partial retention VQO. Because the impact of existing harvest has reached or exceeded the level allowed by the adopted VQO, in Alternatives 2-6, 9 and 10, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

West Coast Waterway/Prince of Wales Island. Alternative 1 in effect adopts a retention VQO (LUD II and Semi-Remote Recreation) throughout this waterway. Alternatives 3, 5, 6 and 10 adopt a wide range of VQO's including retention in the areas allocated to Old-growth Habitat and LUD II, partial retention in the foreground zones in Calder Bay and along the north side of Dry Pass (Modified Landscape), and modification and maximum modification throughout the rest of the viewshed (Timber Production). Alternatives 2 and 4 allocate no Old-growth Habitat areas, and hence the only portions of the viewshed with an adopted VQO of retention is the LUD II area at the north end of the waterway. The north side of Dry Pass and Shakan Bay has an adopted VQO of partial retention and modification (Modified Landscape), and the rest of viewshed adopts a modification or maximum modification VQO (Timber Production). Alternatives 7 and 9 adopt a retention VQO only in the north end (LUD II). The rest of viewshed has an adopted VQO of modification and maximum modification (Timber Production in Alternative 7 and LUD IV in Alternative 9). Alternative 11 adopts the same mix of VQO's as does Alternatives 3, 5, 6 and 10, except for the addition of several small scattered Old-growth allocations all along this channel where the adopted VQO is retention, and the expansion of a Semi-Remote Recreation area just north of Craig where the adopted VQO is partial retention. In effect, all these Old-growth and Semi-Remote Recreation areas will be managed for essentially a natural setting. Because the impact of existing harvest in a few areas (Calder Bay, Dry Pass, and Staney Creek/Twin Peaks) has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Wrangell Narrows. Alternative 1 adopts a retention VQO along all of this waterway (Semi-Remote Recreation). Alternatives 3, 5, 6 and 10 adopt a retention VQO in a couple of Old-growth Habitat areas, and retention and partial retention VQO's for the rest of the viewshed (Scenic Viewshed). Alternatives 2, 4 and 9 adopt retention and partial retention VQO's throughout most of the viewshed (Scenic Viewshed in Alternative 2 and 4 and LUD III in Alternative 9). Alternative 7 adopts a modification and maximum modification VQO throughout the viewshed (Timber Production). Alternative 11 allocates the same mix of LUD's to this viewshed as Alternatives 3, 5, 6 and 10 and hence adopts the same set of VQO's as these alternatives. Because the impact of existing harvest in a few areas (particularly the middle portion of the Mitkof Island side of this waterway) has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Zimovia Strait. Alternative 1 adopts a retention VQO throughout the viewshed (Semi-Remote Recreation). Alternatives 3 and 10 adopt a retention VQO in a couple of small Old-growth Habitat areas and retention and partial retention along the rest of the waterway (Scenic Viewshed). Alternatives 2, 4, 5 and 6 adopt retention and partial retention VQO's throughout most of the viewshed (Scenic Viewshed) except for the west side of the channel's north end which is allocated to Modified Landscape and the east side of the south end which is allocated to Timber

Production. In these areas modification and maximum modification are the predominant adopted VQO's. Alternative 9 adopts primarily a retention and partial retention VQO along the east side of this waterway (LUD III) and modification and maximum modification VQO along the west side of the channel (LUD). Alternative 7 adopts modification and maximum modification VQO's throughout the viewshed (Timber Production). Alternative 11 allocates the Etolin Island side of this waterway to the same LUD's as Alternatives 3 and 10, resulting in retention and partial retention adopted VQO's (Old-growth and Scenic Viewshed). The Wrangell Island side of this channel adopts retention to maximum modification VQO's due to allocations to Old-growth, Modified Landscape and Timber Production (as opposed to Scenic Viewshed and Old-growth allocations in Alternative 3). Because the impact of existing harvest in a few areas (particularly on Wrangell Island just south of Chichagof Pass) has reached or exceeded the level allowed by the adopted VQO's, in all alternatives, further analysis may indicate that even-aged harvest will need to be reduced or deferred in these areas for the next 10-20 years.

Visual Priority Travel Routes and Use Areas

In 1980 the Forest inventoried all travel routes and use areas using the process outlined for the Visual Management System (USDA Handbook #462). This inventory provides a method of measuring the importance of viewed landscapes as well as the level of concern the viewer has towards the landscape. Sensitivity levels are then assigned to each travel route or use area.

The 1990 DEIS and 1991 SDEIS directed special visual management associated with sensitive travel routes and use areas, through the application of the Scenic Viewshed, Modified Landscape, and Wild, Scenic, or Recreational River LUD's. The Timber Production LUD also set some visual management guidelines. The revised Forest Plan (Appendix F) now designates the travel routes and use areas to which adopted Visual Quality Objectives will be applied.

Using the inventoried Sensitivity level 1 and 2 travel routes and use areas as a starting point, the Forest Supervisors selected the routes and areas which provide the viewpoints for the attainment of the adopted VQO's. Their selections were based on judgments about the relative importance of destination points vs. routes to destination points, the types of viewers using routes, and the Existing Visual Condition of the area. The resulting list is organized by Administrative Area, Ranger District and category of use, and is located in Appendix F of the Forest Plan. This list does not alter the designation of sensitivity level 1 and 2 areas in the Forest's resource inventory for scenery. This inventory remains a source of information for managers.

If a route was not selected as a Visual Priority Travel Route or Use Area, the area seen from these routes or areas would in effect be treated as a seldom-seen area, and the least restrictive VQO of maximum modification would be the applicable standard in most seldom-seen areas. All areas, whether seen from a priority route or use area or not, are subject to this minimum standard.

Small plane routes, as well as major airline routes, were not included on the Visual Priority list (Appendix F). The rationale for this is based on the concept of destination-oriented recreation experiences: it is the landscape setting at the destination that should be managed for scenic quality, not necessarily the aerial route traveled to get there.

Most recreation places, communities, cabins, trails, other developed recreation sites, major roads, boat routes, and anchorages and saltwater use areas are listed as Visual Priority Travel Routes and Use Areas. Though not included as Priority Routes, most of the tourist or flightseeing routes of the Tongass pass over areas that will appear essentially unaltered: icefields, rock and water, Wilderness or Natural Setting designations. Other small plane routes are primarily commuter related. Some of the tourist and commuter routes fly over forest lands where timber harvest activities are a dominant feature.

Other specific travel routes and use areas that are designated level 1 or 2 in the visual resource inventory, but are not included on the priority list, are on Prince of Wales Island. These areas include:

1. All of the main road system north of Control Lake and north of the Sandy Beach picnic site. (Main road from Control Lake to Thorne Bay to Sandy Beach and all main roads to the south are included on the list).
2. Labouchere Bay community.
3. Ratz Harbor and Lancaster Cove anchorages.
4. All of Trocadero Bay (other than head of bay)
5. Cholmondeley Sound (other than West Arm and Sunny Cove)
6. Twelvemile Arm (other than the head of the bay and the area around Hollis and along Alaska Marine Highway route into Hollis).

Much of the landscape around the above locations has been heavily modified by past Forest Service harvest or private Native corporation harvest.

Soils

Affected Environment

Soils in Southeast Alaska develop in parent materials originating from a variety of geological or vegetative sources. Parent material is the inorganic or organic matter in which soils develop, and includes volcanic ash, glacial deposits, colluvium, stream and uplifted marine sediments, rock, and deposits of decomposed plant materials. Soils are commonly divided on the basis of their parent material. Both mineral and organic soils occur extensively within the Tongass, where over 100 different kinds of soils have been identified. Soils cover 84 percent of the inventoried land surface area of the Tongass; the remainder consists of ice, exposed bedrock, and bodies of water.

From a resource management perspective, soil productivity - that is, a soil's ability to support vegetative growth - and the potential loss of soils or off-site effects from erosion and landslides are the principle concerns. The productivity of soils directly or indirectly affects the productivity of other forest resources. Tree growth, wildlife and fish habitat quality, and recreation uses and potentials are in part dependent on the quality of the soils. In Southeast Alaska, soil productivity, in terms of tree growth, is high on well drained soils, and decreases as latitude and elevation increase and as drainage becomes poorer.

Soil, or site, productivity is generally measured by the rate of biomass accumulation, and site index is commonly used to give a relative indication of this productivity. Site index is determined by the height of dominant trees at a specified age. The site index tables or curves available for use in Southeast Alaska were developed from trees in even-aged stands, not the uneven-aged or old-growth stands which predominate here, and consequently there are few satisfactory sites for determining site index. Alternatively, soil productivity can be estimated from the characteristics of individual soil types. The principal characteristics are soil depth, drainage, and coarse fragment content.

Soil erosion in the form of gully, sheet and rill erosion is a minor occurrence under natural, undisturbed conditions in Southeast Alaska, because the thick surface duff layers that cover the mineral soils protect them from surface erosion. Mineral soils can be disturbed and exposed either by natural causes, such as landslides and blowdown, or management activities, such as timber harvest and road construction. Surface erosion can become active once the duff layer is removed and until revegetation occurs. Maximum sediment production occurs within the first five years after exposure, returning to background levels in approximately ten years as the vegetation re-grows.

Landslides, both naturally-occurring and human-caused, dominate soil movement processes on steep forest lands in Southeast Alaska. Landslides deliver eroded material to streams more quickly, and in greater quantity, than surface erosion. Landslides can seriously retard soil productivity for forest regeneration on slopes by removing the soil mantle down to bedrock or glacial till. It can take between 50 to 100 years for the nitrogen and organic soil layers to be rebuilt in these landslide areas. Debris deposited on lower slopes and valley bottoms may improve site productivity locally because of incorporation of organic nutrients and improved drainage. Regeneration at such sites is rapid.

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Landslides are thought to be an important natural process by which fish habitat structures and stream substrates are replenished. Sediments and Large Woody Debris, including gravels, are deposited in stream headwater areas. The sediments and wood are then transported through the stream system during high flow periods. Many of the gravels become available as fish spawning habitat. The large wood forms structures for hiding and resting. The frequency of delivery and quantity of the material delivered will determine the effect (either positive or negative) landslides will have on stream channels and fish habitat. It is generally though that increased frequency of slides and quantity of material delivered, above the natural range of occurrence, moves the streams out of equilibrium and degrades fish habitat.

A recent study of landslides occurring between 1963 and 1983 (Swanston, 1989) in Southeast Alaska showed that roughly ten percent (118) happened in clearcut harvest areas or were directly associated with timber harvesting, whereas roughly 90 percent (1,277) happened in unlogged areas. On a per-acre basis, however, landslides occurred in clearcut areas about three times as frequently as in unlogged areas. Landslides in unlogged areas appear to be larger and longer than those in logged areas. Of the 1,277 landslides occurring on unlogged areas, 37 affected fish streams, while 7 of the 118 landslides occurring on logged areas had an effect.

Soils

Environmental Consequences

Forest management activities can cause soil erosion and subsequent loss of site productivity through the exposure of mineral soil, alteration of subsurface drainage, and the concentration of soil and rock material at unstable sites. The management activities that have the greatest potential to affect soil erosion, including sheet, rill, gully or mass movement erosion, are timber harvest-associated activities such as road and log-landing construction, rock pit development, and some yarding methods.

Due to the considerable amount of vegetative groundcover remaining on the harvest units during and following timber harvest, erosion from these areas is usually small. However, with inappropriate practices, water-caused soil erosion can occur, especially where management activities have exposed extensive areas of mineral soils or where cable or shovel yarding has caused trenches which can concentrate water flow. Wind erosion is practically non-existent on harvest units. Blowdown (or "windthrow") can increase along the edges of harvest units, and this may expose mineral soil. Blowdown increases the potential for soil erosion, and may increase the potential for landslides.

Preliminary information suggests that blowdown or windthrow has a positive effect on soil productivity through the periodic mixing of the soil horizons (horizontal soil layers). In the absence of windthrow nutrients tend to accumulate in the organic soil horizons, where they become immobilized (not moving down into the inorganic layers). Over time this may lead to nutrient deficiencies (Bormann et al., in press). Windthrow, and disturbances that mimic windthrow, counter this tendency by overturning and mixing the soil horizons and re-mobilizing the nutrients.

Therefore clearcut logging, and successive harvests ("rotations") without soil disturbance by windthrow, is thought to cause a site to become progressively less productive. Alternative harvest practices (uneven-aged and two-aged management), and longer harvest rotations, are more likely to maintain soil productivity as blowdown of single trees or clumps occurs. Alternatives 2, 7, 9 and 11 all use even-aged, short-rotation harvesting, and are most likely to lead to decreasing soil productivity over time. Alternatives 1, 4 and 5 use primarily uneven-aged management and/or longer rotations, and would best maintain soil productivity relative to blowdown frequency. Alternatives 3, 6 and 10 use two-aged management with shorter rotations, and thus fall somewhere in between the extremes.

Soil productivity decreases from the construction of roads because land is taken "out of production" (removed, covered over, or compacted). Erosion increases from the construction of roads because of the destabilizing effect of cuts, fills, and drainage alterations and the lack of protective vegetation cover on road surfaces and other disturbed areas.

The amount of road construction by alternative is used as a measure of both soil productivity losses and erosion potential. The actual amount of erosion caused by roads is not known or reliably quantifiable, but the differences in acres disturbed by roads is a good indication of how site-specific effects are likely to vary between alternatives. These site-specific effects are evaluated more precisely during project planning, based on the specific conditions found at the project site, and will vary based on soil parent materials, slope, location within a watershed, mass movement hazard, and other factors. Table 3-64 displays "cumulative roaded acres" - the total amount of land area covered by roads at a point in time. "Current roaded acres" is the cumulative amount as of 1995. The amount of new roads estimated to occur by alternative is added to this amount to get the total cumulative roaded acres at the end of decade 1 (10 years after the revised Forest Plan is approved) and at the end of decade 5 (50 years after the Forest Plan is approved).

Compared to either the Forest-wide acreage, or to the acreage within the Moderate and Intensive Development LUD's, the cumulative roaded acres of the alternatives is quite small, and shows little difference between them. This may not be the case within individual watersheds, and a more intensive watershed analysis may be done at the project level.

Table 3-64
Current cumulative roaded acres, and by alternative at the end of decades 1 and 5

Alt.	Current Cumulative Roaded Acres[1]	Cumulative Acres at End of Decade 1	Cumulative Acres at End of Decade 5
1	13,950	13,950	13,950
2	13,950	19,641	29,802
3	13,950	17,055	23,484
4	13,950	15,519	17,838
5	13,950	15,414	17,604
6	13,950	17,664	25,689
7	13,950	21,831	37,443
9	13,950	20,709	33,930
10	13,950	17,574	25,158
11	13,950	17,259	22,599

[1] Total acres covered by roads as of 1995. Roaded acres are calculated based on an average of three acres per one mile of road.

Soil mass movements (such as slumps, earthflows, debris avalanches, and debris flows), constitute the most potentially damaging type of erosion. They are thought to be the major cause of accelerated erosion resulting from resource management activities. Landslides may negatively affect soil quality. They have the potential to affect aquatic habitats both positively and negatively: positively, by providing new sources of woody debris and gravel; negatively, by destroying viable eggs by smothering and bed load overturn and by destruction of habitat elements for fish (pools, riffles, log discharge, etc.).

The landslide frequency information described below is used to predict future landslides, and correlates with the acres of timber harvest projected for each alternative. Estimated landslide occurrence from timber-related management is shown for the first decade, and cumulatively for decades 1-5, in Table 3-65. Additional mitigation measures are now in place that were not used during the period of the landslide study (for instance, riparian standards and guidelines, the removal of extreme hazard soils from the suitable land base, and Best Management Practices). Landslide frequencies are anticipated to actually be lower for each alternative than those displayed in the table. The landslide study was based primarily on clearcut logging; comparability to other logging systems is not known.

Table 3-65
Projected timber harvest acres and estimated increased landslide frequency[(1)]

	Decade 1			Decades 1-5		
		Estimated Landslides			Estimated Landslides	
Alt.	Acres Harvested	Harvest Areas	Non-Harvest Areas[(2)]	Acres Harvested	Harvest Areas	Non-Harvest Areas [(2)]
1	0	0	0	0	0	0
2	147,050	66	22	758,470	339	113
3	95,050	42	14	485,190	217	72
4	62,880	28	9	243,520	109	36
5	45,500	20	7	227,900	102	34
6	115,250	52	17	588,270	263	88
7	202,970	91	30	1,039,520	464	155
9	174,280	78	26	898,930	401	134
10	111,680	50	17	570,420	255	85
11	85,710	38	13	447,410	200	67

[1] Based on an average of one landslide for every 2,240 acres of timber harvesting. See text for explanation.
[2] Estimated number of natural landslides expected from similar landbase with no timber harvest activities. Alternative 1 has no acres scheduled for timber harvesting.

Mitigation

Forest-wide standards and guidelines for the soils resource are used in all alternatives (see revised Forest Plan, Chapter 4), and will apply to all site-specific projects. Forest-wide standards and guidelines are followed to mitigate the effects of management activities. They are designed to minimize accelerated soil erosion and maintain long-term soil productivity. They include soil conservation practices and incorporate the applicable Best Management Practices (Bmp's) (see Appendix C of the Forest Plan). Annual monitoring of Bmp's helps ensure that water quality goals, and standards and guidelines, are met during project implementation (see Forest Plan, Chapter 6).

Special Interest Areas

Affected Environment

Current Situation

Special Interest Areas are areas possessing unique or unusual scenic, historic, prehistoric, scientific, natural or other characteristics. The objective of designating and managing such areas is to protect their unique values and, where appropriate, to foster public use and enjoyment of these areas. Special Interest Areas may be designated as scenic, recreation, historic, archaeological, geological, botanical, zoological or paleontological areas. Special Interest Areas differ from Research Natural Areas in that management may promote public use as well as scientific study.

Special Interest Area designations are intended to maintain natural to near-natural conditions in most cases; the Recreation Area designation may include developed facilities within a natural or near-natural setting. The resources contained within these areas are not available for development, except for public facilities designed to allow recreation use while protecting the values of the area, or for interpretation and scientific study. Each area may require unique management direction, determined through individualized study and planning. Special Interest Areas may be withdrawn from mineral entry. The Land Use Designation for Special Interest Areas applies to all the designated areas.

Seven Special Interest Areas have been previously designated within the Tongass National Forest. These are:

- Mendenhall Glacier Recreation Area (5,791 acres)
- Ward Lake Recreation Area (440 acres)
- Walker Cove-Rudyerd Bay Scenic Area (93,540 acres)
- Admiralty Lakes Recreation Area (8,710 acres)
- New Eddystone Rock Geological Area (1 acre)
- Hubbard Glacier Geological Area (46,000 acres)
- Tracy Arm-Fords Terror Scenic Area (283,000 acres)

The Tongass also contains a small portion of the five-acre Fort Durham National Historic Landmark (most of which is on private land).

Three of the existing Special Interest Areas were originally designated to recognize and protect scenic and recreation values associated with their unique natural settings. Since these designations, the three areas have been included within Wildernesses and/or National Monuments. They are:

- Walker Cove-Rudyerd Bay (Misty Fiords National Monument and Wilderness)
- Admiralty Lakes (Admiralty Island National Monument and Kootznoowoo Wilderness)
- Tracy Arm-Fords Terror (Tracy Arm-Fords Terror Wilderness)

Since the National Monument and Wilderness designations recognize and protect the same values for which the areas were originally designated, the Special Interest Area designation may have become redundant, and the possibility of declassifying these areas as Special Interest Areas is being explored by the Forest Service. No proposals for declassification are being made at this time.

Special Interest Areas are not available for timber harvest, and roads would be allowed only if they are compatible with the interpretive goals of a particular area. Other restrictions may be imposed on a case-by-case basis to protect an area's unique values. These could include closures to off highway (or off-road) vehicle (OHV) use, and withdrawals from mineral entry. Currently, the Mendenhall Glacier and Ward Lake Recreation Areas are withdrawn from mineral entry. The need for such restrictions for newly designated, or expanded, areas may be determined during Forest Plan implementation.

Quite recently the Pack Creek Research Natural Area located on Admiralty Island has been proposed for declassification, to be replaced by a similar area elsewhere on Admiralty Island (see Research Natural Areas). Part of the proposal is to continue management of Pack Creek as a Special Interest Area. The area, expanded to 61,000 acres to include the Pack Creek, Swan Creek, and Windfall Creek watersheds, and Swan and Windfall Islands, will be designated the Pack Creek Zoological Area (effective with the signing of the Record of Decision for the revised Forest Plan and approval of the RNA declassification by the Chief, Forest Service) in recognition of the brown bear population.

Because this area is currently under RNA and Wilderness National Monument management, changing the designation to an SIA (which is proposed for all alternatives) will have essentially no effect. For the purposes of this analysis, Pack Creek can be considered an existing Special Interest Area. A description of the expanded area is included in Appendix F.

Potential Special Interest Areas

An analysis of areas suggested in public comments or identified internally has led to a list of sixteen potential Special Interest Areas. Following are brief descriptions of these areas. Appendix F includes more detailed descriptions of each area, and a general location map.

Arena Cove/Cape Felix Geological Area

This 9,465 acre area is located on the south side of Suemez Island, to the southwest of the Prince of Wales Island town of Craig. It includes volcanic rocks and formations, including a 2,145-foot volcanic peak whose cliffs and scree (volcanic debris) slopes descend dramatically seaward to Cape Felix. The area was possibly used as a prehistoric source of obsidian. Arena Cove is a popular recreation area with local residents, as well as an important subsistence bay.

Bailey Bay Hot Springs Recreation Area

Bailey Bay is located on the upper portion of the Cleveland Peninsula, on the north side of Behm Canal. A trail leads 2.2 miles to the hot springs which have not been altered significantly for recreation use (a rarity in Southeast Alaska), although there is a shelter at the site. The springs have the highest surface temperature of any known springs in Southeast Alaska, and represent a good opportunity for study of hot springs flora. The size of the proposed Special Interest Area is 3,510 acres.

Blind Slough Recreation Area

This 8,150 acre area is located on Mitkof Island south of Petersburg. The area has an ecosystem unique to Southeast Alaska, with a combination of alpine, estuary, wetland and marsh habitats that provide for a rich and diverse bird population. It also has several popular developed recreation sites and offers many recreation opportunities in a setting of outstanding scenery, with 3,300-foot Crystal Mountain the dominant feature. This was proposed in the Supplement as the Blind Slough Scenic and Zoological Area.

Blue River Lava Flow Geological Area

Blue River flows into the Unuk River in the northernmost corner of Misty Fiords National Monument. This 13,520 acre area includes the remains of a lava flow which moved down the Lava Fork and Blue River valleys (starting from inside Canada), creating Blue Lake and temporarily damming the Unuk River (which has since carved a channel through the lava). The area is rich in volcanic history, and the flow is the youngest known in Southeast Alaska. It offers excellent opportunities for studying weathering and plant succession, and may also possess a significant cave resource.

Clear River Zoological Area

This 11,530 acre area is located on central Baranof Island. It includes an alpine/subalpine ecosystem with a high-density mountain goat population, and a unique estuary where a glacial and a non-glacial river converge. Since the mountain goat population is an introduced one, the area offers excellent opportunities for research.

Duke Island Zoological Area

Duke Island, south of Ketchikan, has a unique topography, with many potholes that rarely freeze in the winter. It is extensively used by wintering waterfowl, including trumpeter swans. Duke and the surrounding islands, together totaling 44,650 acres, are also used by marine mammals as haulouts.

Falls Creek Windthrow Botanical Area

This 820 acre even-aged stand of spruce and hemlock, located on Mitkof Island, resulted from a catastrophic windthrow event approximately 200 years ago. The soils are highly productive, and the area represents a good opportunity for study of an unmanaged second-growth forest.

Fish Creek Hot Springs Recreation Area

This 100 acre hot springs area is located on Baranof Island north of Sitka and is used by local residents. Recreation facilities and better access could improve the recreation use and help protect the integrity of the springs.

Glossary

Karst Areas Geological Area

Twelve separate areas with significant cave resources, totaling about 13,635 acres, make up this Special Interest Area. The areas are located on north Prince of Wales Island (four sites near or including Mount Calder, and El Capitan, Perue and North Perue Peaks) and on northwest Dall Island (eight sites). "Karsts" are limestone areas in which erosion has created fissures, sinkholes, underground streams and caves. Recent surveys of the cave resource on north Prince of Wales Island have yielded 30 mapped caves so far (20 of which are within the Special Interest Area) including the deepest known natural pit in the United States (625 feet total depth). The Dall Island karst areas have not yet been surveyed.

Additional acreage (4,890 acres) in the north Prince of Wales Island portion of this area has been added since the Revised Supplement. This expanded area is only shown on the Alternative 11 map.

Keku Islets Geological and Scenic Area

The Keku Islets are located just off the northeast shore of Kuiu Island. The Special Interest Area, including a small portion of Kuiu Island at the tip of Saginaw Bay, comprises approximately 2,300 acres. The islands are rich in Native Alaskan history and have an interesting geology, with many limestone formations and caves. The islands provide safe anchorages and have good recreation potential.

Mt. Edgecumbe Geological Area

Mt. Edgecumbe, an extinct volcano, is located on the southern half of Kruzof Island, across the bay from Sitka. Volcanic activity has occurred since the last ice age and spanned several thousand years, leaving South Kruzof Island with many unique volcanic formations. South Kruzof is a popular recreation area and Mt. Edgecumbe an outstanding scenic attraction. The Special Interest Area would include all of south Kruzof Island, an area of 49,050 acres.

North Hamilton River Red Cedar Cultural and Botanical Area

This 80-acre stand of trees, with an unusually high proportion of red cedar for this latitude, is located on Kupreanof Island southeast of Kake. Native Alaskans use this cedar for woodcarving and other cultural and subsistence uses. The proposed Special Interest Area would be managed for the continuation of these uses.

Patterson Glacier Geological and Botanical Area

The 13,900-acre Patterson Glacier area is located on the mainland, southeast of Thomas Bay and northeast of Petersburg. The glacial history of the area includes outstanding examples of plant succession (from bare ground to old growth) within a short horizontal distance, and other interesting glacial-related features. Many opportunities for study of natural phenomena exist here.

Pike Lakes Recreation Area

This 2,340 acre area located east of Yakutat has ecological features that make it unique from the surrounding Yakutat Forelands. It is the only portion of the Forelands area to escape the most recent period of glaciation. The Pike Lakes area contains many excellent fishing lakes, and has the only known natural population of northern pike in Southeast Alaska. These particular northern pike are a sensitive species.

Soda Springs Geological Area

Soda Springs is an 3,515 acre area located at the head of Soda Bay near Hydaburg on Prince of Wales Island. It contains a number of carbonated springs with unique tufa (porous rock) deposits. Local residents collect the carbonated water for drinking.

Ward Lake Recreation Area (expansion)

This is a proposed expansion of the existing Ward Lake Recreation Area, located just north of Ketchikan. The existing area of 440 acres, which includes three campgrounds and Ward Lake, would be expanded to 7,535 acres. The expansion would include other existing recreation developments (several trails and a campground) and several lakes with additional recreation potential. Recreation use of the Ward Lake area is substantial and increasing.

Special Interest Areas

Environmental Consequences

Existing Special Interest Areas will be protected from the effects of adjacent management activities under all alternatives. No adverse effects on existing areas are anticipated.

All 16 potential Special Interest Areas are recommended for classification under Alternatives 1-6, 10 and 11. Upon approval of the final revised Forest Plan, these areas will be managed under the Special Interest Areas Land Use Designation. Their unique features will be preserved, and opportunities for public and scientific use maintained. No areas are recommended under Alternative 9, and under Alternative 7 two areas (Blue River and Patterson Glacier) are recommended for classification. Table 3-66 shows the Land Use Designation grouping that each area would be allocated to under these two alternatives.

Table 3-66
Potential Special Interest Area Allocations[1] and Suitable Acres

Potential Special Interest Area	Land Use Designation Grouping Alternative 9	Land Use Designation Grouping Alternative 7	Suitable Acres[2]
Arena Cove/Cape Felix	Intensive	Intensive	4,060
Bailey Bay Hot Springs	Natural	Natural	320
Blind Slough	Moderate	Moderate/Intensive	2,200
Blue River Lava Flow	Wilderness	Wilderness	0
Clear River	Intensive	Intensive	1,040
Duke Island	Natural	Natural	0
Falls Creek Windthrow	Intensive	Moderate	620
Fish Creek Hot Springs	Moderate	Intensive	0
Karst Areas	Intensive	Intensive	4,980
Keku Islets	Intensive	Intensive	720
Mt. Edgecumbe	Moderate	Moderate	4,870
N. Hamilton River Cedar	Intensive	Intensive	80
Patterson Glacier	Natural	Natural	180
Pike Lakes	Intensive	Intensive	300
Soda Springs	Intensive	Natural/Intensive	700
Ward Lake Expansion	Natural	Natural/Moderate	1,300

1 All areas are allocated to the Special Interest Area LUD in Alternatives 1-6, 10 and 11.
2 Tentatively suitable timberlands (Revision Data Base, Query 1004, April 1991).

Areas allocated to natural setting or Wilderness LUD's would retain their unique values; these include Patterson Glacier, Bailey Bay, Blue River, Duke Island, and most of the Ward Lake Expansion. Areas allocated to moderate or intensive development could over time lose the values for which they have been identified, as timber harvest and associated road construction occurs. These areas are discussed briefly here:

Arena Cove/Cape Felix. Since they are not associated with suitable timberlands, the area's unique geological features are not likely to be affected by intensive development, but the scenic and recreational qualities of the area may be adversely affected.

Blind Slough. Recreational and scenic values would be affected by timber harvest near recreation areas or along the road system. Visual resource objectives would moderate this effect, but less in Alternative 7, where about half the area is under the Timber Production LUD. Opportunities for additional recreation developments could be lost. The zoological features (unique ecosystem) are largely associated with lands unsuitable for development, and may not be affected.

Clear River. Suitable timberlands in the easternmost portion of the area may be harvested (about 1/10 of the area), but overall the natural character and unique values would be undisturbed.

Falls Creek Windthrow. The area is currently being used to study growth and yield in second-growth stands, and is included in an interpretive road map for Mitkof Island. No timber harvest is scheduled for the next decade.

Fish Creek Hot Springs. The hot springs are a popular recreation use area and would be protected from any harvest activities. The surrounding scenery and setting could change over time.

Karst Areas. These areas contain a higher percentage of suitable timberland (averaging about 40 percent) than the other large proposed Special Interest Areas, and are assigned the Timber Production LUD in both Alternatives 7 and 9. Areas adjacent to the known caves are likely to be harvested, but the caves themselves (and some associated features under Alternative 7) would be protected through Forest-wide standards and guidelines for karst and caves (see Appendix I).

Keku Islets. The scenic and recreational features of these narrow islands and mainland strip could be altered significantly by timber harvest.

Mt. Edgecumbe. Moderate development of this area could mean harvest of a relatively small amount of suitable land (about 12 percent). Visual resource requirements would help maintain the scenic and recreational values, and the unique geological features would not be affected.

North Hamilton River Cedar. The cedar stands are important cultural features. The Heritage Resource Forest-wide standards and guidelines (see Forest Plan, Chapter 4) would apply if timber harvest were scheduled for this area. Stand integrity could be affected by adjacent harvest or road building.

Pike Lakes. This area contains very little suitable timberland. The recreational values associated with the lakes could be affected by modifications to the surrounding setting. The sensitive fish population would be unaffected.

Soda Springs. The core of the area would be undisturbed under Alternative 7 (receiving the Remote Recreation LUD), but surrounding areas, and the entire area under Alternative 9, could have timber harvest and road construction. The unique geological features are not likely to be affected under either alternative, but recreation potential could be reduced.

Classifying some or all of the Special Interest Areas could limit or adversely affect resource opportunities such as timber harvesting or, in some cases, mineral development. The two areas recommended under Alternative 7 are not likely to cause any such effects. Under Alternatives 1-6, 10 and 11, the majority of the areas would be recommended for withdrawal from mineral entry (not included would be Clear River, Fish Creek, Mt. Edgecumbe, and Pike Lakes); none are known to have mineral reserves of high development potential. About half the areas would be closed to Off-Highway Vehicle (OHV) use, but areas currently popular for OHV use (Mt. Edgecumbe, Patterson Glacier and Ward Lake) would not be closed. Approximately 20,750 acres of tentatively suitable timberlands would not be available for timber management.

Subsistence

Affected Environment

Subsistence hunting, fishing, trapping and gathering activities represent a major focus of life for many Southeast Alaskan residents. Some individuals participate in subsistence activities to supplement personal income and provide needed food. Others pursue subsistence activities to perpetuate cultural customs and traditions. Still others participate in subsistence activities for reasons unconnected with income or tradition. For all these individuals, subsistence is a lifestyle reflecting deeply held attitudes, values and beliefs.

Within the context of Southeast Alaska's highly seasonal and cyclical resource-based employment, subsistence harvest of fish and wildlife resources takes on special importance. The use of these resources may play a major role in supplementing cash incomes during periods when the opportunity to participate in the wage economy is either marginal or nonexistent. Due to high prices of commercial products provided through the retail sector of the cash economy, especially in remote communities, the economic role of locally-available fish and game takes on added importance.

The opportunity to participate in subsistence activities reinforces a variety of cultural and related values in both Native and non-Native communities. For example, distribution of fish and wildlife contributes to the cohesion of kinship groups and to community stability through sharing of resources derived through harvest activities. Subsistence resources provide the foundation for Native culture, ranging from the totemic basis of clan divisions, to norms governing the distribution of wealth in potlatch ceremonies, to reinforcement of basic values of respect for the earth and its resources. Participating in subsistence activities contributes to the self-reliance, independence, and ability to provide for oneself; values that social surveys indicate are important reasons why many non-Native people emigrate to or remain in Southeast Alaska (Alves, 1979).

While there are a variety of cultural, popular, and sociological definitions and interpretations of subsistence, Congress addressed this subject in Title VIII of the 1980 Alaska National Interest Lands Conservation Act (ANILCA). Section 803 of ANILCA defines subsistence use as "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands." It also states, in part, that "customary and traditional" subsistence uses of the renewable resources "shall be the priority consumptive uses of all such resources on the public lands of Alaska."

Historic Subsistence Use

Native Cultural Ties. Thousands of years ago, Alaska was settled by people seeking abundant fish and wildlife resources. Villages and camps were established where access to these wild resources was dependable and convenient. Until relatively modern times, most of the necessities of life came from the land and its natural products, or from trade with adjacent neighbors. Rules governing life among villagers were derived from a combination of cultural, traditional, and spiritual beliefs, which developed over long periods of time (ADF&G, Historic Methods for Harvesting Non-Commercial Salmon in Southeast Alaska, February 1989).

The introduction of cash by Russian traders beginning in the 1700's signaled change in the subsistence way of life. Cash transactions allowed Native Alaskans to take advantage of technology and provide a buffer against periods of low food supply. Following World War II, and more precisely at the time of statehood around 1959, jobs opened up and many rural Alaskans began to experience a cash economy. Today, many subsistence users earn wages sometime during the year.

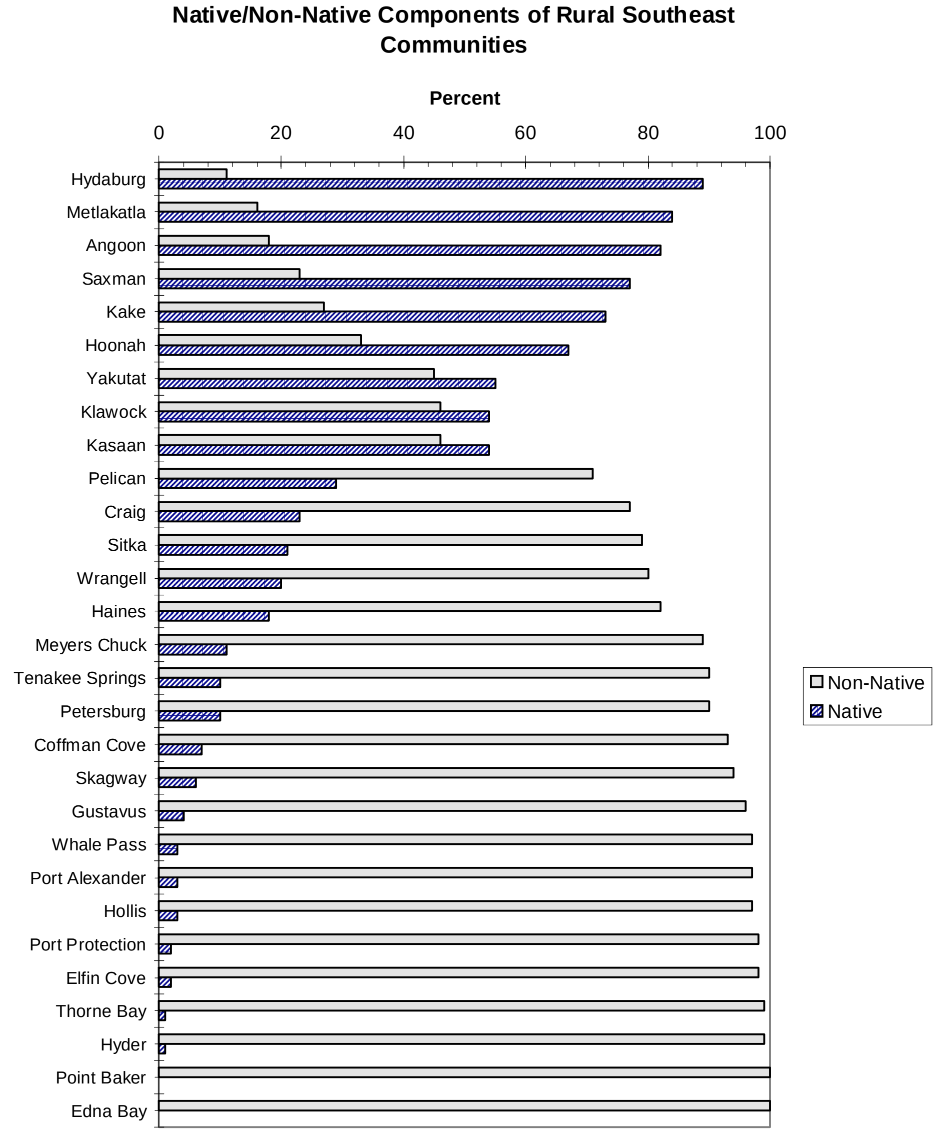
Legal challenges, increased competition from other users of the National Forest, introduction of other cultures and races into the one-time predominantly Native societies, alternative food sources, transportation improvements, and increases in jobs and income have prompted Native residents of Southeast Alaska to actively protect subsistence rights of Alaskan Natives. The Native Alaskan population represents 23 percent of the total population of Southeast's 30 rural communities (Figure 3-7). The importance of subsistence rights is of paramount concern to this segment of the region. "Survival of the hunting and fishing rights is the most vital link to the survival of the State's Native people and their cultures (Mallot, 1989)."

The continuation of Native cultures and customs is increasingly difficult as dependency on natural resources decreases. As with Native Americans of the contiguous 48 states, a close bond between natural resources of the land and cultural commitments of the people provides a continuance of the culture. With the advent of alternative food sources, transportation, education, and other changes, the tie to the land has gradually decreased, threatening the future existence of Native cultures. In Southeast Alaska, with legislation, court proceedings, and alternative supply sources, the Alaska Native is suffering the same loss of bonding to the land. To preserve cultural ties and dependency on the land, the demand for the right to subsist is paramount to Native leaders of Southeast communities.

Native Clan Boundaries. According to Oberg (1973) and others, the basis for property ownership among the Indians of Southeast Alaska was the local clan division. Clan property often consisted of salmon streams, hunting grounds, berry patches, sealing rocks, trapping areas, and other resource hunting and gathering locations. Clan membership, determined by family (matrilineal) descent, established the relationship of an individual to clan property held in common. As Krieger (1927) has observed, the entire territory adjacent to Native communities in Southeast Alaska was portioned out among the resident families or households as hunting, fishing, and berrying grounds. These lands were generally passed down from generation to generation, and the privilege to hunt, fish, or to gather berries belonged only to those individuals having ownership rights under Native law. Permission from the clan exercising property ownership was necessary before members from other clans could "legally" use the land.

Glossary

Figure 3-7


Native/Non-Native Components of Rural Southeast Communities
Percent
0
20
40
60
80
100
Hydaburg
Metlakatla
Angoon
Saxman
Kake
Hoonah
Yakutat
Klawock
Kasaan
Pelican
Craig
Sitka
Wrangell
Haines
Meyers Chuck
Tenakee Springs
Petersburg
Coffman Cove
Skagway
Gustavus
Whale Pass
Port Alexander
Hollis
Port Protection
Elfin Cove
Thorne Bay
Hyder
Point Baker
Edna Bay
Non-Native
Native

Beginning in the late 1800's, non-Native migration and institutional development in Southeast Alaska resulted in population increases, establishment of new communities and expansion of existing ones, and boom-and-bust economic cycles based on a variety of resource-extraction activities (Muth, 1989). Clan boundaries and Indian property rights, as well as most other elements of Native culture, were foreign to the culture of the non-Native settlers increasingly populating Southeast Alaska. New settlers, who competed for fish and wildlife resources both for household consumption and for sale in the cash economy, were often unaware of or disregarded the Native culture's traditional clan boundaries. They used whatever lands were available, and competition for resources rose dramatically (Drucker, 1965). Even so, Native customs and laws continued to govern the landownership and use patterns of the indigenous peoples of Southeast Alaska. According to Goldschmitt and Haas (1946):

> "The Natives had a well-defined system of property ownership which was not unlike our own, except that the land was generally held in the name of a clan or house group, with joint usage by such an extended family. Title to land was obtained by inheritance or as legal settlement for damages; it was never bought or sold. It was recorded in the minds of all interested parties by elaborate ceremonials and the distribution of goods among the people (potlatches), which were necessary before land ownership could be recognized. Deeds were sometimes further recorded in the carvings of the famous totem poles." (p. iv)

Goldschmitt and Haas (1946) identified the land-use patterns associated with Native communities that existed in the mid-twentieth century in Southeast Alaska. Comparing these maps with information from the 1987 Tongass Resource Use Cooperative Survey (TRUCS) maps and from village meetings, it appears that hunting and fishing use by Natives in Southeast Alaska is still governed to some extent by traditional Native laws which define who may hunt and fish on which lands. Despite the introduction of technological innovations (such as large, modern boats) that would allow residents of Native communities to range much greater distances than in earlier periods, their use appears to be confined to locations generally conforming to traditional clan landownership boundaries. The distribution of harvest locations for non-Native communities, on the other hand, is often apt to range over greater areas.

While areas used today by Southeast Natives follow to some extent traditional boundaries, further study is needed to determine whether these areas are used simply because of clan boundaries or because this is where subsistence resources are most plentiful. Regardless, Native leaders have expressed the need for legitimizing clan boundaries and providing for subsistence needs of Southeast Alaska's Native villages.

Resource allocation and land management activities should be sensitive to traditional clan boundaries. For example, if the traditional subsistence hunting areas of one clan are prescribed for other uses (such as recreation development and timber harvest), then the clan potentially impacted by the decision may be left with little choice but to either modify subsistence harvest or encroach on the traditional use areas of other clans. Through time, clan-related land use customs may be lost, potentially increasing inter-group conflicts and further eroding the basis of Native culture in Southeast Alaska.

Current Subsistence Use

Who Subsistence Users Are. There is now a discrepancy between how federal law and state law defines who subsistence users are.

The federal subsistence law clearly states that only rural Alaska residents qualify for subsistence hunting and fishing on federal lands. Alaska residents living in urban areas can harvest under sport, personal use, or commercial regulations, but not under subsistence regulations. The rural preference is contained in ANILCA.

Until December 1989, the State's subsistence law, like federal law, permitted only rural residents to qualify for subsistence hunting and fishing. However, the Alaska Supreme Court ruled in McDowell v. State of Alaska that the rural provision was not permissible under the Alaska Constitution. Consequently, every Alaska resident qualifies as a subsistence user on State lands.

Southeast Alaska has a population of approximately 74,500 people. Most of this population is located in 31 established communities, with Juneau and Ketchikan accounting for approximately 60 percent of the Regional population. Juneau and Ketchikan, the only two designated urban communities in Southeast, do not qualify for subsistence use on federal, public lands under current federal laws and regulations. Sitka, Petersburg, and Wrangell account for 22 percent of the Region's total population. Most of the remaining 18 percent of Southeast Alaska's population live in 27 small communities throughout the Region (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

In addition to permanent communities, there are numerous floating and land-based logging camps across the Tongass National Forest that are large enough and have existed long enough to have an effect on local uses of fish and wildlife. Camp residents appear to be split between Alaska residents and non-residents with some leaving Alaska for the winter months when the working season is over (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

A relatively small number of Southeast residents live at remote isolated locations. These include people living at homesites throughout Southeast, at summer fishing sites along the outer coast, tree thinners camped near areas where they have Forest Service contracts, trappers, people living on floathouses and on fishing boats. This diverse group is typically transient, generally has very low cash income and is closely tied to non-commercial harvest of fish, game, and other renewable natural resources.

As in other parts of Alaska, Southeast's population grew with expansion of government services following the oil boom. In the late 1980s the population decreased, but is now increasing again. A number of new communities are evolving around state land selections or timber harvesting activities. Edna Bay, Coffman Cove, North Whale Pass, Thorne Bay and other small Prince of Wales Island communities are examples.

Economy

Subsistence use of fish and wildlife continues to be an important component of the economies of Southeast Alaska communities. In Native communities, harvest and use of wild resources supported the subsistence-based economy that predated the introduction of cash income. In the modern era, beginning in the late 1700s, the economies of Native communities have undergone a progressive transformation, incorporating cash income into the subsistence-based system. Southeast Alaska communities settled primarily by non-Native immigrants have also depended on a mix of subsistence use of wild resources and cash income.

Cash income in most Southeast rural communities is limited and intermittent; this cash income frequently supports the purchase of fuel and equipment that are part of subsistence harvest technology. Subsistence harvests have been found to fill essential food needs in most rural communities in the region. These harvests are also customarily shared among community residents and between members of different communities. Some subsistence products are traded and bartered within the region. Subsistence harvests are not geared toward market sale or accumulated profit. A mixed subsistence-market economy in which subsistence harvests and cash income are complementary characterizes the economies of most of the region's rural communities (ADFG, Subsistence Resource Use Patterns in SE Alaska, 1994).

Amount of Subsistence Harvest. Eighty-five percent of rural Southeast households harvest subsistence food (Kruse and Muth, 1990). In 1987, half of all households (51 percent) reported harvesting more than 80 pounds of edible subsistence product per capita. A quarter of all households harvest more than 250 pounds per capita (Kruse, 1989).

Figure 3-8 identifies individual community harvest of subsistence resources in terms of fish and game. Almost one-third of households obtain at least half of their food from their own harvest activities. About 40 percent of all households get at least a quarter of their food from subsistence harvest activities (Kruse, 1989).

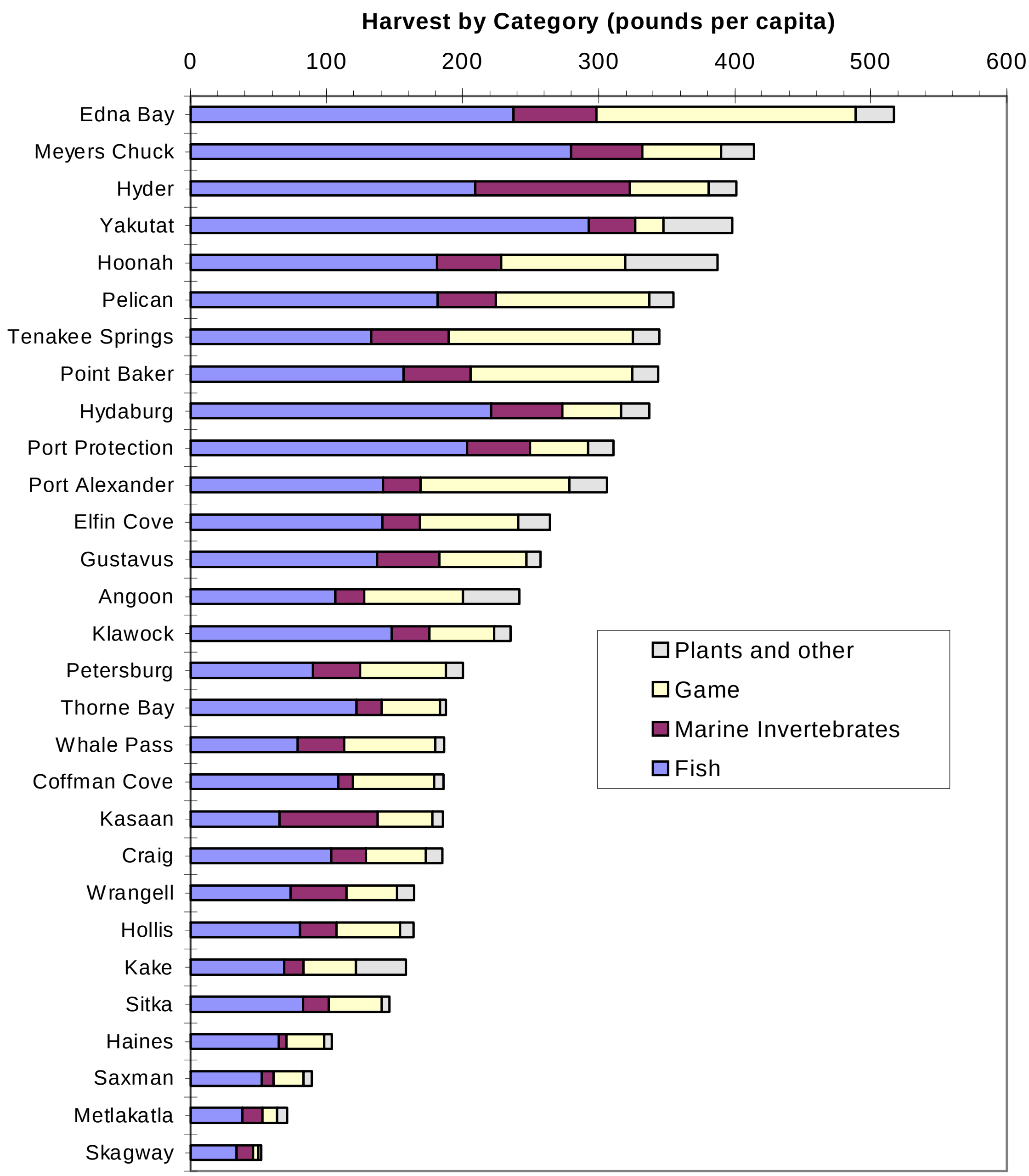
Residents not only use subsistence products for much of their food; more than half of all households (61 percent) harvested at least four different types of fish, wildlife, and/or plant resources in 1987. One in ten households harvested more than 10 different types of resources (Kruse, 1989).

The use of subsistence resources in Southeast cannot be explained simply in terms of household harvest and consumption. Most subsistence harvesters give at least part of their harvest away. In 1987, a third of all households in rural Southeast Alaska gave away at least four different types of resources. Approximately two-thirds of the households reported that they gave no resources away and did not harvest any resources themselves.

What Subsistence Users Harvest. In terms of useable resources provided by the natural environment, Southeast Alaska is a land of abundance. In all, TRUCS (USFS, Tongass Resource Use Cooperative Survey, 1988) found 42 different resource categories harvested for personal use. This variety provides opportunities for diverse diets, depending on individual tastes and preferences. The availability of subsistence resources is not uniform throughout Southeast. The uneven distribution

Figure 3-8

Per Capita Fish, Game, Marine Invertebrate, and Plant Harvest of Rural Southeast Communities



Glossary

of subsistence resources may, in part, explain variations in the diversity of harvest activity among rural Southeast's communities. Edna Bay subsistence resource harvesters gather the most diverse number of resources, while residents of Skagway harvest the least. Geographic differences in the richness of the resource base may explain community differences both in the mean per capita harvest and percent of protein from such harvests. In addition to the geographic aspects of the land base, harvest regulations and other sociocultural considerations are also factors that determine levels and diversity of resource harvest (Kruse, 1990). The diversity of resource harvest activities does not appear to vary greatly by size of place, income, length of residence, or ethnicity. Forest-wide, however, there is a slight tendency for households located in small communities, and households with lower incomes, to harvest a greater variety of resources than other households.

Figure 3-9 identifies the resources used by the rural communities of Southeast Alaska. This figure has been developed primarily from the information supplied in the Tongass Resource Use Cooperative Survey. Supplemental information and verification of information supplied from the TRUCS data has been obtained from Alaska Department of Fish and Game, Division of Subsistence, Technical Reports for the communities of Angoon, Haines, Klawock, Kluckwan, Petersburg, Sitka, Skagway, Tenakee Springs, Wrangell and Yakutat. These technical reports provide site-specific detail related to the communities from which information was gathered while the TRUCS information is by community and related Southeast-wide.

Where Subsistence Harvest Occurs. Historically, subsistence use occurred where access to the resources cost less in energy than the resources gathered. Many of the gathering activities occurred in easily-accessed areas. These activities occurred close to settlements where they could be accessed by foot or boat. Over time, as new technology developed, ease of access meant a movement outward into new resource use areas. The motorboat and development of road systems associated with timber harvest activities in Southeast Alaska have had perhaps the greatest influence on subsistence gathering activity. Today, all communities may be accessed by motorized boats or many are tied to interior lands by road systems. As new roads are developed, subsistence use has moved from areas with higher access costs to areas with easily-achieved access.

The traditional household deer hunting areas mapped in Appendix H show that the road systems are extensively used. This is particularly true on Prince of Wales Island. These maps also show that subsistence use is concentrated in close proximity to individual communities and along the beaches.

Each community throughout Southeast Alaska has distinct home ranges with concentrated use occurring in these home ranges. A wide range of use on a less concentrated scale exists outside the normal home range. More than half (54 percent) of all households in rural Southeast Alaska travel a minimum of 11 miles by boat to reach the one reliable deer hunting area that they chose to describe in the Tongass Resource Use Cooperative Survey (Kruse and Muth, 1990). An additional 18 percent of all households also use boats to reach their reliable deer hunting area, but travel shorter distances (10 miles or less) (Kruse and Muth, 1990). Only 15 percent of all households use cars or trucks to travel to most reliable areas (Kruse and Muth, 1990). Thirteen percent use some other form of transportation, such as airplanes, walking, all-terrain vehicles, and the Alaska Marine Highway System (Kruse and Muth, 1990). While the majority of use occurs within about a 15-mile radius of rural communities, nearly all of the forested lands of the Tongass are used to some degree for subsistence deer hunting (ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165). Appendix H displays, by community, the individual Wildlife Analysis Areas where approximately 75 percent of the average annual deer were harvested.

Figure 3-9
Rural Communities Resource Use

Community	Wildlife[2]								Fisheries[3]			Marine Mammals[4]		Plants[5]					
	D	M	MG	B	Wf	Sb	Fb	SG	Sa	Ff	I	H Seal	O M	G	S	B	F	T	R
Angoon	X				X	X			X	X	X	X		x	x	x	x	x	
Coffman Cove	X				X	X	X	X	X	X	X	X		x	x	x	x	x	
Craig	X	X		X	X	X	X	X	X	X	X	X		x	x	x	x	x	
Edna Bay	X	X		X	X	X	X	X	X	X	X		X	x	x	x	x	x	
Elfin Cove	X						X	X	X	X	X			x	x	x	x	x	
Gustavus	X				X	X	X	X	X	X	X			x	x	x	x	x	
Haines	X	X	X	X	X	X	X	X	X	X	X			x	x	x	x	x	
Hollis	X			X	X	X	X	X	X	X	X		X	x	x	x	x	x	
Hoonah	X			X	X	X	X	X	X	X	X	X	X	x	x	x	x	x	x
Hydaburg	X			X	X	X		X	X	X	X	X		x	x	x	x	x	
Hyder		X	X	X	X	X	X	X	X	X	X	X		x	x	x	x	x	
Kake	X				X	X			X	X	X	X		x	x	x	x	x	
Kasaan	X				X	X	X	X	X	X	X	X		x	x	x	x	x	
Klawock	X	X		X	X	X	X	X	X	X	X	X		x	x	x	x	x	
Klukwan	X			X	X	X		X	X	X	X	X		x	x	x	x	x	
Metlakatla	X				X	X	X	X	X	X	X	X	X		x	x	x	x	
Meyers Chuck	X	X			X	X	X	X	X	X	X		X	x	x	x	x	x	
Pelican	X	X			X	X	X	X	X	X	X	X	X	x	x	x	x	x	
Petersburg	X	X		X	X	X	X	X	X	X	X	X	X	x	x	x	x	x	
Point Baker	X			X	X	X		X	X	X	X			x	x	x	x	x	
Port Alexander	X			X	X	X	X	X	X	X	X	X			x	x	x	x	
Port Protection	X			X	X	X	X	X	X	X	X			x	x	x	x	x	
Saxman	X	X			X	X		X	X	X	X	X		x	x	x	x	x	
Sitka	X		X	X	X	X	X	X	X	X	X	X	X	x	x	x	x	x	
Skagway	X		X	X	X	X	X	X	X	X	X			x	x	x	x	x	
Tenakee Springs	X				X	X	X	X	X	X	X	X	X	x	x	x		x	
Thorne Bay	X	X	X	X	X	X	X	X	X	X	X			x	x	x	x	x	
Whale Pass	X	X		X	X	X	X	X	X	X	X	X		x	x	x	x	x	
Wrangell	X	X	X	X	X	X	X	X	X	X	X			x	x	x	x	x	
Yakutat[1]	X	X	X	X	X	X	X	X	X	X	X	X		x	x	x	x	x	

Source: Subsistence Use of Renewable Resources by Rural Southeast Alaska Residents, 8/90

1 Fish and Wildlife Use in Yakutat, Alaska, 5/86

2 Wildlife: D=Deer, M=Moose, MG=Mountain Goat, B=Black Bear (No Brown Bear data collected specific to subsistence use), Wf=Waterfowl, Sb=Seabirds, Fb=Furbearers, and SG=Small Game.

3 Fisheries: Sa=Salmon, Ff=Other Finfish, and I=Invertebrates.

4 Marine Mammals: Hseal=Harbor Seal, OM=Other Mammals

5 Plants: G=Beach Greens, S=Seaweed, B=Berries, F=Firewood, T=Green Timber, and R=Roots (Source: Hanlon v. Barton).

Kruse and Muth (1990) found that nearly one-half of the households harvesting deer mentioned the existence of clearcuts of various ages occurring in presently reliable areas (44 percent), most-often-used areas (48 percent), and areas no longer used (55 percent). They also reported that old-growth forests were mentioned as most reliable by 90 percent of households harvesting deer, were most-often-used areas by 91 percent of households and were areas no longer used by 90 percent of those households harvesting deer.

While Kruse and Muth (1990) could not assume that the differences in physical attributes between current and abandoned deer harvest areas reflect the reason why residents stopped hunting in the abandoned areas, respondents did offer reasons for abandoning certain areas. One-third of all households that ceased hunting in one or more deer harvest area said that they did so because of an absence of deer in the area. One-fifth of all households stopped using an area because there were too many hunters. Likewise, a fifth mentioned that an area was closed to hunting. About one in ten households said that the area was inconvenient to reach, that it had been logged, or that they had no means to get to the area any longer.

Abundance and Distribution

Wildlife. Wildlife populations for deer, moose, mountain goat, black and brown bear, furbearers and small game range from low to high across Southeast. Trends in population levels for all species range from stable to increasing (USDI, Subsistence Management and Use, 3/88).

Sitka black-tailed deer are important subsistence resources for Southeast Alaska's rural residents. In 1987, deer constituted 21 percent of the total pounds of subsistence resource harvested by rural residents with an estimated 11,600 deer being harvested by 3,000 households. Over one-third (37 percent) of all rural households harvested at least one deer (Kruse, 1989).

Deer harvest levels vary substantially by community. Residents of Edna Bay, Port Alexander, Pelican, Tenakee Springs, Hoonah, and Angoon harvested an average of 250 pounds (80 pounds of useable meat per deer) per household in 1987. These communities are in close proximity to prime deer habitats with healthy deer populations. Liberal regulations have allowed relatively high harvest levels. Harvest levels were understandably lower in communities located away from areas of high deer populations (Kruse, 1989).

"Land mammals other than deer" account for only 4 percent of the total harvest of edible subsistence resources. In 1987, at least 30 percent of the households in Edna Bay, North Whale Pass, Thorne Bay, and Meyers Chuck harvested land mammals other than deer. These mammals included moose, black bear, or furbearers (Kruse, 1989).

Expressed in mean pounds, the harvest of land mammals other than deer is highest in Petersburg and Wrangell where moose was harvested by 9 and 7 percent of the households, respectively. Other land mammals were much more likely to be harvested by low income households (Kruse, 1989).

Waterfowl. Waterfowl and seabirds range throughout Southeast Alaska with population fluctuations occurring seasonally as birds migrate from summer to winter feeding grounds. Many areas lack accurate waterfowl population information and population trends are difficult to identify.

In 1987, duck and geese populations which migrate along the Pacific Flyway showed decreases from their ten-year averages; declines appear to be primarily related to overharvest (USDI, Subsistence Management and Use, 3/88).

In rural Southeast Alaska bird harvest constitutes a negligible percentage of the total subsistence harvest with a third or less of the households in all communities except Edna Bay harvesting birds. Although ducks are the most important type of bird harvested, they contributed an average of only four pounds of edible meat per household per year. Households associated with the highest bird harvest levels are high income, white, and residing in Petersburg. These findings suggest that birds may be more culturally important to rural Southeast residents who grew up in areas where waterfowl hunting was a common activity (Kruse, 1989 and ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165).

Marine Mammals. The only marine mammal harvested for its meat by rural Southeast residents is the harbor seal. Harbor seal accounts for only 3 percent of the total subsistence harvest. In 1987, 400 rural Southeast households harvested some 1,900 marine mammals including 1,500 harbor seal. The principal communities involved in the harvest of marine mammals are Angoon, Hoonah, Kake, and Yakutat. In these communities between a quarter and a third of all households harvested harbor seals in 1987 (Kruse, 1989). Although not used as a food resource, Alaska Natives harvest sea otters for subsistence use to create handicrafts for sale and trade.

Salmon. Commercial catches of salmon statewide have been recorded in excess of 100 million fish for the seventh straight year. Between 1978 and 1985, catches for subsistence use increased steadily. (No specific data was available on subsistence harvest during the 1983-84 season). In 1985 commercial fishery users logged the all-time high harvest of 146.7 million fish. This was substantially greater than previous records set during the 1930's when Alaskan waters and streams were unregulated (USDI, Subsistence Management and Use, 3/88).

Harvests of all salmon species constitute 21 percent of the total harvest of subsistence resources. More that 1.2 million pounds of edible salmon were harvested in 1987. More than half of all households in rural Southeast Alaska harvested at least one salmon. Substantial percentages of households in all communities harvested salmon in 1987. Species harvested by the largest percentage of households in the region as a whole were kings (42 percent) and cohos (38 percent). The 508,000 pounds of kings harvested in 1987 account for 42 percent of the total subsistence salmon harvest.

In Southeast, pink salmon are the most abundant species, but sockeye are preferred by subsistence users. Although historically, many of the sockeye salmon habitats in Southeast have been highly productive, sockeye salmon are now in low supply. It is believed that overharvesting through interception by commercial fishermen prevents the salmon from reaching spawning grounds and subsistence use areas (USDI, Subsistence Management and Use, 3/88).

Numbers of chinook salmon are currently depressed all along the Southeast coast. The major chinook spawning streams are large bodies of water with high turbidity. This prevents accurate escapement counts and makes management for maximum sustained yield difficult (USDI, Subsistence Management and Use, 3/88).

Other Finfish. Finfish other than salmon account for 24 percent of the total subsistence harvest by rural Southeast residents. Sixty-one percent of all households harvest other finfish in 1987; over half of the households in rural

Glossary

communities except Skagway and Metlakatla harvested at least some finfish other than salmon (Kruse, 1989).

Found throughout Southeast Alaska finfish other than salmon are comprised of halibut, cod, flounder, sole, rockfish, herring, steelhead, trout and Dolly Varden char. Halibut is the most commonly harvested finfish other than salmon with 48 percent of all households catching one or more halibut in 1987. Like salmon, halibut is a widely exchanged resource. A third of all rural Southeast households gave away at least some halibut in 1987 and half of all households received at least some halibut. Communities in which households harvest relatively high amounts of halibut include Meyers Chuck, Edna Bay, Pelican, Gustavus, and Yakutat (Kruse, 1989).

Invertebrates. Invertebrates constitute 16 percent of the total subsistence harvest in Southeast. Almost half of the rural Southeast residents harvested invertebrates in 1987. The percentage of households harvesting invertebrates varied from 10 percent in Kluckwan to 100 percent in Kasaan . The species harvested by the largest percentage of residents are clams and cockles (32 percent) and dungeness crab (28 percent). Another notable invertebrate resource is shrimp which is harvested by at least a third of all households in Edna Bay, North Whale Pass, Yakutat, Hollis, Meyers Chuck, Elfin Cove, and Hyder. Also important on a regional basis are abalone, gumboot, herring eggs, king crab, tanner crab and octopus (Kruse, 1989). All species of invertebrates range throughout the waters of Southeast Alaska. Abalone is available on the outer coasts. Except in areas of overharvest, the invertebrate resource appears to be abundant with subsistence harvest being high (USDI, Subsistence Management and Use, 3/88).

Sea cucumber is an important resource in at least 13 communities. Communities in which at least 20 percent of all households harvested sea cucumber include: Hollis, Edna Bay, Point Baker, Thorne Bay, Kasaan, and Meyers Chuck. Sea urchins are important to Yakutat and Edna Bay. Scallops are harvested by at least 10 percent of all households in Edna Bay, Meyers Chuck, Craig, and Hollis. On the average, long-term Native households harvest more invertebrates than other households (Kruse, 1989).

Plants. Over half of all rural Southeast Alaska households harvest edible plants. Plant products account for only three percent of the total subsistence harvest. Berries of various types make up the largest component of the plant harvest. More edible plants are harvested by the residents of smaller communities, by low income households, and by Natives (Kruse, 1989). People also harvest parts of plants such as spruce roots and cedar bark for handicraft projects.

Firewood. Firewood is also an important component of the plant resources. Forty-six percent of all rural Southeast Alaska households harvested an estimated total of 26,000 cords of firewood in 1987 averaging three cords per household. Firewood is also a shared resource, with 13 percent of all households giving firewood away and 10 percent of all households receiving firewood (Kruse, 1989).

Access

Many Southeast communities are accessible only by air and water. Only Skagway, Haines, and Hyder have access to the continent (Canada) by road, with many other communities served by the Alaska Marine Highway System.

Glossary

Road building, a byproduct of timber harvesting and to a much lesser extent mining, is an important agent of change in Southeast. These road networks provide greater access to areas previously unconnected and can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition. On Prince of Wales Island, for example, areas that have become road-connected are now more easily reached through the Marine Highway System, thus providing greater access from Ketchikan, one of the most populated cities in the region. While road systems tend to bring more people into an area, they also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest (USDI, Subsistence Management and Use, 1988)

Southeast Alaska is comprised of isolated islands unconnected by road systems. However, with the transportation means available (floatplanes, Marine Highway System, automobiles, boats), Southeast residents are very mobile in their subsistence resource use activities. Wrangell, the fifth largest community in Southeast, has documented their subsistence gathering from the southern tip of Prince of Wales Island to Yakutat, covering most of the islands in between (Kruse and Muth, 1989).

Competition

Southeast Alaska is a land of abundant resources, however, all the resources are not evenly distributed across the Tongass National Forest. Where the resources are confined to island groups or river systems, where access is costly or nonexistent, use of the resources is low. Where the resource is abundant, and a community is present but access by other communities is costly, the resource tends to be used primarily by the community which resides in the area. Where resources are abundant and access is available to local and other communities of Southeast, competition for the resources may exist (USFS, Tongass Resource Use Cooperative Survey, 1988).

Increased competition may result when less expensive access to the area or within the area is provided. Such is the case when road systems are established to local communities. When areas historically not used for subsistence purposes are made available due to easier, more cost-effective access, the new area then tends to be used. When communities with road access to abundant resources are connected to the Alaska Marine Highway System or to commercial air services, competition for the resources may be generated from outside communities with lower abundance of the same resource.

Examples of the effect of ease of access are readily available in Southeast. Chichagof Island, Prince of Wales Island, and the Yakutat Forelands at one time were isolated portions of the Tongass with limited use from communities in the vicinity. Today, road construction, primarily due to timber harvest activities, has created vast areas in each location readily available from the local community. Access provided by the Alaska Marine Highway System and small commuter planes to Chichagof and Prince of Wales Islands allows easy access by off-island communities. The Yakutat Forelands have been made readily available from the access provided by commercial jet service to the community of Yakutat. Access to the Yakutat Forelands is one of the more popular contacts of the lower forty-eight to Alaska's abundant fisheries and brown bear populations.

Tenakee Springs, although not having a vehicle off-loading ramp at its ferry terminal, receives increased use of its roaded connections in the Indian River drainage. This use is primarily in the form of foot traffic, but has in the past increased due to all-terrain vehicle activity. Tenakee has easy access to other roaded areas (Kadashan/Corner Bay) with access by small boat. Being close to the urban-designated city of Juneau, increased competition for resources has occurred (USFS, Alaska Lumber and Pulp Company 1981-86 and the Alaska Pulp Corporation 1986-90 Operating Period Final Environmental Impact Statements).

Competition for subsistence resources is likely to increase as long as Southeast Alaska's population grows and additional access is created. The Southeast Alaska Federal Subsistence Regional Advisory Council has noted this increased use of the resources, and recommended decreases in harvest of deer, moose, and other wildlife species for non-rural residents.

Subsistence

Environmental Consequences

The analysis of the likely effects of alternatives on subsistence resources and uses is in two parts. Effects on subsistence resources and uses important to each rural community are discussed individually by community in the Communities section. Here, the Forest-wide evaluation is presented, based on general considerations in the three categories of effects previously identified: abundance and distribution, access, and competition. This general analysis relies on the community discussions, and also on the Forest-wide effects analyses from the related resource sections (primarily Fish and Wildlife) where abundance and distribution are an issue.

Section 810 of ANILCA requires the Forest Service, in determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of National Forest lands in Alaska, to evaluate the potential effects on subsistence uses and needs, followed by specific notice and determination procedures should there be a significant possibility of a significant restriction of subsistence uses. The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the evaluation: "A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources." Considerations of abundance and distribution, access, and competition (by non-rural residents) are mentioned.

The U.S. District Court Decision of Record in Kunaknana v. Watt provided additional clarification. In part it states: "restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in non-rural resident hunting."

Direct and Indirect Effects

Abundance and Distribution

Based on the 1987 survey information presented above, 61 percent of subsistence resources (by weight) are fish or marine invertebrates, 21 percent are deer, 4 percent other land mammals, and another 3 percent marine mammals. The primary subsistence resource experiencing potentially significant effects by alternative is Sitka black-tailed deer. Some effects to fish habitat may also result from land management activities, but the magnitude of the effects cannot be calculated. Risk to fish habitat increases with increased timber harvest, increased roading, and narrower riparian areas along streams. A panel evaluation of alternatives (see Fish section) resulted in the following order of increasing risk: Alternatives 1, 5, 4, 3, 6, 8, 2, 9 and 7. Alternative 11 falls between Alternatives 1 and 5, and Alternative 10 has essentially the same risk as Alternative 3.

Due to their association with old-growth forest habitat, which is the main terrestrial habitat type affected by the alternatives, deer become the "indicator" for potential subsistence resource consequences concerning the abundance and distribution of the resources. The community-based subsistence analysis (Communities section) focuses largely on deer, which is by far the largest terrestrial component of subsistence food resources, and this in turn is based on the Sitka black-tailed deer effects analysis in the Wildlife section. (This is a change from the 1991 SDEIS, which evaluated several other mammal species. That analysis was based on habitat capability models no longer being used. These other species are discussed under Wildlife).

In the subsistence analysis in the 1991 SDEIS, it was determined that at that time all of the Forest Plan alternatives, if implemented, could result in a significant restriction on the abundance and/or distribution of subsistence uses of Sitka black-tailed deer, brown bear, and marten sometime during the next 50 years. This conclusion was based on an analysis of the current status of huntable wildlife resources, and identified portions of the Tongass where such restrictions may already be occurring (in other words, were the result of existing conditions) (SDEIS, 1991, pp. 3-762 and 3-763). The unpublished 1992 draft FEIS reached the same conclusion for deer and brown bear. Such restrictions were most likely for communities with subsistence use areas in the northern portion of the Tongass (Chichagof and Baranof Islands, primarily). The RSDEIS came to the same conclusion in its analysis for deer.

As discussed in the Wildlife section of this chapter, hunting demand and huntable populations of wildlife have only been reexamined for Sitka black-tailed deer. Using a revised habitat capability model (revised since the RSDEIS), the new deer analysis reaches similar conclusions to that of the RSDEIS, based on specific areas where recent deer harvests are high relative to deer habitat capability. (This analysis is summarized at the end of the affected environment portion of the Wildlife section; see also Iverson 1996). This analysis identified 7 areas, (near Juneau, Hoonah, Sitka, and Craig/Klawock) where current deer harvests exceed 20 percent of the estimated habitat capability; and another 23 areas exceeding 10 percent of capability (4 on Admiralty, 5 on Chichagof, 4 on Baranof, 8 on Prince of Wales, and 2 near Ketchikan). Areas exceeding 20 percent are those where deer harvest may be restricted, either directly through restrictions in seasons and bag limits, or indirectly through reduced hunter efficiency and increased difficulty in obtaining deer relative to historical rates. Hunters in areas between 10 to 20 percent may experience reduced hunter efficiency and moderate difficulty in obtaining deer. This analysis may underestimate negative effects when deer populations are below carrying capacity. Adverse effects to deer hunters may be further amplified with either reductions in deer habitat capability or increases in deer demand/harvest or both.

The new deer analysis, based only on current (already existing) conditions, is much in line with the previous (1991, 1992, and 1996) analyses (which also used the 10 and 20 percent harvest cutoffs and the same land units). It indicates that deer habitat capabilities in several portions of the Tongass may not be adequate to sustain the current levels of deer harvests, and that implementation of any alternative could therefore be accompanied by a significant possibility of a significant restriction on the abundance and/or distribution of subsistence uses of deer. (However, sport hunting restrictions would occur first, followed by selective subsistence reductions, based on ANILCA section 804.) This possibility, at least in the short-term, is largely due to the continuation of reduced habitat capabilities resulting from past habitat alterations, which is why it applies to all alternatives. The possibility is less, however, in several alternatives which apply a Forest-wide standard and guideline to exclude or minimize future timber harvesting in the areas identified above: these are Alternatives 1, 3, 4, 5 and 6.

Access

None of the alternatives limit the use of public lands for the purposes of subsistence gathering activities. Historical access, by foot, boat, and floatplane, is available in all the alternatives for present and proposed foreseeable future activities. All communities having new road access to previously underutilized subsistence areas have capitalized on the opportunity to expand their range provided by the road systems. As a result of new road construction, new use patterns are likely to develop around some communities. Such changes are not likely to lead to a significant possibility of a significant restriction of subsistence access to the resources.

Competition

Competition for subsistence resources is a result of factors such as fish and game regulations, mobility, the natural distribution of game species across the Tongass, decreases in resource populations as a result of habitat reductions, decreases in resource populations as a result of over-harvest, and access provided to rural communities in the form of roads, ferries, and commercial air carriers. The majority of the population (Juneau and Ketchikan residents) of Southeast Alaska is non-rural. Competition for the more abundant wildlife and fisheries resources near rural communities results from the combination of these factors.

For analyzing competition, the following assumptions are made:

1. New road construction adjacent to communities with ferry access will result in increased competition from outside communities.

2. New road construction adjacent to existing road systems where interties between communities exist will result in increased competition from surrounding communities associated with the inter-connected roads.

3. Habitat reductions will result in increased competition if regulations allow sport use to remain constant, with the same number of users seeking fewer huntable resources.

4. The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Given these assumptions, implementation of all alternatives except Alternative 1 (which has essentially no timber harvesting or new road construction) could result in a significant possibility of a significant restriction of subsistence use by increasing competition for some subsistence resources by non-rural as well as rural residents. This is most likely to occur on Chichagof, Baranof and/or Prince of Wales Islands, where competition for deer and some other land mammals is already heavy, and habitat capability has been reduced as a result of timber harvest.

Cumulative effects

Cumulative effects are discussed in four categories.

1. **Effects Resulting from Timber Harvesting of Private Lands**. Native Corporation lands adjacent to the Tongass National Forest support extensive timber harvest operations. Over the last 14 years, primarily on North Chichagof, Kupreanof, Admiralty (localized) and Prince of Wales Islands, and mainland areas, old-growth forest wildlife habitat capability in these lands, especially that for deer, has declined; and this decline is

expected to continue for at least the next two decades. The resulting lower habitat capabilities on these private lands are likely to increase hunting demands in adjacent National Forest areas, increasing competition and potentially leading to reduced hunter success, reduced or eliminated sport seasons, and in some places reduced or eliminated subsistence seasons.

2. **Effects from Past Activities**. Timber harvest has been more influential in changing the landscape than any other use of the resources of the Tongass. With timber harvest comes roading, Log Transfer Facility development, crew camps ranging from a few years in duration to establishment of new towns, and reductions in old-growth forest habitat. Intensive timber harvesting since the 1950's has resulted in about 400,000 acres of old growth becoming second growth

3. **Effects of Present Activities**. Implementation of the current Forest Plan has resulted in an annual average timber harvest of about 340 million board feet (since 1980), with an annual reduction of about 9,450 acres of old-growth habitat. Approximately 100 miles of road has been constructed annually to access the timber harvested during this time period. One major mining operation, the Greens Creek Mine, came on line and was under full-scale production until about two years ago, with some localized effects. It may reopen in the near future. Other large mines are in the exploratory or permitting phases of development.

4. **Effects of Reasonably Foreseeable Future Activities**. The conversion of old-growth forest habitat to second growth will occur at varying rates under all alternatives except Alternative 1. The principal subsistence resource effect will be on Sitka black-tailed deer habitat, as previously discussed. If timber harvesting were to continue at roughly the present rate, over the next ten years another 94,000 acres of old-growth habitat would change to second-growth, and another l,000 miles of road would be built. The comparison of alternatives at the end of Chapter 2 (and the Timber and Transportation sections) display what is actually predicted for each alternative. With timber harvest activities will come new access, probably new camps, and potential increased use of subsistence resources by rural and non-rural residents.

Timber harvest of Native Corporation lands is anticipated to continue at a relatively low but constant level over the next decade. Land selections could result in some previously unharvested areas being logged. Actual mineral development is difficult to predict; if it occurs, any effects to subsistence resources would be highly localized.

ANILCA Determination

An ANILCA Section 810 evaluation and determination is not required for approval of a revised Forest Plan, a programmatic level decision that is not a determination whether to "withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of National Forest lands. A Forest-wide evaluation and determination is included for the Forest Plan revision to facilitate project level planning and decision making in compliance with ANILCA Section 810.

Consistent with Section 810 of ANILCA, the alternatives considered in the RSDEIS were evaluated for potential effects on subsistence uses and needs, as described above. Based on this evaluation it was determined that, in combination with other past, present and reasonably foreseeable future actions, one or more of the RSDEIS alternatives, if implemented through project-level decisions and actions, may result in a significant restriction of subsistence uses of deer, and possibly other land mammals, due to potential effects on abundance and distribution, and on competition.

As a result of this finding, the USDA Forest Service notified the appropriate State agencies, local communities, the Southeast Alaska Federal Subsistence Regional Advisory Council, and State Fish and Game Advisory Committees, and held hearings in affected communities throughout Southeast Alaska after publication and dissemination of the RSDEIS.

Using the information described earlier in this section and comments from the ANILCA 810 Subsistence Hearings, the alternatives considered in this Final Environmental Impact Statement were evaluated for potential effects on subsistence uses and needs, as described above. Based on this evaluation it was again determined that, in combination with other past, present and reasonably foreseeable future actions, one or more of the FEIS alternatives, if implemented through project-level decisions and actions, may result in a significant restriction of subsistence uses of deer, and possibly other land mammals, due to potential effects on abundance and distribution, and on competition.

Section 810 (a)(3) of ANILCA requires that when a significant restriction may result, three determinations must be made.

1. **Necessity, Consistent with Sound Management of Public Lands**. The alternatives proposed in this Final Environmental Impact Statement for revising the Tongass Land Management Plan have been examined to determine whether they are necessary, consistent with sound management of public lands. In this regard, the National Forest Management Act of 1976, the Alaska National Interest Lands Conservation Act, the Tongass Timber Reform Act, the Alaska Regional Guide, the Tongass Land Management Plan, as amended, the Alaska State Forest Resources and Practices Act, and the Alaska Coastal Zone Management Program have been considered.

   National Forest land management plans are required by NFMA, and must provide for the multiple-use and sustained yield of renewable forest resources in accordance with the Multiple-Use Sustained Yield Act of 1960. Multiple-use is defined as "the management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people" (36 CFR 219.3). The alternatives presented herein represent different ways of managing Tongass National Forest resources in combinations that are intended to meet the needs of the American people. Each provides a different mix of resource uses and opportunities, and each has some potential to affect subsistence uses. Given the theme and emphasis of each alternative, the potential restrictions associated with each alternative are necessary, consistent with the sound management of public lands.

2. **Amount of Public Land Necessary to Accomplish the Proposed Action**. The amount of land necessary to implement each alternative is, considering sound multiple-use management of public lands, the minimum necessary to accomplish the purpose of that alternative. The entire forested portion of the Tongass (except the Yakutat area) is used by at least one rural community for subsistence purposes for, at a minimum, deer hunting. It is not possible to avoid all of these areas in implementing resource use activities such as timber harvesting and road construction under any Forest Plan alternative (Alternative 1 does not continue such

Glossary

activities), and attempting to reduce effects in some areas can mean increasing the use of others. The proposed Forest-wide standards and guidelines, and LUD prescriptions, provide for special management or limit activities in many of the areas most important for subsistence uses, such as beaches and estuaries, areas adjacent to roads, and areas with high fish and wildlife habitat values.

3. **Reasonable Steps to Minimize Adverse Impacts To Subsistence Uses and Resources.** The Forest-wide standards and guidelines and LUD prescriptions will be implemented as part of any alternative action. Subsistence use is addressed specifically in a Forest-wide standard and guideline, and subsistence resources are covered by the Forest-wide standards and guidelines for wildlife, fish, riparian areas, and biological diversity, among others. Fish and wildlife habitat productivity will be maintained at the highest level possible, consistent with the overall multiple-use goals of each alternative. Most alternatives incorporate specific strategies for maintaining fish and wildlife habitats to ensure, at a minimum, the viability of all species.

A final determination will be made in the Record of Decision for the Final Environmental Impact Statement for the Tongass Land Management Plan Revision, and a summary of the evaluation, findings and determination will be contained in the Record of Decision.

Threatened, Endangered and Sensitive Species

Affected Environment

Threatened and Endangered Species

Federally listed Threatened and Endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS), under authority of the Endangered Species Act (ESA) of 1973, as amended. An endangered species is defined as one which is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

The Federally-listed species within the boundaries of the Tongass National Forest are:

Endangered Species:
- American peregrine falcon (*Falco peregrinus anatum*)
- Humpback whales (*Megaptera novaeangliae*)
- Snake River Sockeye Salmon (*Onochorhynchus nerka*)

Threatened species:
- Steller (Northern) sea lion (*Eumetopias jubata*)
- Snake River Spring/Summer Chinook Salmon (*Onorhynchus tshawytshca*)
- Snake River Fall Chinook Salmon (*Onorhynchus tshawytshca*)

The Endangered Species Act for the State of Alaska authorizes the Commissioner of the Alaska Department of Fish and Game (ADF&G) to list Alaska endangered species. Five species are currently listed as state endangered species: Humpback whale, blue whale, Northern right whale, American peregrine falcon, and arctic peregrine falcon. Four of these species are also listed under the Federal Endangered Species Act; the fifth, the arctic peregrine falcon, was formerly a Federally-listed species (see next paragraph).

The arctic peregrine falcon was delisted as a Threatened species by the FWS and is the only change in classification of the Endangered and Threatened species found within the Tongass National Forest since the 1991 SDEIS. Informal consultations with the FWS and NMFS subsequent to the SDEIS, part of the Biological Assessment process for all Endangered and Threatened species that may be affected by the forest plan revision, led to revising portions of the Forest-wide standards and guidelines pertaining to some of these species. Those changes have been incorporated into the Revised Forest Plan, Chapter 4. Recovery plans have been prepared for the humpback whale, Steller sea lion, and the American peregrine falcon.

Pursuant to Section 7 of the ESA, two Biological Assessments were prepared to assess the effects of the Forest Plan revision on endangered or threatened species and ensure that proposed actions would not jeopardize the continue existence of listed species. One Biological Assessment was prepared for the American peregrine falcon and was submitted to the FWS for review and concurrence. A second Biological Assessment was prepared for the endangered Humpback Whale, and Snake River Sockeye Salmon and the threatened Steller Sea Lion , Snake River Spring/Summer Chinook Salmon and Snake River Fall Chinook Salmon and submitted to the National Marine Fisheries Service for review and concurrence. Complete copies of both Biological Assessments and agency concurrences are available in Appendix J. Full information on the Affected Environment and Environmental Consequences for each species are included in the Biological Assessments and are not repeated in this section.

The only plant federally listed or proposed by the FWS in Alaska is *Polystichum aleuticum*, which is endangered. It is only known from Adak and is not expected to occur in the Tongass National Forest.

Other FWS Categories

The 1991 SDEIS discussed "Candidate species" - three categories of species being considered for listing as Threatened or Endangered under the ESA. Candidate species were not provided any legal protection under the ESA. The FWS has modified their candidate species program since the 1991 SDEIS (USFWS 1996). Candidate species are now those species for which the FWS has on file sufficient information on biological vulnerability and threats to support issuance of a proposed rule to list the species under the ESA (formerly identified as Category 1 Species). There were and still are no such candidate species on the Tongass National Forest.

Under the new FWS candidate species policy, Category 2 species are no longer recognized. Category 2 species were discussed in the 1991 SDEIS and were those taxa for which listing as Threatened or Endangered may be appropriate, but for which conclusive data on biological vulnerability and threat were not currently available to support a proposed listing. The FWS subsequently redesignated these taxa as "species of concern," and these were discussed in the 1996 Revised Supplement. More recently the FWS has dropped all such categories, and therefore these species are no longer discussed in relation to any FWS-related special status.

The northern goshawk and Alexander Archipelago wolf were both the subject of ESA listing petitions that were reviewed and formally accepted by the FWS in 1994. The FWS concluded in 1995 that listing was not warranted for either subspecies, but remains concerned for their long-term viability. In part, the FWS decisions were based on expectations of the Forest Service employing species specific conservation strategies into the revised Tongass plan. Recent court decisions have required the FWS to re-evaluate both listing petitions. These two subspecies are specifically included in the viability strategies, as discussed under Wildlife.

Sensitive species

Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern on National Forest System lands within the Region. A viability concern is evidenced by either a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution. It is USDA Forest Service policy to identify and manage Sensitive species and their habitats to prevent the species from becoming threatened or endangered because of Forest Service management actions. The goal of the Forest Service Sensitive species Program (FSM 2670) is to ensure that species numbers and population distribution are adequate so that no Federal listing will be required and no extirpation will occur on National Forest System lands.

The Forest Service has also entered into an interagency Memorandum of Understanding with the FWS and other federal agencies at the national level, and with the FWS and Alaska Department of Fish and Game at the regional level, to cooperate in the conservation of species tending toward federal listing so that listing is unnecessary.

The Alaska Region Sensitive species List was first established in 1990, and a technical revision was completed in 1994 when 22 plants and Queen Charlotte goshawk were added. There are 22 plants and 9 vertebrates currently designated as Sensitive species within the Alaska Region. Twenty plants and 8 vertebrates are known or suspected to occur on the Tongass National Forest (Table 3-67).

Table 3-67
Regional Forester Sensitive species that are known or are suspected to occur on the Tongass National Forest.

Common Name (*Scientific Name*)
Birds
Trumpeter swan (*Cygnus buccinator*)
Osprey (*Pandion haliaetus carolinensis*)
Queen Charlotte goshawk (*Accipiter gentilis laingi*)
Peale's peregrine falcon (*Falco peregrinus peali*)
Fish
Northern pike (Pike Lakes) (*Esox lucius)*
Chum salmon (Fish Creek) (*Oncorhynchus keta*)
King salmon (Wheeler Creek) (*Oncorhynchus tshawytscha*)
King salmon (King Salmon River) (Oncorhynchus tshawytscha)
Vascular Plants
Crucifer, no common name (*Aphragmus eschscholtzianus*)
Norberg arnica (*Arnica lessingii ssp. norbergii*)
Goose-grass sedge (*Carex lenticularis var. dolia*)
Edible thistle (*Cirsium edule*)
Pretty shooting star *(Dodecatheon pulchellum ssp. alaskanum*)
Northern rockcress (*Draba borealis var. maxima*)
Kamchatka rockcress (*Draba kamtschatica*)
Davy mannagrass *(Glyceria leptostachya*)
Wright filmy fern (*Hymenophyllum wrightii*)
Truncate quillwort (*Isoetes truncata*)
Calder lovage (*Ligusticum calderi*)
Pale poppy (*Papaver alboroseum*)
Choris bog orchid (*Platanthera chorisiana*)
Bog orchid (*Platanthera gracilis*)
Loose-flowered bluegrass *(Poa laxiflora*)
Kamchatka alkali grass (*Puccinellia kamtschatica*)
Straight-beak buttercup (*Ranunculus orthorhynchus var. alaschensis)*
Unalaska mist-maid (*Romanzoffia unalaschcensis*)
Queen Charlotte butterweed (*Senecio moresbiensis*)
Circumpolar starwort (*Stellaria ruscifolia ssp. aleutica*)

The Regional Sensitive species List has not been completely revised since its original development and a revision of the list is in progress. Species and subspecies under consideration for addition to or deletion from the Sensitive species list were identified in the RSDEIS. The Alaska Region Sensitive species list remains under review and revision under a regional process. The Natural Heritage Program Rare Species Global Rankings Criteria that were described in the RSDEIS will be one source of information used to identify Sensitive species.

Currently-designated Sensitive species

Queen Charlotte goshawk: The northern goshawk including the Queen Charlotte goshawk subspecies is fully discussed under "Wildlife."

Osprey. The best available information indicates that the osprey is naturally rare in southeast Alaska and this may represent the periphery of the species' range. A total of 16 osprey nest sites have been have been documented in Southeast Alaska, 15 have been located on the Stikine Area and one on the Ketchikan Area (Blatt 1995). Of this total, no more than three have ever been known to be active in any one year. Nest locations include Thomas Bay, Wrangell Narrows near Finger Point, and near the mouth of McCormick Creek on Wrangell Island, on the Duncan Canal Tidal Flats and Douglas Bay, both on Kupreanof Island. Osprey have been observed at Towers Arm, Irish Lakes, and Kah Sheets Creek on Kupreanof Island and on Swan Lake on the mainland near Thomas Bay. Ospreys nest from late April through August and probably overwinter in Mexico and Central America. Historically, there is no evidence that there were more osprey in Southeast Alaska. The population numbers have remained stable but low. Limiting factors are unknown, but available nest sites and foraging areas do not appear to be limiting. Interaction and competition with the abundant bald eagle population may be a limiting factor.

Osprey nests are generally located in the hemlock/spruce forest type and usually near lakes, streams, beaver ponds, coastal beaches or large estuaries. Osprey generally use broken-off snags or large green trees for nesting structures. Approximately 94 percent of the beach and estuarine old growth, 91 percent of the upland old growth below 800 feet in elevation, and 90 percent of the riparian old growth that was historically on the Tongass still remains. Apparently factors other than nest site habitat are affecting the distribution and abundance of osprey in Southeast Alaska.

Osprey prey items are unknown, but in general fish habitat capability has not changed to a large enough degree to adversely affect the historical distribution and abundance of osprey in Southeast Alaska. Learning about how other factors such as commercial fishing, seasonal abundance of prey species in the ocean environment, climate, and interactions between bald eagles, ravens, goshawks, and other raptors in Southeast Alaska may affect osprey may lead to a better understanding of their limited abundance and distribution in Southeast Alaska.

Peale's Peregrine Falcon. Thirty-six nests of Peale's peregrine falcon have been located in Southeast Alaska; 32 of which are on the Tongass National Forest. Nest surveys are very difficult to conduct, and biologists believe more nests may be present. Peregrine nest distribution is closely associated with large seabird colonies located on the outer coasts or nearby islands. The nest sites are on cliffs from 65 to 900 feet in height and all but one face the open ocean. Seabirds are thought to be major prey of the falcon. Information on falcon breeding biology or reproductive success is limited, but based on U.S. Fish and Wildlife Service surveys, populations appear to be stable.

Trumpeter Swan. The largest nesting population of trumpeter swans on the Tongass National Forest occurs on Yakutat Forelands where 100 adult and 55 young were counted in 1993 nesting surveys. The southernmost nesting population in Alaska occurs in the Chilkat Valley on non-National Forest lands. Surveys by the U.S. Fish and Wildlife Service indicate the Yakutat population has been stable where 100 adult and 55 young were counted in 1993, while the population in the

Chilkat Valley has increased from one pair in 1975 to a total of 64 adults and 49 young were counted in 1993. Trumpeter swans winter in ice-free areas throughout Southeast Alaska; information on wintering habitats and populations is very limited but a traditional winter concentration area has been documented at Blind Slough on Mitkof Island near Petersburg. Numerous swans from other parts of Alaska migrate through Southeast Alaska, and many may be wintering in suitable habitats in Southeast.

Northern Pike. Northern pike are found in five lakes, referred to as Pike Lakes, about 23 miles east of Yakutat (Browning, 1986). These lakes are shallow, with high concentrations of humic acid and peat-filled margins. The northern pike in Pike Lakes are the only natural-occurring pike in Southeast Alaska and are probably remnant populations that survived only because the most recent glacial advance missed the Pike Lakes area. Relatively little information is available on the life history and population dynamics for these pike populations.

Large Chum Salmon. Near Hyder on the Portland Canal, Fish Creek produces very large chum salmon, probably the largest chum salmon in North America. Several fish over 38 pounds have been weighed by biologists. Fish weighing 25 pounds are common. The average size is close to 20 pounds (the average chum salmon weighs around 10 pounds). A high percentage of the returning fish have spent four and five years in the ocean, accounting for the large average size. Normally chum salmon stay at sea for two to five years (Sala, 1991). Fish Creek is a low gradient stream, dominated by high quality spawning gravels and extensive areas of groundwater upwelling. The predominant upwelling and high quality spawning gravels appear to be the reasons for the remarkable production levels. Populations have been stable to increasing with a reported escapement of over 60,000 in 1993.

The Forest Service, in cooperation with the Alaska Department of Fish and Game, has undertaken a program of chum habitat improvement. The Marx Creek chum spawning channels have been constructed, adding over a mile of new spawning habitat for these fish. Fish Creek gravels have also been cleaned of sediments deposited from the floods of 1960’s. In cooperation with the recreation staff on Misty Fiords National Monument and the Hyder Community Association, an interpretive display has been constructed to tell the story of the Fish/Marx Creek chum.

The chum habitat improvement projects have also been monitored extensively, and a coded wire tag program has been implemented to evaluate the number of chum fry leaving the Fish/Marx Creek system, numbers intercepted by the commercial fishers, and numbers returning to the watershed, to better understand how the Fish Creek chum can be managed for the benefit of all user groups.

Island Run King Salmon. King Salmon River and Wheeler Creek populations of king salmon are island genetic stocks. No other naturally-occurring runs of island king salmon stocks are known to exist in Southeast Alaska. King Salmon River and Wheeler Creek are both within Kootznoowoo Wilderness. Information on these populations is limited, although recent escapement counts suggest the population is stable or slightly decreasing. The King Salmon River stock serves as an important king salmon transplant source for other streams and rivers.

Sensitive Plants. The sensitive plants discussed here are known or suspected to occur in the Tongass National Forest. Since so little is known about some of these plants, habitat information is limited to the data taken from the labels of herbarium specimens. In many instances this habitat information is very general. During the past several years sensitive plant surveys have resulted in filling gaps in habitat and distribution information, as well as providing information to botanists who are evaluating the taxonomy of these plants. Consequently, some of the plants designated as sensitive have been found to be more common than previously expected, and the taxonomic status of others has been changed. An upcoming revision of the sensitive species list will reflect these changes.

Aphragmus eschscholtzianus, No common name. This distinct species is endemic to southern Alaska and adjacent Canada in a band extending from the Aleutians through the southwest Yukon. It is suspected to occur in mountainous areas on the northern, mainland Tongass. It grows in moist mossy areas, seeps, heaths and scree slopes in the subalpine and alpine. The plant is known from about 30 sites throughout its range. Because the plant is so small it is easily overlooked, and may be more common than previously thought. New populations have been located in the past several years during rare plant surveys.

Arnica lessingii ssp. *norbergii*, Norberg Arnica. Norberg arnica is endemic to Alaska, and known from less than 20 occurrences in a range extending from Prince William Sound through the northern panhandle. The plant is known from the Yakutat Ranger District. It grows from sealevel to subalpine in meadows, shrublands, dry meadows, and open forest.

Carex lenticularis var. *dolia*, Goose-grass Sedge. Recent taxonomic treatments of *Carex* have added *Carex enanderi* to this taxon. Consequently this taxon is more common, but still rare. The plant ranges from the Aleutians east to the Alaska-Canada Coast range, through the Rockies south to Glacier National Park. It is known from the Juneau and Ketchikan Ranger Districts. This sedge grows in wet meadows, along lakeshores and snowbeds, generally at high elevations.

Cirsium edule, Edible Thistle. This regional endemic ranges from southern Southeast Alaska, through western Washington, to extreme northwestern Oregon. It is known from three locations in the Misty Fjords National Monument, and is expected to occur elsewhere in the southeast Tongass National Forest. It grows in open meadows, scree slopes, along glacial streams and lakeshores.

Dodecatheon pulchellum ssp. *alaskanum*, Pretty Shooting Star. The taxonomic status of this plant is questionable; some authors do not recognize the subspecies. It is known from seven populations ranging from Southcentral and northern southeast Alaska to a distinct population near Great Slave Lake. It occurs in wet meadows, upper beach meadows, and wet meadows. Little is known about this plant: distribution, population size, population trends, existence of historical populations, and habitat requirements need to be determined.

Draba borealis var. *maxima*, Northern Rockcress. Recent taxonomic work subsumes var. *maxima* into *Draba borealis*. Var. *maxima* is not a distinct taxon, but a minor variant of the common *Draba borealis*. The variety *maxima* was considered to be endemic to the area extending from Kodiak Island through the northern Tongass National Forest and adjacent British Columbia, with less than 20 occurrences. It grows in alpine areas, heath, open woods and rock outcrops.

Draba kamtschatica, Kamchatka Rockcress. Recent taxonomic work indicates that *Draba kamtschatica* is best treated within *Draba lonchocarpa* and not as a distinct taxon. *Draba kamschatica* ranges from Siberia east along the southern coast of Alaska through the Queen Charlotte Islands. It is known from about 12 sites globally, 4 of these from North America (Southcentral Alaska). It is to be expected in the Tongass National Forest, and grows in rocky alpine situations.

Glyceria leptostachya, Davy Mannagrass. This well-defined regional endemic occurs from central Southeast Alaska disjunctly south through central California. In Alaska, it is known from several sites in the Ketchikan Area and near Wrangell, and has been discovered to be widespread along the Wrangell road system. It grows in shallow freshwater, and along stream and lake margins.

Hymenophyllum wrightii, Wright Filmy Fern. This extremely inconspicuous fern's range is disjunct from the Russian far east, Korea, and Japan to the Petersburg and Sitka areas in the Tongass National Forest, south to about four sites along the British Columbia coast. In Alaska, only gametophytes have been found, however gametophytes and sporophytes occur in coastal British Columbia. It grows on shaded cliff faces, bases of trees, decaying wood and rootwads, in the dense, humid coastal forests near saltwater. Because this is such an inconspicuous plant it may be overlooked. In Alaska, the plant has only been found by bryologists. Distribution, population size, population trends, existence of the historical populations, and habitat requirements need to be determined.

Isoetes truncata (*Isoetes* x *truncata*), Truncate Quillwort. This aquatic plant is a hybrid of *Isoetes occidentalis* and *Isoetes maritima*. Recent reevaluations of *Isoetes* x *truncata* reveal that *Isoetes* x *truncata* identified from the Sitka Ranger District were misidentifications of *Isoetes occidentalis*. *Isoetes occidentalis* was not previously known to Alaska. *Isoetes* x *truncata* is known from Kodiak and Vancouver Islands, with a disjunct population at Pyramid Lake, Alberta. It is suspected to occur from Prince William Sound through the Tongass National Forest. It grows immersed in shallow fresh water pools or ponds.

Ligusticum calderi, Calder Lovage. This is a regional endemic, known from Vancouver Island north through the southern part of the Tongass National Forest (Dall and Prince of Wales Islands), and disjunct to Kodiak Island. It occurs in alpine and subalpine meadows, boggy slopes and rocky areas. It is known from less than 6 places in Alaska, and less than 100 throughout its range.

Papaver alboroseum, Pale Poppy. A rather spectacular poppy, known from Kamchatka and northern Kurile Islands, disjunct to Cook Inlet, Kenai Peninsula, Portage Glacier, disjunct to northern British Columbia and southern Yukon. In the Tongass National Forest, it is suspected on the mainland in the Skagway and Juneau areas. The plant grows in open areas, recently deglaciated areas, rock outcrops, sand, gravel, and on well-drained soils.

Platanthera chorisiana, Choris Bog Orchid. This tiny orchid is known from a range extending across the Aleutian Islands, Prince William Sound, Southeast Alaska, and south to Washington. It grows in bogs, bog edges, open mixed conifer forests, subalpine meadows and heaths throughout the Tongass

National Forest. Sensitive plant surveys are discovering that this easily overlooked plant is more common and wide-ranging than previously thought, although it is still rare.

Platanthera gracilis, No common name. This taxonomically questionable orchid is known from a limited range in the southernmost Tongass and adjacent British Columbia. It has been documented from four sites in wet meadows, and is expected in peat bogs. Little is known about this plant; distribution, population size, population trends, existence of historical populations, and habitat requirements need to be determined.

Poa laxiflora, Loose-flowered Bluegrass. The range of this distinct species extends from the Hoonah area south to Oregon. In spite of numerous surveys, this large grass is known from about 25 sites, 6 of which are in the Tongass National Forest. The plant is suspected to occur throughout the Tongass National Forest from the Juneau Ranger District south, however it is only known from the Juneau and Hoonah Districts and Admiralty Island National Monument. It grows in upper beach meadows, open areas and open forest.

Puccinellia kamtschatica, Kamchatka Alkali Grass. The range of this regional endemic extends from the Aleutians through the central Tongass National Forest. It grows on tidal flats, salt marshes and sea beaches. The taxonomic status of this plant is in question: some authors recognize it as a distinct species, others do not. Current taxonomic revisions of *Puccinellia* may result in moving this taxon into the much more common *Puccinellia nutkaensis*.

Ranunculus orthorhynchus var. *alaschensis*, Straight-beak Buttercup. The most recent treatment of the genus *Ranunculus* does not recognize this variety as distinct from the more common *Ranunculus orthorhynchus* var. *orthorhyncus*. Variety *alaschensis* was considered a regional endemic ranging from the central panhandle south to Vancouver Island; known from about 15 documented occurrences, 13 of which are in Alaska. It grows in wet meadows.

Romanzoffia unalaschcensis, Mistmaiden. This distinct species is endemic to Alaska, ranging from the Aleutian Islands through Prince William sound, disjunct to the western Tongass National Forest. The plant is known from about 25 occurrences. It grows in cracks in rock outcrops, along streambanks, beach terraces, open rocky areas and on grassy, mossy rock cliffs along shores.

Senecio moresbiensis, Queen Charlotte Butterweed. This plant is endemic to the southern half of the Tongass National Forest, Queen Charlotte Islands, and northern Vancouver Island. It is known from less than 100 occurrences, with about 5 from the Tongass. It grows in alpine and subalpine meadows, boggy or rocky slopes, open rocky heaths or grassy areas.

Stellaria ruscifolia ssp. *aleutica*, Circumpolar Starwort. Ranges from the eastern Aleutians east across southern coastal Alaska to the northern Tongass, with about 10 occurrences across its range. One of these is from the Yakutat Ranger District. This plant is inconspicuous and difficult to identify. It grows in open gravely sites, and along creeks in the mountains.

Threatened, Endangered and Sensitive Species

Environmental Consequences

Threatened and Endangered Species

Consultation requirements under Section 7 of the Endangered Species Act, as amended, have been completed with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Both USFWS and NMFS reviewed the Biological Assessments for Threatened and Endangered species under their regulatory jurisdiction and concluded that the Tongass National Forest Plan revision was "not likely to adversely effect" threatened or endangered species occurring on the Tongass. These findings were made subject to the programmatic scope of the forest plan revision and following the associated Forest-wide standards and guidelines (see Chapter 4, Forest Plan). Copies of the correspondence with each agency are included in Appendix J.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended in 50 CFR 17.7, and Forest Service Manual 2670) are used with the NMFS and FWS on all projects that implement the forest plan. Forest-wide standards and guidelines (see Chapter 4, Forest Plan) for Threatened, Endangered, and Sensitive species direct that all projects will comply with requirements of the Endangered Species Act, as amended and Forest Service Policy (FSM 2670).

Sensitive Species

Osprey

Direct and indirect effects. Limiting factors for osprey populations are unknown, but availability of nest sites and foraging areas do not appear to be limiting. The following Forest-wide standards and guidelines (see Chapter 4, Forest Plan) have been developed to provide for protection of nest sites as they are identified:

1. Maintain and improve osprey populations and habitat.
2. Establish a minimum 330-foot radius habitat management zone around each existing osprey nest tree. Determine the exact boundary based on local topography, timber type, windfirmness, and other factors.
3. Within the osprey nest zones, prohibit all land use activity which would likely disturb nesting osprey. Infringement may be acceptable depending on the nature of the project and timing of the activity.
4. Maintain the osprey nest zone even though the nest or nest tree becomes inactive.
5. Provide trees suitable for use by osprey for nesting, feeding and perching. Consider the following:
   - Reserve trees and live trees that dominate or co-dominate a shoreline.
   - Reserve trees with broken tops and live trees with branches large enough to support birds.
6. New nests will receive the same level of management protection as existing nests, however, osprey which select new nests in close proximity to existing human activities will not cause those human activities to be modified.

Additional knowledge gained through research and monitoring will need to be evaluated to develop and increase data base information for managing osprey habitat. Implementation of these standards and guidelines is expected to prevent any adverse effects on osprey populations and habitats and not result in a loss of species viability.

Peale's Peregrine Falcon

Direct and indirect effects. The U.S. Fish and Wildlife Service maintains a data base with confidential locations of all known nest sites of Peale's peregrine falcon in Southeast Alaska. The following Forest-wide standards and guidelines (see Chapter 4, Forest Plan) have been developed to provide for protection of Peale's peregrine falcon habitat:

1. Provide for the protection and maintenance of Peale's peregrine falcon habitat.

2. Maintain nest site location data in cooperation with the U.S. Fish and Wildlife Service.

3. Plan project activities to avoid adverse impacts to the falcons and their habitats. Evaluate the effects of proposed projects within two miles of known falcon nests, considering such items as: a) human activities (aircraft, ground and water transportation, high noise levels, and permanent facilities) which could cause disturbance to nesting pairs and young during the nesting period April 15 - August 31; b) activities or habitat alterations which could adversely affect prey availability. Coordinate all project activities that may affect known or potential nesting habitat with the U.S. Fish and Wildlife Service.

4. Within 15 miles of all known or historical nest sites, prohibit all use of herbicides and pesticides.

Forest-wide standards and guidelines for American peregrine falcons, Seabird Rookeries, and Waterfowl and Shorebird Habitats will also maintain foraging habitat for this species. No organochlorine pesticides (which cause eggshell thinning) are authorized for use on the Tongass National Forest. Implementation of these standards and guidelines is expected to prevent any adverse effects on Peale's peregrine falcon populations and habitats and not result in a loss of species viability.

Trumpeter Swans

Direct and indirect effects. At the present time, the only documented nesting habitat for trumpeter swans on the Forest is at Yakutat, in the Yakutat Forelands Biogeographic Province (#1). About 96 percent of this province is within legislated LUD II areas or other natural setting Land Use Designations. All of the nesting habitat would be classified as wetlands and/or riparian habitat. Forest-wide standards and guidelines for Wetlands and Riparian would apply to these areas. The following Forest-wide standards and guidelines (see Chapter 4, Forest Plan) have been developed for trumpeter swan habitats on the Forest:

1. Provide for the protection and maintenance of trumpeter swan habitats.

2. Avoid disturbance of trumpeter swans, particularly during nesting, brood-rearing and wintering periods, to prevent abandonment of their nests, brood-rearing areas, and winter habitats. As a general guideline, limit developments within .5 miles of wetlands used by nesting, brood-rearing and wintering trumpeter swans. The District Ranger will take feasible measures to minimize disturbance.

3. Avoid placement of overhead wires, fences, or other structures which could interfere with the flight paths of swans and cause injury or mortality.

4. Cooperate with state, Federal and local agencies, partner organizations, and individuals to develop sites and opportunities for the safe viewing of trumpeter swans by the public and maintain a public education program explaining Forest management activities related to trumpeter swans.

Factors that limit trumpeter swan populations are unknown. Nesting, brood rearing, and wintering habitats for trumpeter swans are associated with streams, rivers, lakes and ponds. Standards and guidelines have been developed to provide for their habitat. Additional research and monitoring are needed to identify the factors which may currently be limiting to trumpeter swan populations. Implementation of these standards and guidelines, coupled with additional research and monitoring, is expected to prevent any adverse effects on trumpeter swan populations and habitats and not result in a loss of species viability.

Northern Pike

Direct and indirect effects. Northern Pike are found in five lakes on the Yakutat Forelands. Forest-wide standards and guidelines for Wetlands and Riparian generally cover these areas. In addition, the following specific standards and guidelines (see Chapter 4, Forest Plan) for northern pike apply:

1. Provide for the protection and maintenance of northern pike found in the Pike Lakes on the Yakutat Forelands. This population of northern pike is unique to Southeast Alaska.

2. Avoid the placement of facilities near the Pike Lakes which would increase harvest pressure to the point where the viability of these species is affected.

3. Coordinate with the Alaska Department of Fish and Game on any activities that would affect the viability of the northern pike.

4. Coordinate with other groups or Federal and state agencies to develop a program of study to understand the life history and genetic characteristics of this unique population of northern pike.

Road access exists within 1/2 mile of Pike Lakes. There is no land suitable for timber harvest immediately around the lakes. Natural habitat conditions associated with the lakes are expected to be maintained. Fishing regulations will play an important part in ensuring that no overharvesting of these pike populations occurs. Application of these standards and guidelines to sustain habitat conditions will not result in a loss of viability of Northern Pike.

Fish Creek Chum Salmon

Direct and indirect effects. The habitat for the in Fish Creek chum salmon, near Hyder on the Portland Canal, will be managed in accordance with the Forest-wide standards and guidelines for Wetlands and Riparian (see Chapter 4, Forest Plan). In addition, the following standards and guidelines for Chum Salmon apply:

1. Provide for the protection and maintenance of chum salmon in Fish Creek near Hyder. This population of chum salmon is characterized by their extraordinary large size.

2. Coordinate with the Alaska Department of Fish and Game and the National Marine Fisheries Service on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of the chum salmon runs in Fish Creek in order to preserve these populations.

3. Coordinate with other groups or Federal and state agencies to develop a program of study to understand the life history and genetic characteristics of this run of chum salmon.

4. Provide for habitat improvement and maintenance to maintain the viability of this run of salmon, as necessary.

Improvement projects have been initiated to increase spawning habitat. With these improvement projects, the habitat for these chum salmon is expected to be improved in the future. These fish stocks are also used for commercial, sport, and subsistence fishing. Fishing regulations will play an important part in ensuring that overharvesting of these populations of large chum salmon does not occur. Application of these standards and guidelines to sustain habitat conditions will not result in a loss of viability of the Fish Creek chum salmon.

Island Run King Salmon

Direct and indirect effects. King Salmon River and Wheeler Creek habitats for Island Run king salmon are both within Kootznoowoo Wilderness. Natural habitat conditions are to be maintained. The following Forest-wide standards and guidelines apply (see Chapter 4, Forest Plan):

1. Provide for the protection and maintenance of runs of king salmon that naturally occur on islands including the runs in King Salmon and Wheeler Creeks on Admiralty Island.

2. Coordinate with the Alaska Department of Fish and Game and National Marine Fisheries Service on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of king salmon runs in order to conserve these unique populations.

3. Avoid the placement of facilities or issuing permits for activities near these streams that would increase harvest pressure on these king salmon runs.

4. Coordinate with other groups or Federal and state agencies to develop a program of study to understand the life history and genetic characteristics of these unique runs of king salmon.

These stocks, whose eggs are transplanted into other streams and rivers, are also used for commercial, sport and subsistence fishing. Fishing regulations will play an important part in ensuring that overharvesting of Island Run king salmon populations does not occur. In addition, any possible development or management activities will apply the Riparian Forest-wide standards and guidelines (See Chapter 4, Forest Plan) to protect the integrity of the riparian habitat. Application of Forest-wide standards and guidelines to sustain habitat conditions will not result in a loss of viability of these island run king salmon.

Sensitive Plants

Aphragmus eschscholtzianus, No common name. The *Aphragmus* or its alpine and subalpine habitat could be adversely effected by increased use and associated trampling by recreationists. The likelihood of these adverse effects are low because the plant is suspected to occur in remote alpine areas where the amount and frequency of recreational use will be extremely low. Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. For individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. There is little difference between the effects of the alternative Land Use Designations on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Arnica lessingii ssp. *norbergii*, Norberg Arnica. The *Arnica* or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, construction of other facilities, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. The overall risk to this species due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Carex lenticularis var. *dolia*, Goose-grass Sedge. The *Carex* or its habitat could be effected by changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low for the reasons mentioned above, and because recent taxonomic treatments have added *Carex enanderi* to this taxon. Therefore, the plant is more abundant than before *Carex enanderi* was subsumed by *Carex lenticularis* var. *dolia*, thus further lowering the risk to this plant. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Cirsium edule, Edible Thistle. The *Cirsium* or its habitat could be adversely effected by increased use and associated trampling by recreationists. The likelihood of these effects are low because the plant is suspected to occur in remote alpine areas where the amount and frequency of recreational use will be extremely low. Forest-wide standards and guidelines (Riparian and Wetlands) will be applied to sustain the plant and its habitat. For individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Dodecatheon pulchellum ssp. *alaskanum*, Pretty Shooting Star. The *Dodecatheon* or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternative Land Use Designations on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Draba borealis var. *maxima*, Northern Rockcress. Since var. *maxima* has been subsumed into *Draba borealis*, we are no longer recognizing var. *maxima* as a distinct taxon. Because the taxon is no longer recognized as a taxonomic entity, none of the alternatives will have an effect on *Draba borealis* var. *maxima*.

Draba kamtschatica, Kamchatka Rockcress. Since *Draba kamtschatica* has been subsumed into the much more abundant *Draba lonchocarpa*, we are no longer recognizing *Draba kamtschatica* as a distinct taxon. Because the taxon is no longer recognized as a taxonomic entity, none of the alternatives will have an effect on *Draba kamtschatica*.

Glyceria leptostachya, Davy Mannagrass. The Glyceria or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Riparian and Wetlands) will be applied to sustain the plant and its habitat. The overall risk to this species due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Hymenophyllum wrightii, Wright Filmy Fern. The *Hymenophyllum* or its habitat could be adversely effected by timber harvest, changes in light or temperature due to adjacent timber harvest, road construction, changes in hydrology associated with road construction. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects is moderate because timber harvest may occur in areas supporting undiscovered populations of the plant. Site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. The overall risk to this species due to project activities is low because the probable range of the plant is large. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Isoetes truncata (*Isoetes* x *truncata*), Truncate Quillwort. The *Isoetes* or its habitat could be adversely effected by changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. Impacts caused by recreationists could include damaging pond and lake beds in shallows near their margins through hauling boats and walking in the shallows. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Riparian and Wetlands) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Ligusticum calderi, Calder Lovage. The *Ligusticum* or its habitat could be adversely effected by increased use and associated trampling by recreationists. The likelihood of these adverse effects are low because the plant is suspected to occur in remote alpine areas where the amount and frequency of recreational use will be extremely low. For individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Papaver alboroseum, Pale Poppy. The *Papaver* or its habitat could be adversely effected by increased use and associated trampling by recreationists. The likelihood of these adverse effects are low because the plant is suspected to occur in remote alpine areas where the amount and frequency of recreational use will be extremely low. For individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Platanthera chorisiana, Choris Bog Orchid. The *Platanthera* or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Wetlands) will be applied to sustain the plant and its habitat. The overall risk to this species due to project activities is low, for the reasons mentioned above, and because the plant has been found to be more abundant than previously thought. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Platanthera gracilis, No common name. The *Platanthera* or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Wetlands) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Poa laxiflora, Loose-flowered Bluegrass. The *Poa* or its habitat could be adversely effected by road construction, changes in hydrology associated with road construction, terminal transfer facilities, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Wetlands and Beach and Estuary Fringe) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Puccinellia kamtschatica, Kamchatka Alkali Grass. The *Puccinellia* or its habitat could be adversely effected by the construction and use of terminal transfer facilities, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Wetlands and Beach and Estuary Fringe) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Ranunculus orthorhynchus var. *alaschensis*, Straight-beak Buttercup. Since var. *alaschensis* has been subsumed by *Ranunculus orthorhynchus* var. *orthorhyncus* we are no longer recognizing var. *alaschensis* as a distinct taxon. Because the taxon is no longer recognized as a taxonomic entity, none of the alternatives will have an effect on *Ranunculus orthorhynchus* var. *alaschensis*

Romanzoffia unalaschcensis, Mistmaiden. The *Romanzoffia* or its habitat could be adversely effected by road construction, terminal transfer facility construction and use, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Riparian and Beach and Estuary Fringe) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Senecio moresbiensis, Queen Charlotte Butterweed. The *Senecio* or its habitat could be adversely effected by increased use and associated trampling by recreationists. The likelihood of these adverse effects are low because the plant is suspected to occur in remote alpine areas where the amount and frequency of recreational use will be extremely low. Forest-wide standards and guidelines will be applied to sustain the plant and its habitat. For individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Stellaria ruscifolia ssp. *aleutica*, Circumpolar Starwort. The *Stellaria* or its habitat could be adversely effected by road construction, terminal transfer facility construction and use, changes in hydrology associated with road construction, increased off-road vehicle use, increased access, increased use and associated trampling by recreationists. The consequences of impacts to the plant due to project activities are moderate, because the activities could have adverse effects on individuals, populations or habitat. The likelihood of adverse effects are low because for individual project proposals, site-specific environmental analysis will include Biological Evaluations, which will analyze the effects of those proposals on the plant and its habitat. As a result of the analysis, appropriate mitigation measures would be included in the project. In addition, Forest-wide standards and guidelines (Riparian) will be applied to sustain the plant and its habitat. The overall risk to this plant due to project activities is low. There is little difference between the effects of the alternatives on this plant. Therefore, any alternative may affect individuals but is not likely to contribute to a loss of viability.

Additional Direction

Both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service have concurred with the Forest Service's conclusions in the Biological Assessments that revision of the Tongass Plan will not likely adversely effect listed species with the stipulation that further Section 7 ESA consultation will need to be conducted, where appropriate, for project level planning. Biological Evaluations for all sensitive species are prepared as part of project-level environmental analysis. Forest-wide standards and guidelines (see Chapter 4, Forest Plan) apply to all threatened, endangered, candidate, and sensitive species.

Timber

Affected Environment

The forests of Southeast Alaska have long provided a source of timber to the regional economy and Pacific Rim markets. From 1980 through the present, the Tongass has accounted for about 50 percent of the total Southeast Alaska timber harvest. Timber from the Tongass is harvested for pulp, sawn wood products such as lumber and cants, wood chip exports, and export logs (usually cedar). Timber is one of several valuable resources in Southeast Alaska and many people depend on it for their livelihood. Wood has become the basis for a major industry that provided about 3,849 jobs (2,225 from direct employment; 1,624 from indirect employment) during fiscal year 1994 (Tongass National Forest Timber and Wood Products Trade Data, 1994). Forest products from Southeast Alaska are marketed throughout the world.

The forests of Southeast Alaska are primarily of the western hemlock-Sitka spruce forest type. This type is a segment of the temperate rain forest that occupies a coastal strip 2,000 miles long from northern California to Southcentral Alaska. The most extensive occurrence of this type is in Southeast Alaska. Within the Tongass, western hemlock and Sitka spruce stands cover 98 percent of the timberlands, with the remaining 2 percent supporting western redcedar, Alaska-cedar, and cottonwood. Western hemlock is used for pilings, poles, railway ties, windowsills, doors, and construction lumber, and is an important fiber source for pulp. The primary product is dissolving sulfite pulp, which is used in the manufacture of a variety of products including rayon fabric, carpets, drapes, sponges, cellophane packaging, pharmaceutical goods, food additives, rope, brush and broom bristles, insulation, cosmetic products, rayon cord tires, paint, and furniture lacquers. Sitka spruce is used for specialty products such as piano sounding boards and guitar faces, oars, planking, masts, and spars for custom-made or traditional boats, and ladders; poorer quality Sitka spruce is also used for pulp. The cedar species have been used by Alaska Natives for centuries, for canoes and paddles, housing (along with Sitka spruce), and totem poles. Today redcedar is primarily used as a roofing material; Alaska-cedar is suitable for many uses, including boats, utility poles, heavy flooring, framing, and marine decking and piling.

Current Condition of the Forest Land Base

Forests occupy slightly less than 10 million acres or roughly 60 percent of the Tongass land area. The remaining 40 percent is non-forested such as water, ice, and rock. The forests vary from sparse muskeg forests to heavily timbered stands of 50 thousand board feet (MBF; long log bureau scale) per acre or more.

About 57 percent or 5.7 million acres of the Tongass forest are “Timberlands.” Timberlands are forests biologically capable of producing industrial wood products; previously these lands were called commercial forest lands and are often called “productive” forest lands. In addition to timberlands, there are about 4.3 million acres (43 percent) of “Other forest land” not capable of producing industrial forest products, but of major importance for watershed protection, wildlife habitat, recreation, and other uses. Other forest land is land incapable of yielding crops of industrial wood usually because of adverse site conditions. These conditions may include sterile or poorly drained soil, subalpine conditions, and steep rocky areas where topographic conditions are likely to prevent management for timber production. Other forest land has been called noncommercial or “nonproductive” forest land.

History of Land Selections and Legislative Withdrawals

National legislation has significantly reduced the available timberlands of the Tongass National Forest. About 7.89 million acres have either been selected or legislatively withdrawn. These lands contain about 2.75 million acres of timberland that are no longer available for timber harvest considerations.

These legislation acts includes:

> **The Alaska Statehood Act of 1958.** This act authorized the selection of up to 400,000 acres from the Chugach and Tongass National Forests in Alaska for the development and expansion of Alaska communities. About 165,000 acres of the State selections on the Tongass are timberlands.
>
> **The Alaska Native Claims Settlement Act of 1971 (ANCSA).** ANCSA authorized the transfer of about 44 million acres throughout the State of Alaska from Federal management to private ownership. Under ANCSA, native regional and village corporations were given the opportunity to select from National Forest System lands. About 550,000 acres were entitled to be selected from the Tongass. Approximately 544,400 acres have been selected to date. Of the total to be selected, 460,000 are estimated to be productive forest lands (Knapp 1991).
>
> **The Alaska National Interest Lands Conservation Act of 1980**. ANILCA designated about 5.7 million acres of Wilderness within the Tongass. As Wilderness, these lands are withdrawn from consideration for timber harvest. Of the total Wilderness, 1.6 million acres are classified as timberland. ANILCA also transferred approximately 1.5 million acres of public domain to the Tongass, but the additions have no commercial timber value.
>
> **The Tongass Timber Reform Act of 1990 (TTRA).** TTRA amended ANILCA and withdrew additional acres from lands available for timber harvest: 299,000 acres of additional Wilderness and 727,000 acres of permanent LUD **II** (roadless). About 342,000 acres of stream buffers were designated for no commercial timber harvest. This totals approximately 1.3 million acres. Of the total TTRA withdrawn acres, 689,000 acres are timberland.

As a result of this legislation, there are approximately 3.4 million acres of available timberland on the Tongass.

Tentatively Suitable Forest Lands

Not all of the remaining available timberland on the Tongass is suitable for timber harvest. The National Forest Management Act (NFMA) requires the Secretary of Agriculture to identify lands not suited for timber production due to physical and other pertinent factors. The NFMA also included consideration of economic factors in the identification of suitable lands, but TTRA exempted economic considerations as a requirement for identifying suitable lands on the Tongass.

Timber resource land suitability has been completed by the Forest Service for the Revision (Forest Plan, Appendix A). Tentatively suitable lands have the biological capability, and availability, to produce commercial wood products. To be considered tentatively suitable, the forested land must (36 CFR 219.14):

> be at least 10-percent occupied by trees or have formerly had such tree cover, and not be developed for non-forest uses;

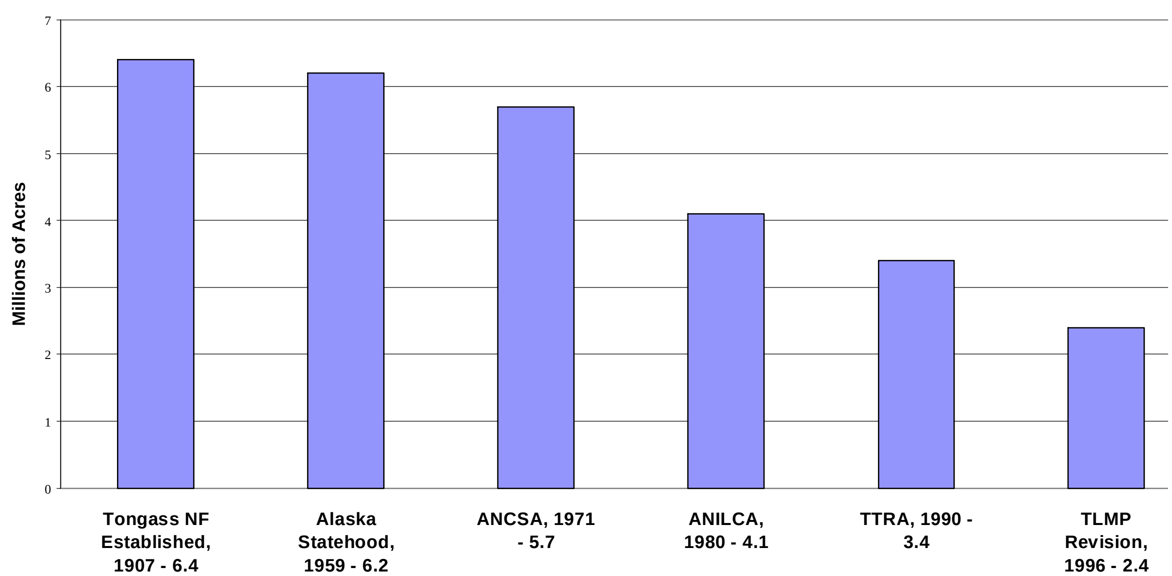
be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;

be capable of being restocked within five years after final harvest; and

not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Based upon the tentatively suitable process (Appendix A, Forest Plan), there are 2.4 million acres of remaining timberland available for timber harvest. Figure 3-10 illustrates the changes that have occurred to the commercial forest land on the Tongass due to legislation and the tentatively suitable process.

Figure 3-10
Commercial Forest Land in the Tongass National Forest, 1907-Present



Current Condition The Timber Resource

There are six conifer forest types within the Tongass (Table 3-68). The western hemlock and western hemlock-Sitka spruce forest types account for 96 percent of the timberlands of the Tongass and about 75 percent of the total forest land area.

Table 3-68
Forest Type Composition (Percentage) of the Tongass National Forest

Forest Type	Timberlands Available	Timberlands Reserved	Other Forest Land Available	Other Forest Land Reserved	Total Forest
Alaska-Cedar	0	0	8	10	3
Cedar	1	0	38	41	16
Hemlock	52	62	46	41	51
Hemlock-Spruce	43	35	1	1	24
Lodgepole	0	0	6	5	2
Sitka Spruce	4	3	1	2	4

Source: Timber Resource Statistics for the Chatham, Stikine, and Ketchikan Areas of the Tongass National Forest, Alaska, PNW-RB-184, 185, and 186, January 1992.

Age Class Distribution. The Tongass is a mix of old-growth stands, naturally regenerated forest, and planted forest. Harvest-created young-growth amounts to less than seven percent of the total timberland area. Timberlands are classified into five stand conditions: (1) old-growth sawtimber, (2) young-growth sawtimber, (3) poletimber, (4) seedling and sapling, and (5) nonstocked. For timber inventory purposes, stands of trees 150 years old or older are designated as old-growth. Nearly 89 percent of timberlands meet the criteria for old-growth sawtimber (Table 3-69).

To help define tree ages on the Tongass, Farr and McClellan (unpublished manuscript) measured and analyzed age data from 67 plots located throughout the Tongass (excluding the Yakutat Area). They found that 90 percent of all overstory trees were >180 years old; 84 percent were >200 years; 47 percent were >300 years old; and 15 percent were >400 years old, 5 percent were >500 years old.

Table 3-69
Estimated Age Class Distribution (Thousands of acres)

Age Class (Years)	All Timberlands	Reserve Timberlands	Tentatively Suitable
0-5	31	3	21
5-40	208	15	169
40-70	196	50	121
70-150	149	91	42
150+	5,141 (90%)	2,159 (93%)	2,068 (85%)
Total	5,725	2,319	2,423

Source: Revision Data Base Q3003B, 9/96.

Timberlands greater than 150 years of age cover 5.14 million acres (90 percent) of the 5.7 million acres of forest land on the Tongass. Acres of such forests in wilderness or other land classifications where timber production is not allowed total 3.14 million.

Glossary

Timber Inventory Methodology and Scientific Accuracy. The first Southeast Alaska-wide timber inventory began in 1953 and was completed in 1958. Due to the extensive area to be covered, the inventory was subdivided into Juneau, Sitka, Petersburg/Wrangell, Yakutat, and Ketchikan/Craig working circles. Ten years later, a portion of the original inventory was re-measured to improve estimates of growth and mortality trends in young growth stands in Southeast Alaska (Hutchinson and LaBau, 1975). Young-growth stands, for timber management considerations, are defined as being less than 150 years old and normally less than 20 inches in diameter (measured at "breast height").

A complete reinventory program to re-evaluate Southeast Alaska's forest area and volume began in the early 1970s and was completed by 1975. Several new categories of information were collected including data to evaluate level of stocking (the number of existing trees compared to full stocking of trees for a site), strata classes (timber categorized by several attributes such as species, decadence, stocking, site index and board feet per acre), soils, multiple-use objectives, slope, better definition of harvest categories, and a redefinition of quality guides. Detailed data, such as risk class and soil microsite, were collected on individual trees to better estimate their potential for timber management considerations (Hutchinson and LaBau, 1975).

In 1979, an extensive point sampling system inventory developed for the Tongass Land Management Plan gathered specific information across the Tongass to provide specific information for the completed 1970s forest inventory. In the early 1980s, this inventory was redesigned by Administrative Area. Field data collection for this inventory was completed in 1985.

The 1980s inventory was designed to achieve an estimate of the standing volume on the Forest within certain error limitations. Sampling errors of area and volume which resulted met the requirements of FSM 2409.13 (Plus or minus 10 percent per billion net cubic feet at a 68-percent confidence level; Rogers and Van Hees, 1992) and Table 3-70 illustrates sampling design goals and sampling errors achieved**.** A review of the inventory methodology and results was conducted in September 1989 by a Forest Service Biometrician, Jim Brickell He concluded that the inventory results are reliable as an assessment of forest areas and volumes at the Forest and Area levels, (Brickell, 1989).

The forest inventory is a sound and statistically reliable source of information regarding Tongass timber production potential and stand characteristics. The data for the inventory were gathered on a Forest-wide basis. The inventory was designed to be specific only to the Administrative Area level. The inventory was not designed to collect all timber resource information nor was it designed for comparison of individual plot results to timber type map polygons or volume strata.

Table 3-70
Relative Sampling Errors at the 68-percent confidence level[1] (expressed in percent)

	Design Sampling Error	Sampling Error Achieved: Chatham	Stikine	Ketchikan
Net growing stock on available timberland				
Per billion cubic feet	10.0	10.1	9.1	10.7
Total cubic feet		3.8	3.4	3.8
Net growing stock volume on available other forest land				
Per billion cubic feet	15.0	14.5	17.5	22.2
Total cubic feet		12.5	15.0	13.5
Net growth of growing stock on available timberlands				
Per billion cubic feet	10.0	4.3	4.8	4.4
Total cubic feet		22.5	34.7	27.8
Net growth of growing stock on other forestland.				
Per billion cubic feet	15.0	3.3	2.3	3.1
Total cubic feet		45.8	20.8	25.4

Source: Timber Resource Statistics for the Chatham, Stikine, and Ketchikan Areas, PNW-RB-186, PNW-RB-184, PNW-RB-185.

1 A 68-percent confidence level means that if repeated samples were taken of the population, the estimate of the total would be between plus or minus the sampling error (in percent) 68 percent of the time.

The results of the 1980-85 inventories (Table 3-71) show that the Tongass National Forest had a net growing stock of 22.7 billion cubic feet on 4.3 million acres of available lands (5.3 thousand cubic feet per acre). This would indicate that the 2.42 million acres of tentatively suitable land would have approximately 12.8 billion cubic feet of growing stock. The net growing stock for the 5.7 million acres of productive forest land or timberlands was 31.5 billion cubic feet or 5.5 thousand cubic feet per acre.

TIMTYP Strata

The Forest Service established four volume classes of commercial timber in the 1979 plan (amended 1985). Using net inventory volumes per acre, the classes are:

- class 4: 8,000-20,000 board feet
- class 5: 20,001-30,000 board feet
- class 6: 30,001-50,000 board feet
- class 7: 50,001 board feet or greater

There have been a number of concerns regarding the reliability of this information (usually referred to as the TIMTYP map). These concerns have come from within and outside the agency. Jim Brickell (USDA-Forest Service, Region 1) was commissioned in 1989 to address concerns about the TIMTYP map reliability. Brickell found that: 1) there is no practical or statistical difference in three of the four sawtimber strata with respect to mean board feet per acre; 2) the prospect of being able to interpret the existing timber type map in terms of sawtimber volume per acres seems dim; and 3) from information taken in the field in the Forest inventory, it appears that a fairly large proportion of the polygons were not classified correctly as to stratum.

Table 3-71
Net Growing Stock Volume -- 1980-85 Inventories.

Area		Timberland (million cubic feet)	Other Forest Land (million cubic feet)
Chatham	Available	7,247	1,354
	Reserved	4,308	3
Stikine	Available	7,233	1,355
	Reserved	938	105
Ketchikan	Available	8,202	1,636
	Reserved	3,533	1,275
Tongass	**Total:**	**31,461**	**5,728**
		(thousands of acres)	(thousands of acres)
Chatham	Available	1,419	909
	Reserved	792	556
Stikine	Available	1,227	939
	Reserved	147	83
Ketchikan	Available	1,533	1,023
	Reserved	628	796
Tongass	**Total:**	**5,746**	**4,306**

Definitions:
Growing stock volume: all live trees except cull trees.
Available timberlands: timberland not withdrawn from use in production of timber products as a result of administrative statute or regulation.
Other forest land: unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions.
Timberland: forest land producing or capable of producing crops of industrial wood.
Reserved timberland: productive forest land withdrawn from use in production of timber products as a result of administrative statue or regulation.
Sources:
Rogers, George; Van Hees, William W. S. 1991. Timber resource statistics. for the Chatham Area of the Tongass National Forest, Alaska, 1982. Resource Bulletin PNW-RB-186. Portland, OR; U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.
Rogers, George; Van Hees, William W. S. 1991. Timber resource statistics for the Stikine Area of the Tongass National Forest, Alaska, 1984. Resource Bulletin PNW-RB-185. 19 p.
Rogers, George; Van Hees, William W. S. 1991. Timber resource statistics for the Ketchikan Area of the Tongass National Forest, Alaska, 1985. Resource Bulletin PNW-RB-184. 18 p.

The TIMTYP map has also been used by the Alaska Region to calculate long-term timber sale contract timber volume proportionality as required by Section 301 of TTRA. However, this procedure was successfully challenged in court by the Wildlife Society, Alaska Chapter. The court disputes over TTRA Section 301 proportional harvest methodology have been settled, with issuance of an updated Forest Service Handbook Supplement (Region 10, FSH 2409.18 Supplement No. 2409.18-96-1).

Because of the above issues, alternative methods of assigning site quality (or the capability to produce different timber volumes) to lands currently supporting old-growth forests have been considered for purposes of the Forest Plan revision. Five different options were studied and evaluated (Julin and Caouette In Preparation). The method for identifying volume classes within the productive old-growth forest currently being used is discussed in the Biodiversity section of this chapter.

Statistical analysis indicates that three strata can be distinguished for the available timberlands (lands not legislatively or administratively withdrawn) using the existing inventory with additional information on soils and slopes. The polygon characteristics of the three-strata approach are displayed in Table 3-72. The table also displays the volume per acre statistics for the four volume classes previously used (i.e., volume classes 4, 5, 6 and 7).

Table 3-72
Tongass National Forest Strata Characteristics -- Available timberlands

Strata	Trees /Acre	Quad Mean Diameter[1] (inches)	Dominant Tree Height (feet)	Basal Area (sq. ft/acre)	Percent Defect	Three-strata Volume/Acre[2] Cubic Feet	Three-strata Volume/Acre[2] Board Feet	TIMTYP Volume/Acre[2] Volume Class	TIMTYP Volume/Acre[2] Board Feet
Chatham Area									
Low	102	16.9	65	152	22.5	3.2	9.4	4	14.6
Medium	110	19.1	75	203	18.8	5.2	19.2	5	23.1
High	108	21.0	91	240	17.2	7.0	30.4	6	30.5
								7	35.9
Stikine Area									
Low	120	17.0	80	182	24.7	4.7	16.9	4	22.0
Medium	118	18.1	90	205	21.7	6.1	24.1	5	27.4
High	99	20.5	90	214	19.0	6.9	29.3	6	30.2
								7	40.9
Ketchikan Area									
Low	128	16.8	72	195	32.0	4.0	13.9	4	16.9
Medium	111	19.1	88	208	22.1	5.7	23.3	5	29.4
High	89	21.9	97	218	18.5	7.1	29.9	6	26.9
								7	36.0

[1] Diameter of average basal area (quadratic mean diameter)
[2] Bureau Long Log Scale

Current Practices

Regeneration Methods

Clearcutting, with reliance on natural seeding, has been the most commonly used silvicultural system in the Sitka spruce-western hemlock forest types. Clearcutting is used where timber production is the primary use and where it is the optimal method. The clearcutting method is favored for several reasons. Clearcutting increases exposure to the sun, which raises soil temperature, speeds up organic decomposition, and thus improves soil productivity. The regeneration of Sitka spruce is favored in open sites with disturbed soils. Clearcutting also aids in controlling dwarf mistletoe by eliminating infected overstory trees, and minimizes windthrow and logging damage. Logging costs are lower than with other systems. The clearcut method has proven very successful in the regeneration (regrowth) of healthy forested stands. (A fuller discussion is included in Appendix G.)

However, the practice of clearcutting has been, and continues to be, a controversial issue. The main concerns center around the esthetics of clearcuts, and the loss of old-growth forest stands and their attendant wildlife resources. The Alaska Region has begun an "alternatives to clearcutting" study, and several of the FEIS alternatives prescribe silvicultural methods other than standard clearcut harvesting. These methods involve both the harvest of trees singly or in small groups (typically called uneven-aged management), leaving residual trees in clearcuts, and extending the "rotation age" of harvesting -- the time period at which a previously-harvested area or stand can be harvested again. These various options are now briefly described (see also the Forest-wide standards and guidelines for timber in Chapter 4 of the revised Forest Plan).

Uneven-aged Systems. This is typically the harvesting of single trees from within a stand, or of small groups of trees (usually less than two acres). This method maintains a multi-aged, multi-layered stand structure by removing some trees in all age groups. Very little is known about the ultimate success of uneven-aged methods in Southeast Alaska.

Two-aged Systems. In this system, approximately 10-20 percent of a stand is left as residual (or reserve) trees, both singly and in patches, and the rest of the stand is harvested. The reserve trees and patches remain unharvested, and provide structural diversity and an older aggregation of trees within the otherwise young-growth stand.

Extended rotations. In Southeast Alaska, old-growth forest conditions are normally not reached until a stand is 150-years old or older (U.S. Department of Agriculture, Forest Service, 1992). Extending the time period before a young-growth stand is scheduled for a second harvest gives the stand more time to acquire at least some characteristics of old-growth forests. Extended rotations also mean either fewer entries into a given area within a given time period, or smaller amounts of harvest when entries are made, but can increase the need for roads if equivalent volumes are to be harvested. Currently young-growth is projected to be harvested on an average 100-year rotation cycle.

Young-Growth Management

After harvest, young-growth stands can be treated through thinning and other methods to promote growth and tree quality. In recent years, such timber stand "improvements" have typically consisted of precommercial thinning and have averaged 5,600 acres per year. Commercial thinning and pruning are additional methods available under some of the alternatives. Together these methods may significantly speed up the growth of high-quality, high-volume stands of trees for future harvesting, or may be used to promote conditions that mimic old-growth stand characteristics. On the other hand, they can add substantially to the cost of the timber program.

Precommercial Thinning

The 1979 TLMP included an annual precommercial thinning (PCT) program of 6,300 acres which provided an allowable cut effect of 34 MMBF per year. This means that if 6,300 acres received PCT treatment each year, the ASQ from the current land base could increase by 34 MMBF per year due to faster growth rates and less defect in young-growth stands (when compared to old-growth).

Between 1979 and 1995, approximately 99,000 acres have been precommercially thinned on the Tongass, for an average annual PCT program of a little more than 5,800 acres. Not included in this total are 3,400 acres that have been precommercially thinned but subsequently selected and conveyed to the State or native corporations and 6,000 acres that were treated for dwarf mistletoe control and do not count towards the 1979 TLMP PCT program.

The average annual PCT program is highly dependent upon annual appropriations. Actual PCT accomplishments range from zero acres in FY 1988 to over 9,700 acres in FY 1980. The lack of adequate funding is the primary reason why the Tongass has been unable to meet the 1979 TLMP program.

There are additional reasons for precommercial thinning other than the increased volume projected in the 1979 TLMP. Along with an increase in volume, PCT produces larger diameter trees at a given age when compared to no PCT because growth is concentrated on a fewer number of trees. This results in a larger log which has a higher economic value and lower per unit logging cost. In addition, PCT is beneficial to wildlife and fish habitat. The larger diameter trees produced are more beneficial for Large Woody Debris in streams, snags, and coarse woody debris on the ground. Through tinning, sunlight is allowed to reach the forest floor for a longer period of time, thereby delaying the onset of the stem exclusion stage and reducing the overall length of time the stand is in this stage. This means that the stand will produce wildlife forage for a longer period of time when compared to stands that receive no thinning.

Yarding Methods

Most logs are yarded downhill using cable logging systems such as highlead and skyline. Access is usually from valley bottoms because road building on steep slopes is difficult and costly. Most logging occurs inland with logs transported via road systems to Log Transfer Facilities at tidewater (see Transportation). Harvest by tractor has been limited; it is not practical on most of the soils and topography found in the Tongass. Harvest by helicopter has been limited in the past but is increasing; it is typically the costliest method, but also causes the least resource damage.

Yarding methods can be divided into three "operability" classes, which relate to the methods necessary to harvest and transport trees under various conditions. Normal operability includes the standard cable logging systems used in areas where access is relatively easy. These areas have the lowest logging costs. Difficult operability includes longspan cable systems and helicopter logging, occurring where ground access is difficult or not possible. Difficult operability involves higher costs. The third class, isolated operability, consists of isolated stands a mile or more from a helicopter landing site. These tend to be uneconomical under even high timber markets.

The concern over operability class has increased in recent years, as information is showing a disproportionate harvest (in terms of the total suitable timber base) of the normal operability lands. Normal operability areas make up about 70 percent of the tentatively suitable land base, yet from 1980 to 1991 they represented about 94 percent of the harvest. Difficult operability areas account for 22 percent of suitable lands, but less than 6 percent of the harvest of these same years. The remaining 8 percent of suitable lands, classed as isolated, accounted for only 0.5 percent of the harvest. As harvest continues to occur disproportionate to the composition of the suitable timber base, sustained yields will depend on harvesting the difficult and isolated areas in the future, and under present systems and technology these areas will be more costly to harvest.

Tongass Timber Sale Program

An objective of ANILCA was the maintenance of timber supply opportunities for the Southeast Alaska timber industry. TTRA (Section 101) provides for the Forest Service to seek to provide a supply of timber from the Tongass that meets annual market demand and meets the market demand for each planning cycle, to the extent consistent with providing for the multiple-use and sustained-yield of all renewable resources. The planning cycle is assumed to be the 10 to 15 year period between Forest Plan revisions.

The Tongass timber program is part of a long-term cooperative effort among the federal government, the State of Alaska, and local governments to provide greater economic diversity and stability in Southeast Alaska and more year-round employment. Soon after the First World War, the Forest Service performed reconnaissance of the pulp timber resource and undertook efforts to attract the paper industry to Southeast Alaska. The Forest Service established requirements to process timber in Alaska, including the construction and operation of pulpmills via 50-year timber sale contracts awarded in the early 1950s.

During the 1920s, the Forest Service proposed several long-term sales to help establish a pulp industry in Southeast Alaska. The objective was to provide a sound economic base in Alaska through establishment of a permanent year-round pulp industry. The first successful sale was made in 1951, and the construction of a pulpmill was completed at Ward Cove near Ketchikan in 1954. This long-term contract is held by Ketchikan Pulp Company (KPC). During the 1950s the Forest Service offered three additional long-term sales. The belief was that to attract the timber industry to Alaska, a long-term assured supply of timber was necessary.

Three of the long-term timber sale contracts are no longer operating. The US Plywood-Champion Paper contract in the Juneau unit was canceled by mutual consent in 1976; no operations were performed on-the-ground. The Pacific Northern Timber Company contract located on the Wrangell Unit required the construction and operation of both a sawmill and pulpmill in the contract to operate for 50 years. Construction and operation of a sawmill only occurred, and the contract was thus limited to 25 years. All ground activities for the Wrangell Unit were completed in 1981 (R10, Timber Management, Contract Files). The Alaska Pulp Corporation closed their Sitka pulpmill in 1993 and the Wrangell sawmill in 1995. Their contract was terminated by the Forest Service in 1994.

In February 1997 an end to the one remaining contract, with KPC, due originally to expire in 2004, was negotiated. The pulpmill has closed, and under the terms of the negotiation approximately 300 MMBF will be released to KPC over the next three years (1997-1999), from already approved timber sales, for continued short-term operation of its sawmills. See Appendix M (revised) for further discussion.

The Tongass timber program is composed of a long-term sale program, a short-term program, and a firewood and personal use program. Table 3-73 displays the annual combined harvest of net sawlog and utility logs.

Table 3-73
Tongass National Forest Timber Harvest History by Calendar Year[1] 1909-52 and by Fiscal Year[2] for the Period 1952-1995 (sawlog and utility volume, long log bureau scale)

Calendar Year	Tongass Volume (sawlog)	Fiscal Year	Tongass Volume (sawlog, utility)	Fiscal Year	Tongass Volume (sawlog, utility)
1909 to 1916	234.5	1952	58.0	1974	559.6
1917	41.0	1953	49.5	1975	462.4
1918	43.1	1954	66.8	1976[3]	444.3
1919	37.4	1955	179.3	1976	109.6
1920	45.6	1956	215.8	1977	456.3
1921	11.7	1957	253.6	1978	414.0
1922	20.6	1958	195.7	1979	422.2
1923	40.5	1959	218.3	1980	480.1
1924	48.6	1960	314.8	1981	386.7
1925	53.7	1961	347.4	1982	370.7
1926	51.0	1962	339.2	1983	250.5
1927	52.0	1963	180.5	1984	261.0
1928	33.8	1964	415.7	1985	231.3
1929	42.0	1965	424.6	1986	290.5
1930	38.5	1966	439.6	1987	336.2
1931	18.2	1967	450.5	1988	396.2
1932	14.7	1968	541.3	1989	443.1
1933	14.7	1969	518.7	1990	471.0
1934	28.2	1970	493.0	1991	363.3
1935	30.5	1971	584.2	1992	370.0
1936	40.0	1972	532.4	1993	325.0
1937	35.3	1973	590.7	1994	276.0
1938	25.6			1995	221.0
1939	26.5				
1940	30.9				
1941	35.8				
1942	38.5				
1943	73.6				
1944	86.8				
1945	58.3				
1946	48.6				
1947	83.4				
1948	81.0				
1949	49.2				
1950	54.4				
1951	52.9				
1952	63.4				
	Calendar Year 1909-1952			***Fiscal Year 1952-1995***	
Total Harvest:	**1,784.5 (MMBF)**			**15,750.6 (MMBF)**	
Average Yearly Harvest:	**40.6 (MMBF)**			**358.0 (MMBF)**	

Source: Timber Management, Region 10
1 Calendar Year = January 1-December 31.
2 Fiscal Year = October 1-September 30.
3 This is the transition quarter for the year when Congress changed the fiscal year from July 1-June 30 to October 1-September 30.

Glossary

The average annual timber harvest on the Tongass was about 40 million board feet per year from the early 1900s to 1952. Since establishment of the long-term contracts in the 1950s, timber harvest has averaged about 358 million board feet per year (sawlog and utility). This volume has been generated primarily from the Ketchikan, Pacific Northern Timber, and Alaska Pulp contracts. Harvests peaked in 1973 to around 591 million board feet and then declined to a low of about 181 million board by 1985.

Long-term sales comprised almost three-quarters of the timber volume made available during the period of 1980 through 1991 (Table 3-74). Since Fiscal Year 1980, an annual average of 247 million board feet of volume has been made available to the long-term contract holders. Due to market fluctuations, appeals and litigation, and other factors since 1980, the annual average harvest was about 249 million board feet of volume.

Table 3-74
Timber Volume Offered, Sold, and Harvested for Fiscal Years 1980-1985 (million board feet, sawlog plus utility long log bureau scale)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Short-term Timber Sales Program										
Volume Offered	195	171	134	208	201	151	97	113	94	90
Volume Sold	199	158	80	81	50	42	189	168	70	92
Volume Harvested	127	142	150	55	71	36	60	72	100	142
Long-term Timber Sales Program										
Volume Offered	385	445	401	311	337	331	343	344	293	279
Volume Released	359	287	190	150	223	150	115	346	266	198
Volume Harvested	354	245	220	195	210	145	230	264	296	303
Total Tongass Timber Sales Program										
Volume Offered	580	616	535	519	538	482	440	457	287	369
Sold/Released	558	445	270	231	273	192	304	514	336	290
Volume Harvested	481	387	370	250	281	181	290	336	396	445
Acres Harvested	13,235	9,038	6,145	4,303	4,481	6,023	4,878	14,405	10,140	13,870

	1990	1991	1992	1993	1994	1995	Total
Short-term Timber Sales Program							
Volume Offered	54	79	40	61	100	110	1,898
Volume Sold	26	52	81	45	52	102	1,487
Volume Harvested	173	90	72	55	48	59	1,452
Long-term Timber Sales Program							
Volume Offered	331	318	449	257	207	217	5,248
Volume Released	287	354	357	303	217	159	3,961
Volume Harvested	298	273	298	270	228	162	3,991
Total Tongass Timber Sales Program							
Volume Offered	385	397	489	318	307	327	7,146
Sold/Released	313	406	438	348	269	261	5,448
Volume Harvested	471	363	370	325	276	221	5,443
Acres Harvested	15,778	10,713	11,577	10,524	9,074	6,404	153,362

Source: Region 10, Timber Management

The primary sources of timber within Southeast Alaska are the Tongass, private corporations (principally Alaska Native Corporations formed through the Alaska Native Claims Settlement Act), and the State of Alaska (Table 3-75). Since 1980, harvest from the Tongass contributed about 50 percent of the timber supply in Southeast Alaska. However, timber harvest since 1990 has fallen to less than 50 percent of total supply.

Glossary

Table 3-75
Timber Harvest and Imports for Southeast Alaska, Fiscal Years 1980-1994 (in million board feet, long log bureau scale)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Tongass National Forest										
Sawtimber	428.3	339.5	326.6	220.0	226.7	126.8	251.4	282.0	331.5	377.1
Utility[1]	51.8	47.8	43.8	30.0	34.0	54.2	39.1	54.2	64.7	67.0
Total:	480.1	387.3	370.4	250.0	260.7	181.0	290.5	336.2	396.2	444.1
State of Alaska										
Sawtimber	32.5	38.1	26.2	21.8	16.9	4.2	12.2	19.5	16.8	11.4
Utility	0.5	0.7	0.0	0.1	0.5	0.5	0.2	0.3	0.0	0.1
Total:	33.0	38.8	26.2	21.9	17.4	4.7	12.4	19.8	16.8	11.5
Private[2]										
Export Sawtimber	83.0	31.6	137.0	249.3	199.7	224.4	294.1	282.5	277.0	419.8
Utility	61.8	35.4	22.3	54.3	88.0	61.0	32.9	121.5	118.1	112.1
Total:	144.8	67.0	159.3	303.6	287.7	285.4	327.0	404.0	395.1	531.9
BIA	12.8	4.7	2.8	3.1	1.1	0.1	0.0	0.0	0.0	3.5
SEA Total	**670.7**	**497.8**	**558.7**	**578.6**	**566.9**	**471.2**	**629.9**	**760.0**	**808.1**	**991.0**
Imports										
Sawlogs	33.0	27.1	3.1	21.1	5.7	7.8	24.4	5.7	0.1	1.8
Pulplogs	0.0	0.0	0.0	2.0	38.0	11.9	22.1	5.1	6.8	1.9
Woodchips[3]	0.0	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	0.0

	1990	1991	1992	1993	1994	Totals	
Tongass National Forest							
Sawtimber	399.0	299.3	303.1	268.3	221.8	**4,437.1**	
Utility[1]	72.0	64.0	66.6	56.7	54.0	**815.2**	
Total:	471.0	363.3	369.7	325.0	275.8	**5,252.3**	**49.8%**
State of Alaska							
Sawtimber	11.1	4.0	14.9	5.0	18.1	**252.7**	
Utility	1.0	0.0	0.1	0.0	2.7	**6.7**	
Total:	12.1	4.0	15.0	5.0	20.8	**259.4**	**2.5%**
Private[2]							
Export Sawtimber	433.7	307.2	348.7	328.2	194.8	**3,811.0**	
Utility	72.4	147.4	97.0	82.2	82.0	**1,188.4**	
Total:	506.1	454.6	445.7	410.4	276.8	**4,999.4**	**47.4%**
BIA	0.0	7.5	4.5	0.0	0.0	**40.1**	**0.4%**
SEA Total	**989.2**	**829.4**	**834.9**	**740.4**	**573.4**	**10,551.2**	**100%**
Imports							
Sawlogs	1.2	1.2	0.0	0.0	0.0	**132.2**	
Pulplogs	0.0	3.0	3.0	3.0	3.0	**99.8**	
Woodchips[3]	0.0	0.0	1.5	0.0	0.0	**17.1**	

Source: USDA Forest Service, Alaska Region
[1] Utility volume includes logs with less than one-third net sawlog volume but contains at least one-half firm usable pulp chips. The current TLMP does not include utility logs or residual chips in the Allowable Sale Quantity of 450 million board feet.
[2] Private harvests are estimated.
[3] Source: Department of Commerce. Wood chips are converted to log scale at a ratio of 2.7 short tons per million board feet

Demand

The market demand for Tongass timber is derived from a complex set of factors including Southeast Alaska's timber industry (mill) capacity, international timber markets, and available and projected supplies locally, nationally, and world-wide. Brooks and Haynes, draft 1997 update has a fuller discussion of these and other factors. Several economic consultants have projected the demand for Tongass timber in recent years, with varying results. The Alaska Region continues to use the projections of the Pacific Northwest Research Station (PNW Station) of the Forest Service as the most reliable and defensible estimates (Haynes and Brooks, draft 1997 update). The PNW Station projections take into account international markets for wood products, recent developments affecting demand in the Pacific Northwest and Canada, and local industry conditions and mill capacities.

The PNW projections are revised periodically. The 1997 revised estimates include consideration of recent changes in world timber and wood products markets and closure of both Sitka and Ketchikan pulp mills. These mill closures significantly affects the pulp wood component of demand. Sawlog demand is not similarly affected. The closure of the Wrangell Mill (currently owned by Alaska Pulp Corporation) is not considered to be permanent, and the sawlog market may support its reopening or replacement. See Appendix M (revised) for an evaluation of the KPC mill closure, contract renegotiation, and related changes in demand.

The PNW Station has estimated that for the next decade and a half (1997 to 2010), timber market demand will be substantially lower than previously estimated. Three projections, based on different market assumptions, are given: a medium estimate of a yearly average of 101 MMBF for the period 1998-2002, rising to 135 MMBF annually in 2008-2010; a low estimate of a yearly average of 65 MMBF for the period 1998-2002, rising to 72 MMBF annually in 2008-2010; and a high estimate of a yearly average of 136 MMBF for the period 1998-2002, rising to 206 MMBF annually in 2008-2010. The different assumptions regard the Alaska share of North American lumber shipments to Japan, the North American share of Japanese softwood lumber imports, the share of Alaska shipments to other export markets, and overrun lumber production in Alaska. These are explained in more detail in the most recent Brooks and Haynes study (1997 draft).

PNW projections also consider stumpage prices -- defined as the average price of timber sold (Brooks and Haynes. In preparation. Alaska Stumpage Prices: Several Projections). Alaska stumpage prices are expected to increase (faster than the inflation rate) overall as a result of projected increases in sawlog prices in the Pacific Northwest. Alaska sawlog prices will increase in proportion to Pacific Northwest prices, and pulp prices will remain constant, at about the average value for the period 1975-94. Over the past 15 years, market pulp prices, adjusted for inflation, have been roughly constant (although subject to cycles).

Timber

Environmental Consequences

The analysis of the potential effects of the alternatives addresses the following questions:

- How much land will be allocated to timber production?
- What silvicultural systems and vegetative practices would be utilized?
- At what intensity would these lands be managed?
- What would be the allowable sale quality (ASQ) and Long-term Sustained Yield?
- What are the factors that affect the attainment of the ASQ?
- What would be the quantity and quality of products (sawlogs vs. pulplogs) produced?
- How would the timber supply compare to historic harvest levels?
- Would the timber supply meet our long-term contract obligations?
- How much timber would be available for the small business (SBA) program?
- Would there be a sufficient timber supply for a 10-year contract?
- Would there be a sufficient timber supply to meet projected demand?
- How should proportionality be handled at the programmatic level?
- What would be the future condition of the Forest in 150 years?

The effects on the existing timber industry infrastructure and employment levels are discussed in the socioeconomic section of this chapter.

Suitable Timber Lands

Tentatively suitable lands, as defined by NFMA regulations (36 CFR 219.14(a)) and Section 102 of TTRA, include about 2,400,000 acres. This represents about 14 percent of the total Forest acreage and is the same for all alternatives. Appendix A of the Forest Plan contains a detailed discussion of the tentatively suitable determination process.

The 1991 SDEIS had a tentatively suitable land base of 2.54 million acres. The changes since then, by Administrative Area, are displayed in Table 3-76.

Table 3-76
Changes in Tentatively Suitable Land Base (in millions of acres)

	1991 SDEIS	1996 FEIS
Chatham	0.74	0.774
Stikine	0.69	0.684
Ketchikan	1.11	0.942
Total	**2.54**	**2.400**

The reasons for the reduction are:

Extreme Hazard Soils. On July 5, 1995, the Forest Service published an overview of the characteristics controlling hillside stability in Southeast Alaska. The paper concluded, based on the findings, that Mass Movement Index 3 and 4 (MMI 3 and MMI 4, respectively) should be adjusted for the TLMP Revision. MMI 3 should be from 51 to 72 percent slope and MMI 4 should be slopes greater than 72 percent. Previously, 75 percent slope had been used for the cutoff.

Better Resource Inventories. The Ketchikan Area had its timber suitability information updated by a private contractor. Changes from this update have been incorporated. (*Suitable Timber Analysis, Operability Analysis, and Resource Data Enhancement for the Ketchikan Area, Tongass National Forest*. draft report, December 22, 1995.)

Landownership Adjustments. Approximately 59,000 acres of National Forest land have been converted to private ownership since the 1991 SDEIS.

During the alternative development process, additional lands within the tentatively suitable timber base (2.4 million acres) were determined to be inappropriate for timber production (36 CFR 219.14) in accordance with each alternative's objectives, and were classified as unsuitable. This occurred if other land use objectives precluded timber management. The lands considered suitable for timber production therefore vary by alternative.

Table 3-77 displays the amount of tentatively suitable land, and the amount each alternative would designate as suitable for timber management. The amount of suitable land would vary from 0.0 percent of the Forest in Alternative 1 to 9 percent of the Forest in Alternative 7. No Alternatives have a suitable land base greater than 1.7 million acres. This significant difference results primarily from differences in assigning the old-growth Forest, Remote Recreation, and Semi-remote Recreation LUD's. In Alternative 1, 89 percent of the tentatively suitable acres are assigned to Remote or Semi-remote Recreation. Alternatives 3, 5, 6, 10 and 11 have substantial timber-suitable acreages assigned to the Old-growth Habitat LUD.

Removing land from the suitable land base reduces both potential ASQ and long-term timber growth and yields. While the effect is not perfectly linear, the magnitude of the reduction is generally related to the proportion of lands removed. The timber production lost is irretrievable but is not irreversible. If future designation of these lands is changed to allow timber management, it would be possible to resume timber management activities.

Where land is dedicated to road construction or development of facilities, minerals or rock excavation, the loss of land for timber production is generally irretrievable and may be irreversible. Similarly, the occurrence of landslides or excessive erosion can significantly degrade soil productivity thus reducing potential forest growth and yield.

Table 3-77
Land Classification (thousands of acres) Tentatively Suitable and Suitable Lands[1]

Classification	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt 7	Alt. 9	Alt. 10	Alt. 11
Total national forest land (items 1 and 2)	16,883	16,883	16,883	16,883	16,883	16,883	16,883	16,883	16,883	16,883
1. Non-Forest land (includes water)	6,949	6,949	6,949	6,949	6,949	6,949	6,949	6,949	6,949	6,949
2. Forest Land	9,933	9,933	9,933	9,933	9,933	9,933	9,933	9,933	9,933	9,933
3. Forest Land Withdrawn from Timber production	4,179	4,179	4,179	4,179	4,179	4,179	4,179	4,179	4,179	4,179
4. Available Forest land (item 2 minus item 3)	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**	**5,755**
5. Non-Productive Forests: Forest Land Not Capable of Producing Crops of Industrial wood.	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
6. Available timberlands (PFL) (Item 4 minus item 5)	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**	**3,354**
7. Timberlands: Physically Unsuitable	524	524	524	524	524	524	524	524	524	524
8. Timberlands: Inadequate Information	429	429	429	429	429	429	429	429	429	429
9. Tentatively suitable timberlands (Item 6 - items 7 and 8)	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**
10. Tentatively Suitable timberlands not appropriate for timber production by Land Use Designations:										
a. Research Natural Areas	2	2	2	2	2	2	0	-	2	2
b. Remote Recreation	461	94	94	94	94	94	24	266	94	76
c. Old growth	20	8	369	8	140	140	-	-	369	443
d. Municipal Watersheds	-	-	-	-	-	-	-	-	-	4
e. Semi-Remote Recreation	1,683	354	354	354	354	354	116	-	354	459
f. Scenic Viewsheds-SV (Beach Fringe, Riparian)	-	61	51	64	60	60	-	30	47	55
g. Modified Landscapes-ML (Beach Fringe, Riparian)	-	64	58	70	62	62	7	-	52	65
h. Timber production-TM (Beach Fringe, Riparian)	6	116	147	138	128	128	113	76	115	129
i. Wild Scenic or Recreation Rivers	88	30	30	30	30	30	-	-	30	40
j. Special Areas	29	32	32	32	32	32	1	-	32	35
k. LUD III - Special	-	-	-	-	-	-	-	59	-	-
l. Additional Beach Fringe (TM, SV and ML LUD's)	31	29	29	29	29	29	29	29	29	17
m. LUD I Release	-	-	-	-	-	-	-	10	-	-
Total (Items 10a through 10m):	2,320	789	1,164	819	929	929	289	460	1,123	1324
11. Model Implementation Reduction Acreage	-	384	384	440	394	394	527	442	301	345
12. Net Remaining (Item 9 minus Items 10 and 11)	**80**	**1,227**	**852**	**1,141**	**1,077**	**1,077**	**1,584**	**1,499**	**977**	**731**
13. Scheduled (Suitable Lands)	**-**	**1,180**	**795**	**845**	**786**	**1,024**	**1,575**	**1,390**	**924**	**676**
13a Scheduled Old growth	-	931	609	829	770	862	1,337	1,119	710	496
13b Scheduled Young Growth	-	249	186	16	16	162	238	271	214	180
Allowable Sale Quantity (1st Decade)										
Sawlog (MMCF)	-	92.7	51.2	26.1	24.4	61.8	128.2	110.0	60.0	53.6
Utility (MMCF)	-	9.7	11.2	5.8	5.5	13.9	28.2	98	13.3	11.7
Total (MMCF)	**-**	**113.2**	**62.4**	**31.9**	**29.9**	**75.7**	**156.4**	**134.1**	**73.3**	**65.3**

[1] Totals may be off due to rounding

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Silvicultural Systems and Practices

This section describes vegetation management practices prescribed in the Forest Plan including regeneration methods, reforestation, and intermediate treatments. Definitions for each of these practices, how they will be applied, and expected effects on the timber resource are provided.

Regeneration Harvest Methods

For modeling and planning purposes, the Forest Plan considered three regeneration methods: clearcutting (even-aged system), clearcutting with reserves (two-aged system), and group selection (uneven-aged system). This does not mean that these are the only three regeneration methods that will be considered for use on the Tongass. Other even-aged methods such as seed tree and shelterwood, while utilized to meet specific objectives, would be similar to clearcut with reserves in regards to appearance and effects. For this reason, only one of the three methods was modeled and displayed. These regeneration methods can be applied to all timber types on the Tongass (USDA Forest Service, 1983). In addition, other regeneration methods may be applied on a limited scale to test their utility in achieving other forest management objectives, such as the Silvicultural Alternatives to Clearcutting in the Old-growth Forests of Southeast Alaska study now underway.

Implementation of any Forest Plan alternative would include a full array of silvicultural prescriptions, including modification of these methods, depending on the site-specific conditions. The choice of the regeneration method and rotation length is based upon site specific analysis done at the project level, considers multiple resource needs and objectives, and includes the rationale for using the selected regeneration method. This is documented in the silvicultural prescription, which must be approved by a certified silviculturist.

Clearcutting (even-aged system). Clearcutting is the harvesting of all merchantible trees in a stand in one harvest entry with the intention of establishing a new stand of uniform age and size. Where the primary origin of the new stand is from advanced regeneration (existing seedlings and/or saplings), the harvest method is called overstory removal.

In 1992, the Chief of the Forest Service directed that clearcutting be limited to areas where it is essential to meet forest plan objectives and which involve one or more circumstances. The circumstances under which clearcutting is practiced on the Tongass are:

- Control of dwarf mistletoe, a disease that almost exclusively infects western hemlock (Hennon, 1995).
- Eliminates the risk of blowdown of residual trees (Harris, 1989).
- Eliminates the risk of logging damage to residual trees. The tree species found on the Tongass are thin barked, easily damaged during timber harvest operations, and susceptible to heartrot and other diseases (Harris and Farr, 1974).
- Encourages germination and growth of Sitka spruce, a tree species that is more shade intolerant than western hemlock (Harris and Farr, 1974).

In addition to the above circumstances that meet former Chief Robertson's direction, clearcutting is practiced for the following reasons:

- Is an efficient and cost effective method for harvesting timber (Harris and Farr, 1974).
- Improves forest yields by converting highly defective and slowly growing old-growth to vigorous young growth (Harris and Farr, 1974).

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- Raises soil temperatures, hastening organic matter decomposition rates to release soil nutrients that become available to the new stand (Gregory, 1956; Wiant, 1967).
- Reduces the amount of road construction and sediment transported to streams resulting from road construction (Harris and Farr, 1974).

National Forest Management Regulations and Alaska Regional Guide requirements limit the maximum size of created openings to 100 acres with a few exceptions as described in the Forest-wide standards and guidelines.

Clearcutting with reserves (two-aged system). Clearcutting with reserves maintains a portion of an existing stand (a minimum of 15 percent, with 70 percent of that in clumps or groups), creating a two-layered structure with two or more age classes. Research and experience with this method are extremely limited in Southeast Alaska. The rationale for using this method in Southeast Alaska are to:

- Provide biological and structural diversity in stands by leaving standing green trees individually or in groups.
- Reduce the impacts to scenic resources.
- Provide better protection of landslide prone sites by retaining a living root system.

Group Selection (uneven-aged system). The group selection method prescribes the removal of small groups of trees to create openings in the stand. The forest created using this method is a mosaic of small groups of trees of uniform age and height with the goal of regenerating an uneven-aged stand structure across the landscape. Group sizes range from 0.1 acres to approximately 2 acres in size. Research and experience with this method is extremely limited in Southeast Alaska. The ideas behind using this method in Southeast Alaska are to:

- Protect excessively steep or unstable soils.
- Reduce the impacts to scenic resources.
- Reduce impacts to wildlife resources.

Table 3-78 displays the annual number of acres scheduled for each of these regeneration methods, by alternative for the first decade of the Plan. The acreages displayed are for modeling purposes only to estimate Forest Plan outputs and does not limit the managers ability to utilize any regeneration method to best meet project goals and objectives.

Variations of the above three methods include selecting leave trees based upon their species and seed producing capability to promote regeneration of preferred species (seed tree cut) or retaining greater numbers of trees to modify the micro-environment to create conditions favorable to germination and growth of preferred species (shelterwood cut). Under both of these methods, the retained trees are harvested when the new stand becomes established. Additional variations include not harvesting the retained trees (two-aged system), in which case the method would be called seed tree cut with reserves or shelterwood cut with reserves. These last two methods create two-aged stands which would be almost identical to clearcut with reserves in regards to appearance and number of trees retained. Thus, the effects would be the same as for clearcut with reserves.

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Table 3-78
Vegetative Management practices

Average Annual Harvest Acres of Suitable Lands Modeled in First Decade									
	Alternative[1]								
	2	3	4	5	6	7	9	10	11
Regeneration Harvest									
Clearcut	14,705					20,297			6,857
Clearcut with Reserves		9,423	6,288	4,550	11,437		17,428	11,168	1,714
Group selection		82			88				
Regeneration Treatments[2]									
Natural & Artificial	14,705	9,423	6,288	4,550	11,525	20,297	17,428	11,168	8,571
Intermediate Treatments									
Precommercial Thinning	592	1,575	0	0	1,575	3,165	991	1,575	2,134

Source: FORPLAN table F10.1 (Forest-wide Activity and Output Results)
[1] Alternative 1 is not displayed because there is no scheduled timber harvest.
[2] Planting would occur on about six percent of the total acres.

Effects of Regeneration Harvest Methods to the Timber Resource

There are six major effects of these regeneration methods on the timber resource. Due to very limited research and experience with methods other than clearcutting in Southeast Alaska, effects for methods other than clearcutting cannot be quantified or predicted with high degrees of certainty.

1. Species composition. Of the four major commercial tree species on the Tongass, western hemlock is the most shade tolerant, followed by western red cedar, Alaska cedar, and Sitka spruce (USDA Forest Service, 1990). Western hemlock is by far the most prevalent species, making up 83 percent of the old-growth forests (Farr and McClellan, 1994). Western hemlock is susceptible to dwarf mistletoe, a disease that does not infect Alaska cedar or western red cedar and rarely infects Sitka spruce (Hennon, 1995). Western hemlock also appears to have more insect enemies than Sitka spruce (Harris and Farr, 1974). Having a diverse species mix contributes to wildlife habitat quality, species diversity, and minimizes losses due to insect and diseases that are species specific. In addition, western hemlock has the lowest economic value of these four species.

Five years following clearcutting, Harris (1967) reported that 53 percent of the regenerated stand was western hemlock, 41 percent Sitka spruce, and 6 percent cedar. Taylor (1934) estimated that at the end of a 75-100 year rotation period, even-aged young growth stands would consist of about 50 percent Sitka spruce. Alaback (1982 and 1984) noted that as even-aged stands continue to age, the density of Sitka spruce decreases with a consequent increase in the density of western hemlock.

Regeneration harvest methods that create open conditions and expose bare mineral soil such as clearcutting would encourage germination and growth of Sitka spruce and the cedars. Clearcutting with reserves, leaving few reserve trees, and group sizes near 2 acres in group selection, would also encourage germination and growth of Sitka spruce and the cedars, but to a lesser degree than clearcutting due to side shading and shading from the residual overstory. Regeneration methods that create less ground disturbance and smaller openings in the canopy such as single tree selection, smaller sized groups in group selection, overstory removals, and

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treatments with many reserve trees would encourage growth of western hemlock at the expense of the other species.

Alternatives 2, 7, 9 and 11 would tend to favor regeneration of Sitka spruce and the cedars. Alternative 1, which has no scheduled timber harvest, would tend to maintain species composition similar to that found in the old-growth forests. Alternatives 3, 4, 5, 6 and 10 are variable but would generally create conditions intermediate between Alternative 1 and Alternatives 2, 7, 9 and 11. Leaving few reserve trees, harvesting groups near 2 acres in size, or both, would be more favorable to Sitka spruce and cedar than leaving more reserve trees and harvesting smaller groups.

2. Damage to residual trees. Western hemlock and Sitka spruce are thin barked, shallow rooted species and are easily wounded during timber harvest activities (Harris and Farr, 1974; Hennon and DeMars, 1995). These wounds provide an avenue for disease organisms to enter trees, reducing their economic value and making them more susceptible to windthrow and/or windsnap. If the residual trees are expected to remain standing to provide vertical structural diversity, their falling down may mean management objectives were not met. The cedars are also susceptible to damage and subsequent attack by disease organisms. However, their wood appears to be more resistant to decay (USDA Forest Service, 1990).

On partially logged areas in the western hemlock-Sitka spruce forests of Oregon and Washington, Wright and Issac (1956) estimate that 35 percent of the residual trees were damaged. Lighter cuts (removing less volume) resulted in more residual trees being damaged than heavier cuts. Hennon (1990) reported that following commercial thinning, 33 percent of the residual western hemlock and 61 percent of the residual Sitka spruce were wounded during logging activities. The amount of decay to expect from this damage has not been quantified and is difficult to estimate due to very little research and the fact that most trees in the old-growth forests are already scarred or wounded due to natural or human related events. Farr *et al* . (1976) reported that total defect accounts for about 31 percent of the gross board-foot volume in old-growth forests of Southeast Alaska. Hennon and DeMars (1995) found that decay from scars 11 to 34 years old accounted for less than 5 percent of gross tree volume in six even-aged stands studied in Southeast Alaska (63 to 116 years old). They suggested that decay rates may be slower in Southeast Alaska (when compared to Oregon and Washington) because of lower temperatures. Studies showing how long damaged trees remain standing have not been done.

Clearcutting and group selection (opening sizes greater than 1 tree height in diameter) remove residual trees and create opening sizes large enough to fall a tree within cutting area boundaries. Thus, damage to residuals is confined to trees surrounding units. This damage is controlled through contract clauses and can be kept to a minimum. Other regeneration methods such as clearcut with reserves and group selection (openings less than 1 tree height in diameter), which leave residual trees in harvest units and create smaller openings, would likely result in trees within and surrounding cutting area boundaries becoming damaged. These wounds will likely become infected with decay and weaken the tree. If standing trees are left to provide vertical structure, they may not remain standing as long as undamaged trees. This could have an effect on whether management objectives are being met or not. As these residual trees age and snap-off or blowdown, they will also damage the regenerating stand.

Alternatives 2, 7, 9 and 11 would damage the fewest number of residual trees. These alternatives would have similar results. Alternative 1, which has no scheduled timber harvest, would tend to maintain conditions found in the old-growth forests. Alternatives 3, 4, 5, 6 and 10 are variable but would generally result in more trees being damaged than Alternatives 2, 7, 9 and 11. Leaving more residual trees would increase both the risk of damage and the number damaged.

3. Blowdown. The shallow-rooted character of western hemlock and Sitka spruce, frequent fall storms, abundant rainfall, shallow soils, complex topographic features, cyclonic wind patterns, and other factors make the forests of Southeast Alaska very susceptible to windthrow (Harris and Farr, 1974). Harris (1989) noted that blowdown is the most important natural process in renewing the forest in Southeast. He observed that most old-growth stands are composed of more-or-less even-aged trees arranged in complex patterns. In a study of blowdown on Prince of Wales and adjacent islands, he found that about half of the blowdown was complete (few or no trees remained standing) and the rest was partial (10-90 percent of the trees remained standing). The size of blowdown patches ranged from 2 to 175 acres with an average size of 18 acres. Assuming that 15 years is the maximum time that complete blowdown can be identified on aerial photos, a total of 18,537 acres blew down between 1958 and 1972. Small areas of blowdown (less than 2 acres) were not included nor were stands where isolated single trees or small groups blew down. Because scattered single trees or small groups often blow down, Harris noted that total blowdown was probably greatly underestimated. In addition, an estimated 1,000 acres that blew down in 1968 and were salvaged prior to the date of the aerial photography used were not included in the acreage estimate.

On northeast Chichagof Island, Garvey (1995 preliminary information) found similar results. He found that 47 percent of the blowdown left 0-10 percent of trees standing and the remaining 53 percent had more than 10 percent of the trees standing. The average size of blowdown patches was 34 acres with one patch being 434 acres in size. Only blowdown patches 5 acres or larger in size were considered in this study.

There is very little research on the size of opening that can be created without risking blowdown of adjacent stands or the percent of a stand that can be removed without risking the residuals within the unit blowing down. The distribution of blowdown across the landscape is highly variable and is dependent upon such factors as forest type, current condition of the forest, slope, aspect, elevation, soils, prevailing wind direction and wind speeds (Harris, 1989). Some areas are prone to windthrow on a regular basis while other areas experience windthrow infrequently. In the western hemlock, Sitka spruce, Douglas-fir forests of Oregon and Washington, Wright (1956) found that cuts that removed more than 20-25 percent of the board foot volume resulted in considerable blowdown of the residual stand. He found that anywhere from 50 percent to 85 percent of the residual stand blew down within 10 years following logging.

Clearcutting, by removing the trees within the cutting boundary, confines windthrow to adjacent stands. If unit boundaries are not designed properly, this loss can be considerable and continue over several years (Harris, 1989). Also, smaller harvest unit sizes, such as group selection, increase the amount of adjacent stands that are exposed to wind. This may increase the total amount of windthrow that occurs (Harris and Farr, 1974). Clearcutting with reserve trees generally opens stands up to the point that risk of windthrow to residual trees within unit boundaries and adjacent stands in increased. Leaving reserve trees in clumps may improve the chances of some residuals remaining standing. In all cases, however, losses to windthrow can be minimized through careful design of harvest units, consideration of past wind activity, and topographic position, and choosing the regeneration method that best mimics natural disturbance patterns.

Alternatives 2, 7, 9 and 11, by removing all trees within a unit, would confine windthrow to adjacent stands. These alternatives rank the same. Alternatives 1, 3, 4, 5, 6 and 10 are variable. Removing more than 20 to 25 percent of the volume and/or creating a number of small openings would increase the likelihood of blowdown of the residuals. However, this effect is very site specific and is highly dependent upon natural wind patterns and intensities.

4. Dwarf mistletoe. Dwarf mistletoe is a parasitic plant that infects western hemlock. It is rarely found in Sitka spruce and has not been reported in the cedars of Southeast Alaska. Dwarf mistletoe reduces height growth, causes a reduction in volume growth loss, and reduces wood quality (Hennon, 1995).

Dwarf mistletoe is one of the most important diseases of western hemlock in Alaska (Hennon, 1995). It is most abundant where all-aged forests exist and understory trees are constantly exposed to dwarf mistletoe seeds from above (Shea and Stewart, 1972). Studies in British Columbia found that lightly infected trees have no measurable growth loss, moderately infected trees lose about 23 percent growth, and heavily infected trees about 40 percent growth. These studies did not involve older trees (trees greater than 150 years old) but it is predicted that growth loss in old, slow-growing trees would likely exceed that of fast-growing younger trees (Hennon, 1995). Heavy infections can also result in top-kill or tree death. In general, height growth is more seriously affected than diameter growth for a given degree of infection (Hawksworth, 1978). Height growth loss of 81 percent has been reported (Smith, 1969). While estimates of annual losses by hemlock dwarf mistletoe have not been made for Alaska, in Oregon and Washington they are estimated to be 42 million cubic feet (Childs and Shea, 1972).

Clearcutting tends to eliminate dwarf mistletoe from the stand by removing the seed source and producing a vigorous, new stand that can grow faster vertically than the disease can spread (Hennon, 1995). Regeneration methods that create numerous small openings, such as group selection, retain a source of dwarf mistletoe seed, producing slower growth in hemlock and favoring the short-range dispersal mechanism of the disease. These factors contribute to the maintenance or increase in dwarf mistletoe in the stand (Hennon, 1995). Leaving dispersed reserve trees that are infected with dwarf mistletoe will result in discrete infection centers of young-growth trees around the residuals with uninfected or lightly infected young-growth trees between (Hennon, 1995). Diameter limit harvests tend to remove large trees and retain smaller ones. Considerable infection may occur in the smaller trees that remain. However, on productive sites, the height growth of the residual trees may be such that they can outgrow the vertical spread of the parasite (Hennon, 1995).

Despite its adverse effects to timber production, the brooms caused by dwarf mistletoe infection provide nesting sites and hiding cover for some species of birds. Several animals also use dwarf mistletoe for food. This indicates that light levels of infection may be desirable to wildlife and species diversity (Hennon, 1995).

Alternatives 2, 7, 9 and 11 would tend to control dwarf mistletoe. These alternatives rank the same. Alternative 1 which has no scheduled timber harvest, would tend to maintain levels of dwarf mistletoe found in old-growth forests. Alternatives 3, 4, 5, 6 and 10 are expected to be variable in control of dwarf mistletoe. Harvesting trees in larger groups (near 2 acres in size) could create patches of uninfected or lightly infected regeneration. Leaving few infected residuals scattered throughout harvest units may create isolated pockets of dwarf mistletoe that would have little effect on the regenerating stand. Leaving many infected trees scattered throughout the unit or harvesting smaller groups could result in infection levels in the new stand similar to Alternative 1.

5. Growth rates. Estimation of future yields from young-growth stands created by timber harvest are critical for developing allowable sale quantities for the Tongass Plan Revision. Growth and yield tables have been developed for even-aged stands in Southeast Alaska (Taylor, 1934; Farr, 1984). Published growth and yield tables have not been developed for stands regenerated under two-aged or uneven-aged methods.

Given that over 30 percent of the volume in old-growth stands is defective (Farr, 1976), it is unlikely that these trees would respond to the additional growing space made available through partial harvest. Even the older even-aged stands are generally beyond the age where partial removal of the stand would improve the growth of the remaining stand (Harris and Farr, 1974). Farr and Harris (1971) observed that several 96-year-old stands in Karta Bay responded to thinning but the degree of the response was not quantified. Oliver and Larson (1990) note that when suppressed trees are released, they may exhibit poor growth form.

Growth rates of trees growing under a canopy are not available for Southeast Alaska and very few studies have been done elsewhere. A study done on Douglas-fir in Washington showed that leaving five overstory trees per acre reduced the height growth of the regeneration by almost 15 percent. Leaving 10 overstory trees reduced the height growth of the regeneration by 20 percent and leaving 20 overstory trees reduced the height growth of the regeneration by 50 percent. Leaving more than 20 overstory trees resulted in mortality of the regeneration (Wampla, 1993). While Sitka spruce is more shade tolerant than Douglas-fir, it is reasonable to expect some growth loss when Sitka spruce is growing under residual overstory trees.

Clearcutting creates open conditions and even-aged stands where growth and yield can be predicted. While group selection creates openings up to two acres in size, information presented above indicates that some growth reduction would more than likely occur due to the fact that the regeneration would be under the influence of side shading part of the time. The closer regeneration is to boundaries, the greater the anticipated reduction in growth. Clearcut with reserves would also reduce growth with greater reductions occurring where more trees are retained.

Alternatives 2, 7, 9 and 11 would create even-aged stands where growth and yield of the new stand can be predicted. Overall stand growth would be highest under these alternatives. These alternatives rank the same on a per acre basis. Alternative 1 would create stands where there is considerable uncertainty in the growth and yield of the new stand. The effects on growth rates resulting from implementing Alternatives 3, 4, 5, 6 and 10 would be variable. Generally speaking, growth rates of the new stand would probably be greater than under Alternative 1 but less than under Alternatives 2, 7, 9 and 11. Leaving few residual trees or harvesting larger groups (near 2 acres in size) would result in higher growth rates compared to leaving many residual trees or harvesting smaller groups. There is also uncertainty in the growth and yield of the new stand.

6. Site productivity. Taylor (1933) observed that growth and vigor of shrubs and conifer seedlings increase greatly after clearcutting and that clearcutting has the effect of rejuvenating a site. Stephens *et al*. (1969) reported finding site index to be reduced about 20 units when stands originate after blowdown. Harris and Farr (1974) note that clearcutting allows more solar radiation to reach the forest floor, thus raising soil temperature and hastening biological decomposition of the thick organic mat, resulting in increased nutrient availability. While this hypothesis has not been tested, the above discussion indicates that more open conditions, such as those created by clearcutting, improve site productivity for some time. Those regeneration harvest methods that leave shade cover would retard organic matter decomposition and thus nutrient availability.

Recent work by Bernard Bormann (Bormann *et al.* 1995) in Southeast Alaska indicates that windthrow may be important in maintaining long-term soil productivity. The authors found that with lack of windthrow or other soil disturbance events, an impermeable layer forms in the soil that restricts soil drainage. This leads to accumulations of organic material and reduces site productivity. Windthrow breaks up this impermeable layer, mixes the soil layers, and increases biological decomposition which in turn increases nutrient availability. This impermeable layer can form in 350-400 years. Thus, management activities such as clearcutting that remove all standing trees from an area over successive rotations may cause the site to become excessively organic and reduce the productive potential of the soil. However, the amount of soil disturbance necessary to maintain long-term productivity has not been determined. This hypothesis needs further testing.

Concern has also been raised that clearcutting of forested wetlands may cause the water table to rise, thus reducing the rate and amount of decomposition and thereby reducing site productivity. Regeneration harvest methods such as group selection and clearcut with reserves may retain enough trees on site to reduce the effects of the raised water table. This hypothesis has not been tested.

Alternatives 2, 7, 9 and 11 would tend to increase site productivity for some period of time following harvest. The duration of this increased productivity is not known. These alternatives would have similar results. Alternative 1 which has no scheduled timber harvest would tend to maintain soil productivity at current levels. The effects of implementing Alternatives 3, 4, 5, 6 and 10 on site productivity would be variable. Generally speaking, future site productivity would probably be greater than under Alternative 1 but less than under Alternatives 2, 7, 9 and 11. Leaving few residual trees or harvesting larger groups (near 2 acres in size) would probably increase local site productivity but the degree and duration of this increased productivity are not known. Leaving many residual trees or harvesting smaller groups would create conditions similar to Alternative 1.

Reforestation

The NFMA requires assurance that all areas receiving final removal harvest can be adequately restocked with trees within five years of that harvest. On the Tongass, natural restocking, from advance regeneration and seeding is usually adequate to meet this objective. Since 1988, natural regeneration has accounted for 94 percent of the reforestation program. The remaining 6 percent has been artificial regeneration (planting). The future need for planting will be determined on a site-specific basis to achieve management objectives such as increasing the abundance of Sitka spruce where western hemlock or brush may have a competitive edge or increasing the abundance of Alaska cedar or western redcedar where natural regeneration of these species is anticipated to be inadequate. The desired species composition, required number of seedlings, and method of regeneration should be displayed in the silvicultural prescription. Table 3-51 lists the acreages requiring reforestation (natural or artificial) by alternative.

Intermediate Treatment Methods

The composition, health, value, and growth of a stand of timber can be improved through the application of intermediate treatment methods. Forest-wide standards and guidelines identify four types of intermediate treatments: precommercial thinning, cleaning, pruning, and commercial thinning. Of these, only precommercial thinning is scheduled in the Forest Plan. The other methods may be applied on limited scales to identify their utility in Southeast Alaska. Precommercial thinning is used because it:

1. Can be used to favor preferred tree species (Harris and Farr, 1974).
2. Concentrates tree growth on fewer individuals to produce larger trees in a shorter period of time (Aulerich *et al.,* 1982).
3. Increases the amount of light reaching the forest floor, thereby retaining understory vegetation that is valuable wildlife forage (DellaSalla *et al.,* 1994).

Timber Management Intensity

Suitable forest land is allocated to four broad yield categories according to the intensity of timber management desired to meet management objectives for a particular alternative. Because each alternative has different resource objectives, the mixture of management intensities is also different for each.

Category I Lands: Full timber yields. These lands generally have high timber yields. The full range of silvicultural practices are available subject to being consistent with the standards and guidelines designed to provide for multiple uses. These lands are generally managed using even-aged silvicultural systems. Rotation ages for managed stands occur near the Culmination of Mean Annual Increment (CMAI), a point where the average net merchantable growth (cubic foot basis) is at its maximum level. The age at which this occurs is dependent on the species, utilization standards, site productivity, stocking, and the management applied to the stand. On well-stocked, intensively managed stands CMAI can occur as early as 60 years or as late as 160+ years.

Category II Lands: Modified timber yields. These lands have special requirements to meet other resource objectives that result in reduced yields, usually from retaining live trees or extending the conversion period. These lands are generally managed using two-aged silvicultural systems or uneven-aged management on the basis of small even-aged/two-aged patch cuts. In two-aged systems, live trees are retained indefinitely in groups or as individually scattered trees throughout the unit. Small patch cuts are usually on the order of 1-1/2 to 4+ acres. These patch cuts can be treated by conventional even-aged management techniques (e.g., precommercial tinning etc.). Over time, a unit could be converted to an uneven-aged mosaic of such even-aged patches without any large and visually obtrusive harvest area.

Category III Lands: Incidental timber yields. These lands are characterized by significantly reduced timber yields. Areas where maintenance of visual quality is important, sensitive riparian areas, beach buffer, stream buffers, and sensitive wildlife habitat areas are included in this category. Generally, any management of the timber resource on these lands will be for stand maintenance purposes only and will approach an uneven-aged silvicultural system. Production of high current or future timber yields is not a consideration.

Under this management regime or concept, individual trees or small groups of trees are removed if conditions indicate a disease or pest threat to the stand, imminent mortality, or severe decline in growth. This concept should not be confused with the selection system (group or individual tree) of management. Selection implies strict stocking control and a high intensity of management to maintain growth rates, crown ratios, and overstory and understory tree vigor. Until actual selection silviculture becomes feasible on these lands, or even-aged management can be made environmentally acceptable or the lands classified as unsuitable, yields and control considerations are secondary and other uses have priority. The Region lacks growth data for even short-term projections. Attempts to project yields through many cutting cycles with present growth and inventory data are not realistic.

A recent study of uneven-aged silviculture (Gludin, 1996) reviewed a number of case studies and the author identified some factors that are needed to successfully employ uneven-aged silviculture. These are:

- The method works best when research has developed some expertise with specific forest types. This in not the case for Southeast Alaska forest types.
- Success with this method has been in gentle terrain, a condition not typical for Southeast Alaska.
- Attention was paid to cutting the worst trees and leaving the best.
- An extended period of time-two decades or more-is usually required before a reasonable, scientifically supportable assessment can be made of the success or failure of the method in a given forest type.

Category IV Lands: No programmed yields. These lands are unsuitable for timber production and are not included in the ASQ calculation. However, non-scheduled or incidental harvests might be obtained on some of these lands in all alternatives when vegetative management was an objective. Salvage operations as well as incidental harvesting may be planned on unregulated lands if necessary to enhance other resource values.

Table 3-79 displays how many acres would be managed by yield category for each alternative. Alternatives 2, 7 and 9 propose the greatest amount of lands with a high timber yield emphasis.

Table 3-79
Timber management intensity by alternative (Thousands of acres)[(1)]

Alt	No Yield (Category IV)	High Timber Yields (Category I)	Moderate Timber Yields (Category II)	Incidental Yields (Category III)	Total[(1)]
1	2,320	-	-	80	2,400
2	1,220	1,099	-	81	2,400
3	1,605	-	730	65	2,400
4	1,555	-	783	62	2,400
5	1,614	-	734	52	2,400
6	1,376	-	931	93	2,400
7	825	1,565	-	10	2,400
9	1,010	1,282	-	108	2,400
10	1,476	-	864	60	2,400
11	1,724	566	85	25	2,400

[1] All tentatively suitable timber lands.

Timber Supply Quantity

The expected quantity and quality of wood that each of the alternatives could contribute to the Southeast Alaska wood supply will now be discussed, focusing on:

- the Allowable Sale Quantity
- the factors that affect Allowable Sale Quantity
- the Allowable Sale Quantity and Long-term Sustained Yield capacity
- the species composition that would be expected for the next decade
- the projected log grade or quality that would be provided
- the product mix, in terms of sawlogs and pulplogs.

Allowable Sale Quantity and Timber Sale Program Quantity

The ASQ's of the alternatives are an indicator of possible future timber supply levels. The ASQ is the maximum quantity of timber that may be scheduled from suitable lands on the entire Forest for the next 10 years (36 CFR 219.3). It is usually expressed as an annual average. The yearly quantity may exceed or be less than the annual average for the decade. The Allowable Sale Quantity is a ceiling; it is not a future sale level projection or target and does not reflect all of the factors that may influence future sale levels. Given the uncertainties inherent in developing ASQ's, shortfalls between the ASQ and timber sales should be expected.

The ASQ is an expression of the biological potential of the forest regulated to produce timber within the constraints of other resource needs; it is constrained by harvest limitations necessary to meet Long-term Sustained Yield requirements, multiple-use considerations, and environmental restrictions. Changes in the timber land base, timber inventory or silvicultural prescriptions would affect ASQ.

An ASQ is, to some extent, imprecise because it is based on estimating techniques and forest-wide data rather than on detailed, on-the-ground data from the timber sale area. For example, variation from the mean timber volume by stratum is expected within smaller land divisions. The actual volume harvested should approach the Forest average over a number of Management Areas over all Ranger Districts. If this is not the case, a plan amendment or revision may be needed.

The timber sale schedules for each of the three Tongass Administrative Areas include that portion of the timber inventory that is scheduled for sale for a specific year. The schedule may include harvests from unsuitable lands and convertible products (such as beach log salvage and fuelwood) in addition to sales counting towards the ASQ. Schedules are updated annually or more frequently.

Table 3-80 displays the allowable sale quantities and area sale schedule comprising the TSPQ that could result from implementing each alternative. The ASQ is composed of two categories: sawlogs and utility logs. There is no scheduled yield from Alternative 1, since the entire land base is allocated to the incidental yield category. Four of the ten alternatives provide an ASQ that is greater than 300 MMBF. Three of the ten alternatives provide an ASQ between 200 and 300 MMBF. Two of the ten alternatives provide an ASQ between 100 and 200 MMBF.

Factors Affecting the Allowable Sale Quantity

Within Land Use Designations where timber yields are compatible with the resource objectives of the area, there may be "intrusions", "physical factors" and "unmapped" standards and guidelines which limit timber management opportunities. These factors, often termed "falldown," have been recognized at the Forest level, and the anticipated timber output adjusted appropriately. These limitations may include lands that are not capable of supporting a sustained timber management program. In other cases, where there are physical limitations, a less intensive or perhaps unregulated output may be scheduled for this period. Other factors also contribute to differences between ASQ's and timber sales, such as budgets and legal challenges.

The forest-wide estimates used to develop the ASQ considered many of the factors contributing to differences between ASQ's and timber sales. Taken into account were those factors that affect the suitability determination of forest lands and usually encountered in on-the-ground examinations (e.g., sale reconnaissance, stand exams, layout, and sale preparation). For each alternative, areas were set aside (not scheduled for harvest) to allow for those factors most often encountered. Data from previous case studies, monitoring, site visits, inventory data, the GIS database, and the new TIMTYP map were used to develop the acreage estimates (see Appendix B for more information).

More specifically, the following questions were considered:

1. Is it tentatively suitable? (36 CFR 219.14[a])

   Appendix A of the proposed Forest Plan outlines the process used to determine the tentatively suitable land base. The three most common factors encountered during project implementation are: (1) unmapped streams that need TTRA buffers; (2) unmapped extreme hazard soils; and (3) forest land incorrectly mapped as capable of growing industrial wood products.

2. Is it appropriate for timber production? (36 CFR 219.14[c and d])

   The Forest Plan alternatives standards and guidelines were reviewed for elements that are not mapped or in the GIS database and that could cause a loss of suitable acres. These were:

Table 3-80
Allowable Sale Quantity and Projected Administrative Area Sale Schedules (First Decade, Average Annual)

Alt	Administrative Area	Sawlog & Utility (MMBF)[1]	Sawlog & Utility (MMCF)[2]	Sawlog (MMCF)
2	Stikine	136.9	33.3	27.3
	Chatham	109.1	27.7	21.4
	Ketchikan	216.9	52.3	44.1
	ASQ	**462.8**[3]	**113.2**	**92.7**
3	Stikine	97.6	23.8	19.4
	Chatham	48.5	12.3	9.5
	Ketchikan	109.3	26.3	22.2
	ASQ	**255.5**	**62.4**	**51.2**
4	Stikine	47.2	11.5	9.4
	Chatham	32.0	8.2	6.3
	Ketchikan	51.0	12.3	10.4
	ASQ	**130.3**	**31.9**	**26.1**
5	Stikine	46.1	11.2	9.2
	Chatham	31.8	8.1	6.2
	Ketchikan	44.0	10.6	8.9
	ASQ	**121.9**	**29.9**	**24.4**
6	Stikine	112.0	27.3	22.3
	Chatham	79.6	20.2	15.6
	Ketchikan	117.5	28.2	23.9
	ASQ	**309.1**	**75.7**	**61.8**
7	Stikine	207.6	50.5	41.4
	Chatham	138.1	35.1	27.1
	Ketchikan	294.2	70.7	59.8
	ASQ	**640.0**	**156.3**	**128.2**
9	Stikine	155.7	37.9	31.0
	Chatham	124.9	31.8	24.5
	Ketchikan	268.2	64.5	54.5
	ASQ	**548.8**	**134.1**	**110.0**
10	Stikine	109.6	26.7	21.8
	Chatham	65.6	16.7	12.8
	Ketchikan	124.7	29.8	25.3
	ASQ	**299.8**	**73.3**	**60.0**
11	Stikine	95.3	23.2	19.0
	Chatham	51.4	13.1	10.1
	Ketchikan	120.5	29.0	24.5
	ASQ	**267.2**	**65.3**	**53.6**

[1] MMBF = Million Board Feet, long log bureau scale. ASQ is reported in cubic feet; board foot estimate is for informational purposes only.
[2] MMCF = Million Cubic Feet
[3] Totals may be off due to rounding

Karst and caves. For alternatives using the Karst and Caves standards and guidelines, the high vulnerability landscapes have been mapped and taken out of the suitable base; however, low to moderate rated landscapes have not been. These landscapes often contain areas with significant karst and cave features that are often identified during project planning and implementation.

Unmapped Class III stream buffers. The Tongass has an incomplete inventory of Class III streams. Alternatives 3, 4, 5, 6, 10 and 11 have significant buffer requirements for these streams.

Deer Standards and Guidelines. Alternatives 1, 3, 4, 5 and 6 require that important deer winter range be maintained in areas where average deer harvest exceeds 10 to 20 percent of deer habitat capability.

New Bald Eagle/Osprey Nests. These require 330-foot radius habitat management zones.

New Goshawk nests. These require 100-acre Management Areas.

Non-enacted municipal watersheds.

New Murrelet nests. These would receive 600-foot buffers.

Active wolf dens. These receive 600-foot forested buffers.

Important mountain goat winter habitat and travel corridors.

Land selections. State and Native land selections not yet conveyed.

Summary: Table 3-77 displayed the acreage that was assigned a no-harvest prescription to allow for the above factors. This is called the model implementation reduction acreage. Deer standards and guidelines, karst and caves, land selections, isolated stands, and Class III buffers account for the majority of the acres.

Cost efficiency: TTRA provides that:

> ANILCA is further amended by deleting section 705(d)(16 U.S.C. 539d(d)) in its entirety and inserting in lieu thereof:
> [d] All provisions of section 6(k) of the National Forest Management Act of 1976 (U.S.C. 1604[k]) shall apply to the Tongass National Forest except that the Secretary need not consider economic factors in the identification of lands not suited for timber production. (TTRA, Sec. 102.)

Economics is an important consideration in determining whether lands should be harvested; however, experience has proven that it is not feasible to effectively factor in economics as part of the 10-year timber suitability determination. There are various reasons why:

1. Economic conditions fluctuate greatly during the course of a plan period. One year a certain area of land or species may be uneconomic to harvest, and another year market conditions may have changed to where the same

area or species would be in demand. This makes it difficult to meaningfully assess the economics of harvesting a particular site over a 10-year period.

2. The value of the timber sale program must be considered as a whole rather than by only evaluating individual timber sales or harvest units in isolation, since some sales or units of low value are offset by other higher-value sales or units.

3. The timber program also must be viewed with consideration of non-market contributions, such as enhanced hunting use, fuelwood gathering, and motorized recreation, and not strictly timber sale costs and receipts.

4. Economic considerations can be adequately addressed through other means. For example, forest plan standards or non-interchangeable components can be established to limit harvesting due to economic reasons. In addition, economic considerations can be considered as part of the program development and budget process.

5. Economics of harvesting any particular site can be considered as part of the project decision to approve harvest of the area.

Two strategies were employed to address the economic issues:

1. Isolated stands of low to medium volume and low volume stands of difficult operability were assigned a non-harvest prescription.

2. The remaining economically and technologically marginal lands were scheduled for harvest but assigned to a non-interchangeable component (discussed below).

Non-interchangeable components

The Allowable Sale Quantity (ASQ) is partitioned into two non-interchangeable components (NIC's). The purposes of partitioning are:

- maintain the economic sustainability of the timber resource by preventing the over-harvest of the best operable ground; and
- identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions.

Limits on the sale of chargeable timber volume associated with each NIC cannot be exceeded. The total ASQ is derived from the sum of the timber volumes from both NIC's. For the Tongass, the following are identified as the NIC's:

NIC I: Normal Operability (80-82 percent of ASQ): This is volume scheduled from suitable lands using existing logging systems. Most of these lands are expected to be economic under projected market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchaser to profit from his/her investment and labor. This is the best operable ground.

Normal operability includes those systems most frequently used on the Tongass. These systems are tractor, shovel, standard cable, and some helicopter.

Tractor - Tractor logging includes all ground wheel or track systems used for skidding logs to a landing. Shovel yarding is included; however, tractor or rubber-tire skidding used in conjunction with swing operations are not included.

Standard Cable - The most typical logging systems used on the Tongass. Included in the standard cable system component are highlead uphill, highlead downhill, slackline, running skyline, and flyer.

Standard Helicopter - Helicopter yarding with yarding distances up to three quarters of a mile.

NIC II: Difficult and Isolated Operability (18-20 percent of ASQ): This is volume scheduled from suitable lands that are available for harvest using systems (e.g., logging or silvicultural) not in common use in southeast Alaska. Most of these lands are presently considered economically and technologically marginal.

Difficult operability includes those systems used on the Tongass which have significantly higher costs. These may include balloon, long-span skyline, multi-span, or helicopter with yarding distances greater than three-quarters of a mile. This category also includes lands which have limited access as a result of being isolated by prior harvest activities or other management activities.

Long Span Cable - Cable systems which require longer than average yarding distances. Typical long span cable systems considered are standing skylines and multispan.

Access Limitation - Logging systems required for areas with access limitation concerns. The logging system should be highlead cable when access to timber and roading is difficult. Typical harvest systems are helicopter and swing operations.

Isolated operability is comprised entirely of isolated stands. These are small stands of isolated timber which are extremely difficult to harvest. The harvest system could vary, but would be more costly due to the location of the stand, with average yarding distances greater than one mile.

Since 1980, about 7 percent of the harvest acres have come from this component (see Table 3-81). This component represents about 18 to 20 percent of the Alternative ASQ's.

Table 3-81
Harvest Acres by GIS Operability Class (acres)

Harvest Year	Normal	Difficult/Isolated	Total
1980	12,795	400	13,195
1981	8,898	140	9,038
1982	6,345	220	6,565
1983	4,183	80	4,263
1984	4,381	60	4,441
1985	5,583	440	6,023
1986	4,713	159	4,877
1987	12,825	1,460	14,285
1988	8,706	560	9,266
1989	11,137	1,859	12,996
1990	12,995	579	13,574
1991	7,438	619	8,057
1992	10,659	640	11,299
1993	10,184	1,061	11,245
1994	5,863	579	6,442
Total:	**126,710**	**8,856**	**135,566**
	(93%)	(7%)	

Source: Oracle Query QHarv80.out

Other Factors that Affect the Timber Sale Program

Budgets. The amount of funding that the Forest receives also affects the timber sale program. Often this factor can be more significant than changes in suitable acres. The ASQ of the Current Plan is 450 MMBF (sawlog); however, the average funded timber sale program from 1980 through 1995 was 404 MMBF or 90 percent of the ASQ (Table 3-82). The average funded level for the past 5 years (90-94) was 380 MMBF or 84 percent of the ASQ. The portion of the ASQ that was actually sold or release (80-95) averaged 304 MMBF or 68 percent of the ASQ.

Table 3-82
Timber Program Funding

Program Components	(MMBF)	Percent of ASQ	Range in Values (80-95) (MMBF)
ASQ (sawlog)	450		
Funded (80-95)	404	90	306 to 465
Funded (90-94)	380	84	320 to 477
Sold/Released (80-95)	304	68	171 to 496

Note: Years are fiscal years.

The cost of preparing timber sales has risen steadily over the past few years due to increased costs of environmental and GIS analysis, planning, resource support and the appeals/litigation process. Forest Service costs were around $30 per MBF harvested in 1988 and by 1993, rose to about $80 per MBF harvested; NEPA/planning costs were about 16 percent and 33 percent respectively of the total. As per unit costs have been rising, the amount of volume offered has been declining. Forest Service costs would be significantly higher in those Alternatives that use clearcutting with reserves or group selection; identifying the retention areas would require additional time and expense.

Appeals and Legal Challenges. Administrative appeals and lawsuits affect the continued availability of an adequate and consistent timber supply. Table 3-83 displays the appeal litigation history for 1991 through 1996. Since 1991, over 1.6 billion board feet has been appealed or litigated. About 890 million has been subsequently released, almost 610 million is still unresolved, and almost 100 million board feet has been dropped from the timber sale projects being challenged (about 6 percent of the total).

Table 3-83
Appeal and Litigation History for 1991 - 1996.

Year	Project Name	ROD Volume (MMBF)	Volume Affected
1991	Frosty Bay	26	Appeal withdrawn.
1991	North Sea Otter Sound	34	Appeal settled. Settlement agreement allowed about 28.5 to go forward.
1991	Starfish	44	Appeal dismissed (untimely).
1991	Shelter Cove	66	Decision was affirmed on appeal. Seven units were stayed until determination on road connection was completed in December 1991.
1992	Bohemia	38	Decision withdrawn, no volume released.
1992	Salt Lake	6.7	Decision reversed on appeal. Revised EA issued, DN also authorized 6.7 MMBF.
1992	Kelp Bay	117	Decision was affirmed on appeal, but the Wildlife Society litigated it[1]. ROD volume allowed to go forward, but 53.4 MMBF was subsequently enjoined by AWRTA[2] litigation.
1993	Southeast Chichagof	127.8	Decision affirmed on appeal, but 63.3 MMBF subsequently enjoined by AWRTA litigation.
1993	North and East Kuiu	136	123.2 MMBF stayed while appeal was reviewed. This volume was released when decision was affirmed, but 114 MMBF subsequently enjoined by AWRTA litigation.
1993	Central Prince of Wales	267	Decision affirmed on appeal, but was subsequently litigated by SEACC[3]. Approximately 98 MMBF was released under a settlement agreement, while remaining volume was suspended pending completion of a Supplement to the FEIS.
1994	North Revilla	205	Decision affirmed on appeal.
1994	North Irish	4.8	Decision withdrawn on appeal, no volume released.
1994	Bohemia	34	Decision reversed on appeal, no volume released.
1995	Ushk Bay	67	Decision affirmed on appeal. Approximately 600 MBF dropped in negotiations with State during ACMP review. Litigation pending[4]. The Forest Service agreed to not open bids on any sale from this project until 21 days after the District Court has issued a decision or until January 31, 1997, whichever comes first.
1995	Polk Inlet	64.5	Appeal withdrawn.
1995	Bohemia	34	Decision affirmed on appeal.
1996	CPOW Supplement	214	Decision affirmed on appeal. Litigation pending[5]; the Court denied motion for preliminary injunction.
1996	Northwest Baranof	66.7	Decision affirmed on appeal. Litigation pending[6].
1996	Eight Fathom	104	Decision affirmed on appeal. Litigation pending[7].

[1] Wildlife Society v. Janik, Case No. J93-001 (D. Alaska)
[2] Alaska Wilderness Recreation and Tourism Association v. Morrison, 67 F.3rd 723 (9th Cir. 1995)
[3] Southeast Alaska Conservation Council v. Powell, Case No,. J94-021 (D. Alaska)
[4] Friends of Southeast's Future v. Morrison, Case No. J96-011 (D. Alaska)
[5] Shoaf, et. al., v. Powell, et. al., Case No A96-137 (D. Alaska)
[6] Sitka Tribe of Alaska v. Morrison, et. al., Case No. J96-019 (D. Alaska)
[7] Hoonah Indian Association v. Morrison, Case No. J96-018 (D. Alaska)

Factors Not Addressed. Only those project items (Model Implementation Reduction Factors) that would change the suitability designation of currently suitable lands are incorporated into the FORPLAN model constraints. Project decisions that affect scheduling, mapping errors (office vs. field measurements), office vs. field discrepancies, dispersion requirements, differences in sale planning philosophies, logging system decisions, appeals/litigation, and other similar items are not factored into the FORPLAN model constraints. The volume from these lands, while not available for harvesting immediately because of project or court decisions, would still be part of the suitable timber base for ASQ calculations.

Allowable Sale Quantity and Long-term Sustained Yield Capacity

Long-term sustained yield (LTSY) is the maximum timber yield that can be sustained indefinitely from lands managed for timber production when all stands have been converted to a managed state. This varies by alternative according to the timber management strategy proposed. LTSY is a function of the total number of acres allocated to timber management, the management intensity, standards and guidelines, silvicultural systems, and the productive capacity (conifer growth) of the suitable lands. The harvest schedule is based on: (1) a harvest schedule that exhibits non-declining yield at or below Long-term Sustained Yield capacity, (2) a regeneration harvest age at or beyond culmination (maximum) of Mean Annual Increment, and (3) a planning horizon of 150 years.

Table 3-84 displays the LTSY and ASQ by alternative. For all alternatives, the ASQ never exceeds the LTSY during the 150-year planning horizon. Alternatives that would allocate a greater number of acres for timber management and/or have more acres under intensive management would produce the highest LTSY's.

Table 3-84
Allowable Sale Quantity and Long-term Sustained Yield Capacity (MMCF)[1]

Alt	Decades 1 to 5	Decades 6 to 10	Decades 11 to 15	LTSY
1	-	-	-	-
2	113.2	113.2	115.2	127.7
3	62.4	62.4	64.4	72.2
4	31.9	31.9	31.3	62.9
5	29.9	29.9	29.3	58.7
6	75.2	75.2	78.1	92.1
7	156.3	156.3	159.7	177.3
9	134.1	134.1	136.4	149.2
10	73.3	73.3	74.7	84.3
11	66.8	66.8	68.8	75.9

[1] Long-term Sustained Yield is only expressed in the cubic foot measure.

Timber Supply Characteristics

In most of the following discussions of timber supply, comparisons are made for a range of sale quantities; a high end or 100 percent attainment of the ASQ and the NIC I component. An even lower sale quantity than the NIC I component could occur as the result of timber markets, appropriations, appeals and litigation, or other factors.

Species Composition

Stands differ in their species composition and grade and hence in their value. The species composition is a reflection of the volume strata that would be scheduled for harvest in the first decade. The estimated mixture of species that would be offered for sale is displayed in Table 3-85.

In Southeast Alaska, an important consideration is the occurrence of cedar. Cedar species are usually sold in separate markets. The cedar species, both western red and Alaska yellow-cedar, are minor species that historically have not provided enough volume of sufficient quality to support a sizable local domestic industry. Much of the cedar volume is poor grade and is of little value as lumber or shingles. In addition, cedar is generally not used to produce pulp. However, high-grade logs (especially Alaska yellow-cedar) usually command high prices in the export market. These species can be exported and are usually sold in the export market. The round log export policy is currently under review by the Forest Service and could result in a restriction on cedar export.

Table 3-85
Species Composition of the Allowable Sale Quantities by Alternative, Projected Annual Average for Decade 1 (MMBF)

	Sitka Spruce		Western Hemlock		Cedar		Utility		Total	
Alt.	**ASQ**	**NIC I**	**ASQ**	**NIC I**	**ASQ**	**NIC I**	**ASQ**	**NIC I**	**ASQ**	**NIC I**
1	0	0	0	0	0	0	0	0	0	0
2	121	100	234	189	25	20	83	67	463	375
3	67	57	129	105	14	11	46	37	255	210
4	34	29	66	53	6	5	24	19	130	107
5	32	27	61	50	6	5	22	18	122	100
6	81	67	156	125	15	12	57	45	309	250
7	168	138	323	261	34	28	115	92	640	520
9	143	118	278	225	30	25	98	79	549	447
10	79	66	151	122	15	12	54	44	300	245
11	70	57	135	108	15	12	48	38	267	215

Cedar: Alaska Red Cedar and Western Yellow-cedar
Utility: Sitka Spruce and Western Hemlock
[1] Totals may be off due to rounding

Gross Sawmill Log Delivery

Decisions regarding whether a log will go to the chipper or to the saw mill will vary, depending on the market price of lumber and pulp, as well as the current available log and chip supply. Log grades are related to the quality of the products to be produced from the logs. Therefore, quality is defined in terms of some derived product, preferably the product that gives maximum value for a given log.

Glossary

The discussions and table on this page, and the top of the next page (through Table 3-87), break out the timber supply of each alternative by likely end-product, one of which is pulp logs. With the closure of the KPC pulp mill, the market for this material will be considerably different over the next decade. Some pulp logs may go to the chip market; other will likely remain unsold. This fact does not alter the following analysis of log quality, which is a supply issue.

The proportion of each log grade that can be expected to be delivered to the sawmill was estimated using the logs sawn ratios contained in the Forest Service Appraisal Handbook 2409.22. The ratios represent data collected from the past ten years. The logs sawn ratio is the percent of each grade that would normally be delivered to the sawmill. The projected volumes are displayed in Table 3-86 for each alternative. About 57 percent of the hemlock-spruce volume would go to the sawmill, with the remaining 43 percent to the pulpmill. These numbers are used in projecting the portion of the sale quantity that would go towards satisfying sawmill capacity, with the remainder designated for the pulpmill capacity, some other facility using pulp grade material, or export.

Table 3-86
Projected Hemlock and Spruce Log Grade Compositions of the Allowable Sale Quantities of the Alternatives, 1st decade annual average (MMBF) ASQ and NIC I

Alt	Hem-Spruce Sawlogs		Hem-Spruce Pulplogs		Cedar Logs		Total	
	ASQ	NIC I	ASQ	NIC I	ASQ	NIC I	ASQ	NIC I
1	0	0	0	0	0	0	0	0
2	240	196	198	159	25	20	463	375
3	133	110	109	89	14	11	255	210
4	68	56	56	46	6	5	130	107
5	63	53	53	43	6	5	122	100
6	160	130	134	107	15	12	309	250
7	332	272	274	220	34	28	640	520
9	285	233	234	189	30	25	549	447
10	156	128	129	104	15	12	300	245
11	139	112	114	91	15	12	267	215

Products (sawlogs, pulplogs, chip-by-product, other)

The timber resource of the Tongass can generally be classified into four types of products: sawlogs, pulplogs (logs delivered to the pulpmill, e.g., utility logs and lower grade sawlogs), chip by-products, and other products (usually cedar export logs). Based on the species composition and log grade composition, the ASQ's of each alternative were divided into the three product categories. These volumes are used to project that portion of the ASQ that would likely go to the sawmills (sawlogs), to the pulpmills (pulplogs), and to the export market based on past experience. The results are displayed in Table 3-87. The product breakdown for all alternatives is about 52 percent sawlogs, 43 percent pulplogs (includes utility), and 5 percent export cedar logs.

Alaska's sawmills produce chip residues from the lumber manufacturing process and they also produce chips from a portion of the sawlog volume delivered to the sawmill. These chips and chip by-products are an important supply source for the remaining pulp mill in Southeast Alaska. Pulp is produced from the logs (i.e., low grade sawlogs and utility logs) delivered to the pulp mill and from the chip by-products produced from sawmills. If there is a dependable excess supply of this product, it could be used by another manufacturing facility (e.g., a medium density fiberboard plant), utilized for energy, or exported.

Table 3-87 also displays the projected chip by-product (in terms of bone dry units) that would be produced from each alternative's projected wood supply. The output is based on certain assumptions of product conversions, overrun, and product recovery. The assumptions we used are available (Brooks and Haynes, 1994). This information is used in the socioeconomic section to predict the effect the alternatives may have on the existing Southeast Alaska timber industry infrastructure (i.e., the sawmills and pulpmill) and the subsequent effect on jobs and communities.

Table 3-87
Projected Product Composition of the Allowable Sale Quantities, Decade 1 Annual Average

Alt	Gross Log Input Sawmill (MMBF)[1]	Lumber Produced (MMBF)	Sawn Logs (MMBF)	Chipped Logs (MMBF)	MFG Residue[2]	Chip Logs[2]	Pulp Logs[2]	Total Chips & Residue[2]	Total BDU's
1	0	0	0	0	0	0	0	0	0
2	240	251	199	41	169	111	529	808	674
3	133	139	110	23	93	61	291	446	371
4	68	71	56	12	47	31	150	228	190
5	63	66	52	11	44	29	141	214	179
6	160	168	133	28	113	74	357	543	453
7	332	347	275	57	233	153	731	1,117	931
9	285	297	236	49	200	131	626	957	797
10	156	163	129	27	109	72	343	524	437
11	139	145	115	24	97	64	304	466	388

Gross log input = ratio of lumber production and log deliveries to sawmills, ratio is from Brooks and Haynes, 1994.
Ratio of gross log input and overrun = units are board feet of logs chipped per board feet of logs used for lumber.
[1] long log bureau scale
[2] Thousand Dry Tons

Effects on the Timber Supply

The following discussion displays the potential consequences of implementing the proposed alternatives on the timber supply. The analysis uses the ASQ and NIC I estimate of each alternative's timber supply potential. The consequences of implementing the proposed alternatives focus on the following questions:

- How would the timber supply compare to historic harvest levels?
- How much timber would be available for an SBA program?
- Would there be a sufficient timber supply for a 10-year contract?
- What would be timber sale action plan?

1980 to 1995 Harvest Comparison

The average volume harvested per year for the first 15 years (1980 to 1995) of the current plan was about 340 MMBF (sawlog and utility). During this time period both the KPC and APC pulp mills were operating. The NIC I sale quantity in the alternatives ranges from 0 to 520 MMBF, and the full ASQ's from 0 to 640 MMBF. The projected NIC I estimates for Alternatives 1, 3-6 and 10-11 are not sufficient to meet sell-and-harvest levels equivalent to those of the last 15 years (Table 3-86). Only Alternatives 2, 7 and 9 would provide sufficient volume to achieve historical harvest levels.

The projected ASQ's for Alternatives 1, 3-6, 10 and 11 are not sufficient to meet sell and harvest levels equivalent to those of the last 15 years. However, Alternatives 2, 7 and 9 would provide enough volume.

1989 to 1991 Harvest Comparison

The average volume harvested per year for fiscal years 1989 through 1991 was about 426 MMBF (sawlog and utility). This was the high point of timber harvest during the last 15 years and includes APC and KPC harvest. This was a period of favorable market conditions that prompted an increase in the output of manufactured wood products. In fiscal year 1989, timber from the Tongass National Forest supported nearly 45 percent of the logging employment in Southeast Alaska, and roughly 70 percent of employment in pulpmills. The projected ASQ for all alternatives except Alternatives 2, 7 and 9 are not sufficient to meet the sell and harvest level equivalent to that of the 89-91 operating period (Table 3-86). The projected NIC I sale quantities for all alternatives with the exception of Alternatives 7 and 9 are not sufficient to meet the sell and harvest level equivalent to that of the 89-91 operating period.

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Glossary

SBA Program

Sec 105, Small Business Set-Aside Programs, of the Tongass Timber Reform Act states that the Secretary shall, in consultation with the Small Business Administration:

> "seek to provide a supply of timber from the Tongass National Forest to those purchasers qualifying as 'small business concerns' under the Small Business Act as amended (15 U.S.C 631 et seq.)."

To facilitate the development of competitive enterprises and markets for timber resources, the Forest Service and Small Business Administration, in 1995, agreed to an annual set-aside goal of approximately 100 MMBF for the Tongass National Forest. Mills qualifying for the Small Business set-aside program are distributed throughout Southeast Alaska.

The United States Department of Agriculture, Forest Service, Alaska Region (Forest Service), and the Small Business Administration (SBA) have agreed that:

1. The independent timber sale program goal for the Tongass National Forest will be 100 MMBF per Fiscal Year (October 1, 1995 to September 30, 2000).

2. All independent sales shall be offered as SBA sales (exceptions: small salvage timber sales, resales of uncompleted contracts (defaulted sales), and previously advertised but unsold timber sales).

3. If markets change, the small business offerings may be adjusted through joint agreement.

4. The agreement will be reviewed for possible modification upon completion of the Forest Plan Revision.

Table 3-93 displays, by alternative, the volume that would be available for an SBA program after termination of the KPC contract. The portion of this volume under each alternative not related to the SBA Program would be available for an Independent Sale program not restricted by SBA requirements or for a ten-year timber sale contract. These projections are based on 100 percent attainment of the ASQ and the NIC I estimate. There appears to be sufficient volume from all alternatives (except Alternative 1) to meet the 100 MMBF SBA goal or higher. All alternatives meet the 100 MMBF SBA goal at both the ASQ and NIC I volume levels.

Table 3-93
Small Business Program Supply Capability (MMBF)[1] Assuming the KPC Long Term Contract is Terminated

Alt.	Available ASQ	Available NIC I	SBA Goal	Surplus/Deficit ASQ	Surplus/Deficit NIC I
1	0	0	100	-100	-100
2	462.8	375	100	+363	+275
3	255.5	210	100	+155	+110
4	130.2	107	100	+30	+7
5	121.9	100	100	+22	0
6	309.1	250	100	+209	+150
7	640.0	520	100	+540	+420
9	548.8	447	100	+448	+347
10	299.8	245	100	+199	+145
11	267	215	100	+167	+115

[1] All figures are MMBF's, sawlog plus utility

10-Year Contract

As part of the letter terminating the Alaska Pulp Corporation long-term timber sale contract (April 14, 1994), the Regional Forester included the following statement:

> "While 17 years remained under this contract, I bring to your attention the fact that the Forest Service, under authority granted by the National Forest Management Act, 16 U.S.C. 472a, may offer timber sale contracts for a period not to exceed ten years. Should APC continue to explore the economic viability of building and operating an MDF facility, the Forest Service has authority to prepare a ten-year timber sale package for advertisement and bidding. The ten-year period may be a sufficient length of time to assure a reasonable return on such an investment and promote the important goal of maintaining continuous, year-round employment in Southeast Alaska. The Forest Service also stands ready to continue to provide technical or other assistance within our capability with respect to means of full utilization of timber in Alaska."

In a followup letter (Ten-year Timber Sale Contract Feasibility Study, July 12, 1994) the Regional Forester concluded that the TLMP Revision would be the appropriate process for determining the advisability of proceeding with a ten-year sale offering.

The primary objectives for a ten-year contract would be to provide enough volume from an exclusive timber sale area to secure capital investments for the construction and production of an industrial wood manufacturing facility in Southeast Alaska. The economic goals would be to:

- be sustained with the available wood supply
- use environmentally compatible production processes
- provide maximum opportunities for value-added products.

The original focus of a ten-year timber sale contract was to provide employment and wood utilization to replace that lost in Sitka, Alaska with the closure of the APC pulp mill. APC had indicated that it was considering the feasibility of converting the pulp mill to a medium density fiberboard (MDF) plant. Although APC has since announced that it will not pursue a MDF facility at its site in Sitka, consideration has been given to the feasibility of an alternative manufacturing facility, primarily MDF. (Feasibility Analysis of Alternative Wood-based Industries for the City and Borough of Sitka, Alaska, International Resources unlimited, Inc., Draft Report 1995.) Closure of the Ketchikan Pulp Mill may provide an alternative impetus for consideration of an MDF plant in Southeast Alaska.

MDF is an engineered panelboard product manufactured from refined wood fibers and resin. Virgin wood fiber from round wood and chips plus other wood product manufacturing residual are the primary fibers used to manufacture MDF. Wood fibers are bound together with urea formaldehyde or other resins. Bonding technology has advanced to the point where a non-formaldehyde based binder may now be economical.

Wood fibers used in MDF are refined from chips into fine particles, thus transforming wood into a homogeneous fiber unit with a more constant density across species. Other fiber sources, such as wood demolition debris, recycled paper and agricultural waste are currently being tested and used as alternative raw materials in MDF manufacturing. MDF is manufactured by extrusion pressing or by flat, mat-formed pressing. Flat-pressing represents the bulk of the current existing manufacturing processors in the USA. In this flat-press, fiber is blended with wax and resin and compressed in heated presses where the resin cures and solidifies the mixture into panels. MDF has been used for furniture manufacture, replacing scarce and expensive hardwood plywood. More recently, MDF's usage has spread to door frames, floor sheathing and wall paneling. The building industry values it for its stable price and uniformity. MDF possesses excellent machining qualities due to the small particle size of the fiber. MDF is very useful for furniture components, indoor sheeting, and ready-to-assemble products.

Sitka Spruce and hemlock found in Southeast Alaska are acceptable as raw material for MDF. The size of suitable raw material is from one and seven eighth inch chips down to sawdust. All fiber must be free from all foreign objects; the manufacturing process will tolerate not more than three percent bark content. The raw material needed for MDF comes from two basic sources. One is residuals from sawmills and other wood product manufacturers in the area. The other source is from utility logs. The majority of the raw material needed for a MDF in Southeast Alaska would come from the Tongass National Forest. Not only is the greatest volume of timber located on the National Forest, but federal law requires local processing. Much of State and Native harvest that takes place in the region rely on round log (unmanufactured) export to the Pacific Rim markets. Only federal timber is required to receive primary local manufacturing (add-on) before the product can be exported.

It appears to be infeasible for a MDF facility to be self-sufficient for raw material. The availability of residuals from sawmills or pulp logs require association with a sawmill. The lower quality pulp (utility) log is included as a component of timber sales. An efficient mix in a timber sale is considered to be about 65 percent of the material to be sawn and the remainder used for manufacture using pulp and residual quality material. A sawmill approximating the capacity of the APC Wrangell Mill is considered an integral part of a MDF facility operation in the analysis.

Two manufacturing capacities were analyzed to evaluate the timber supply required for a MDF facility and are displayed in Table 3-94.

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Table 3-94
MDF facility capacity alternatives[1]

	Capacity Alternatives A	B
MDF Capacity (MMSF)	120	65
Roundwood Equivalent (MMBF)	69	37
Sawmill Sawlogs (MMBF)	60	60
Wood Residue (from sawlogs) (MMBF)	23	23
Utility Logs (MMBF)	46	14
Total Roundwood (MMBF)	**106**	**74**

[1] MDF capacity is expressed in MMSF. An MMSF is one million square feet of three quarters inch panelboard stock. All other amounts are MMBF

Both capacity alternatives are expected to yield the same stumpage return (approximately $50/MBF) under current market conditions. The economies of scale afforded by the 120 MMSF (see table for definition) design are offset by the high cost of supplementing sawmill residue with whole log chipping. In contrast, over 60 percent of the raw material input for the 65 MMSF plant can be supplied by sawmill residues, which reduces the cost of raw material and offsets the less efficient design.

Because of the high percentage of pulpwood (utility logs) in the timber supply, a 60 MMBF sawlog supply for the sawmill requires a somewhat higher harvest volume. Therefore, the wood requirements of the 120 MMSF MDF plan/sawmill combination are more closely aligned with the physical properties of the timber supply. A smaller MDF plant would be more likely to leave the sawmill with an excess of pulp logs.

In the previously cited *Feasibility Analysis of Alternative Wood-Based Industries for the City and Borough of Sitka, Alaska* opportunities for a sawmill, a custom kiln drying facility, a planner mill, a laminated strand lumber manufacturing facility, shared manufacturing facilities, as well as a medium density fiberboard facility were all assessed. Based on this analysis, several of the alternatives were feasible.

The Forest Service currently has the authority to make ten-year timber sale contracts. The environmental considerations for this type of contract are not qualitatively different than for any other timber sale contract. In other words, as long as the volume for a ten-year timber sale originated on lands determined to be suitable for timber harvest and the volume was part of the scheduled Allowable Sale Quantity, Forest Plan resource objectives could be met. Social impacts would be related to competition between purchasers. Based on this and other assessments, it would take approximately 100 MMBF annually to support a MDF (or probably other facilities interested in a ten-year timber supply). The feasibility of providing this volume is contingent on other demand for timber supply..

Referring back to Table 3-88, 390 MMBF is higher than the historic (1980-94) harvest average of 340 MMBF. Only three Alternatives (2, 7 and 9) have an ASQ meeting or exceeding 390 MMBF. None of the alternatives meet or exceed 390 MMBF at the NIC I sale quantity estimate.

Projected Demand

Based on the recent Brooks and Haynes update (1997), the medium estimate of demand for Tongass timber for the next decade (1998-2007) is an average 110 MMBF per year. This will all be lumber (sawlog) demand, since pulp mill demand is zero. Table 3-96 compares this requirement to the ASQ's of the alternatives.

Table 3-96
Alternative sawlog composition and projected demand for Tongass sawlogs (all figures are MMBF)

Alt.	Sawlog Demand (10 yr. average)	Sawlog Component ASQ	Sawlog Component NIC I	Surplus or Deficit (-) ASQ	Surplus or Deficit (-) NIC I
1	110	0	0	-110	-110
2	110	240	196	130	86
3	110	133	110	23	0
4	110	68	56	-42	-54
5	110	63	53	-47	-57
6	110	160	130	50	20
7	110	332	272	222	162
9	110	285	233	175	123
10	110	156	128	46	18
11	110	139	112	29	2

Source for Sawlog Demand: Brooks and Haynes, 1997 draft

The ASQ's, and NIC I ASQ components, of Alternatives 2-3 and 6-11 are all capable of meeting the estimated lumber demand for the next decade (medium scenario). Alternatives 1, 4 and 5 have neither an ASQ or NIC I component capable of meeting the projected demand. Using the low demand scenario (see page 3-262, as updated), which would be a 68 MMBF average for the next decade, these three alternatives still do not meet demand except for Alternative 4 at full ASQ. Using the high scenario (154 MMBF average), only Alternatives 2, 7 and 9 would meet demand only at the full ASQ level. Using this high-end estimate, Alternatives 1, 3-5 and 11 would not be capable of meeting demand with either component.

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Future Conditions

Most of the existing timber stands (about 92 percent) on the Tongass are beyond Culmination of Mean Annual Increment (CMAI). Timber stands which exceed CMAI are not growing at optimal rates for their site's potential productivity. Tongass timber stands are capable of producing prodigious amounts of wood. On a site typical of those currently harvested (Taylor Site index 120, Yield of Second-Growth Western Hemlock-Sitka Spruce Stands in Southeastern Alaska), a normally stocked stand 30 years old would be expected to contain 197 square feet of basal area and 3,800 cubic feet of wood per acre. By age 50, basal area will increase to 248 square feet and volume to 7,275 cubic feet. The age of merchantable CMAI would be around 100 years with a Mean Annual Increment of 137 cubic feet/acre/year. The yield per acre in board feet (International rule (1/8-inch kerf)) would be about 91 MBF (7 inch and more in Diameter at Breast Height). Yields from two-aged silvicultural systems would be significantly less (Alternatives 3, 4, 5 , 6 and 10) but still significantly higher than existing old-growth stands.

As a greater proportion of the forest is converted from slower growing, highly-defective stands to stands well-stocked with vigorously growing conifers, total forest growth would increase. Because of higher volumes and lower defect, managed young-growth would be able to provide significantly higher harvests on the same land base or support the same harvest on a smaller land base. Under a 100-year rotation only about 2/3 of the current timber base would be needed to provide the ASQ. The remaining 1/3 of the timber base could revert to some other land use and be available to provide old-growth habitat.

Since each alternative would prescribe different harvesting schedules and timber management land bases, the conversion period (the time it takes to reach a regulated stand) would vary considerably between alternatives. Table 3-98 and Figure 3-11 display for each alternative the conversion period for existing stands and the average rotation age or management age of the managed stands. There is a wide variety of rotation ages (70 to 170 years) in all alternatives, with the exception of Alternatives 4 and 5. Entry into young-growth stands is expected to start occurring in the 5th or 6th decade. The majority of old-growth stands would be harvested by the end of the 7th decade, with the exception of Alternatives 4 and 5.

Table 3-98
Old growth Conversion Periods and Young-Growth Rotation Ages and Management Ages (Regulation Class 1 and 2 lands)[(1)]

Alt	Conversion Period Existing Stands	Average Rotation Age Young-Growth/ Management Age	Young-Growth Rotation Management Age Range in Values
1	-	-	-
2	70	105	70-170
3	70	115[(2)]	70-170
4	200	200[(2)]	
5	200	200[(2)]	
6	70	110[(2)]	70-170
7	70	100	70-170
9	70	110[(2)]	70-170
10	70	105	70-170
11	70	105	70-170

[1] Years
[2] Rotation age for two-aged management is based on the managed understory. These stands contain significant amounts of unmanaged old-growth structure in the overstory.

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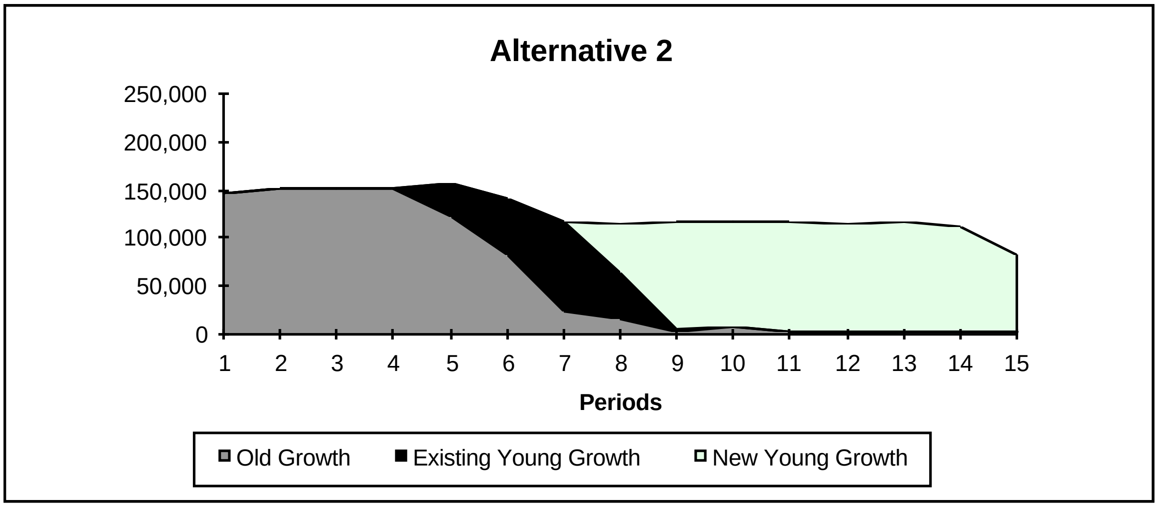
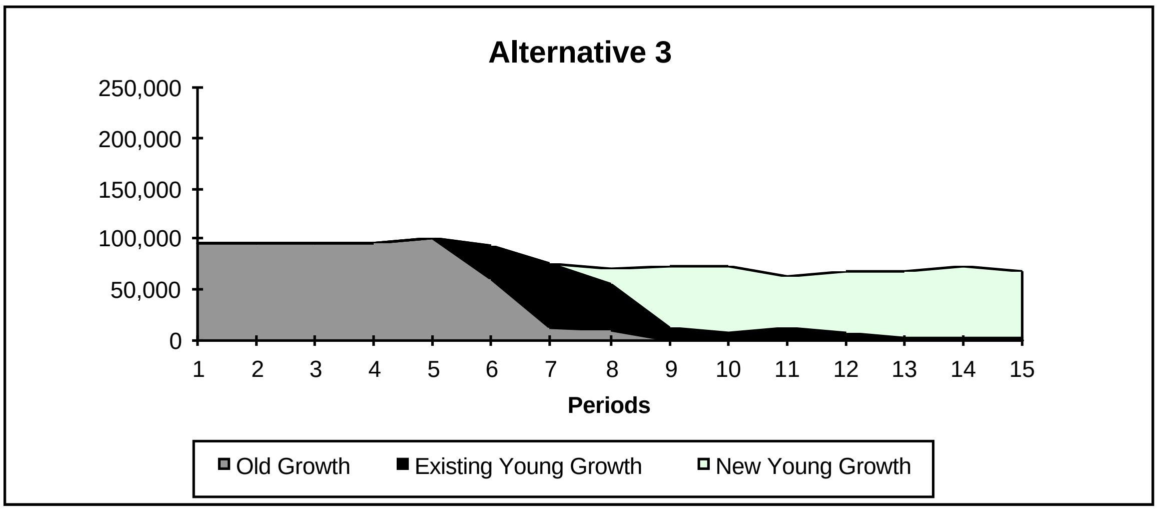
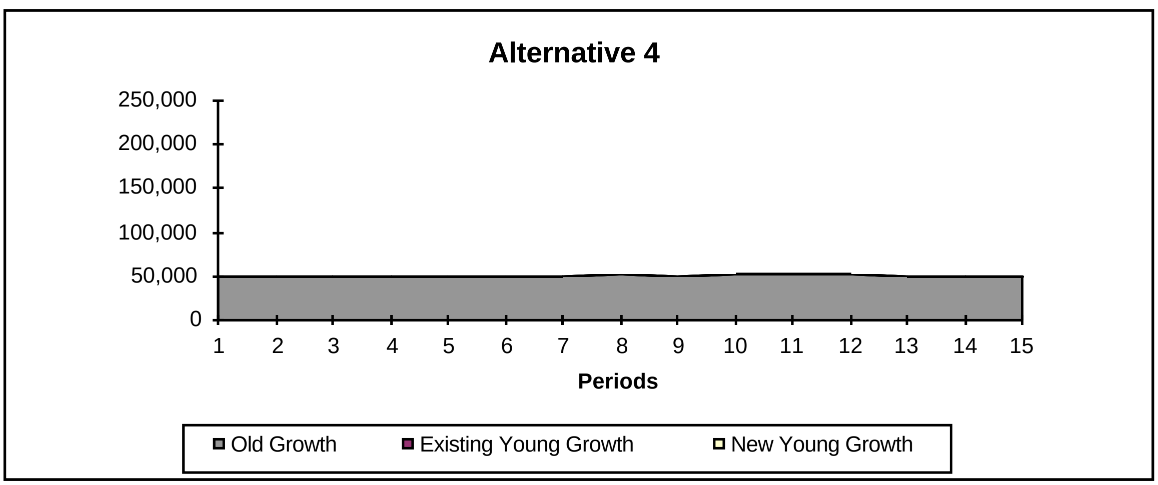
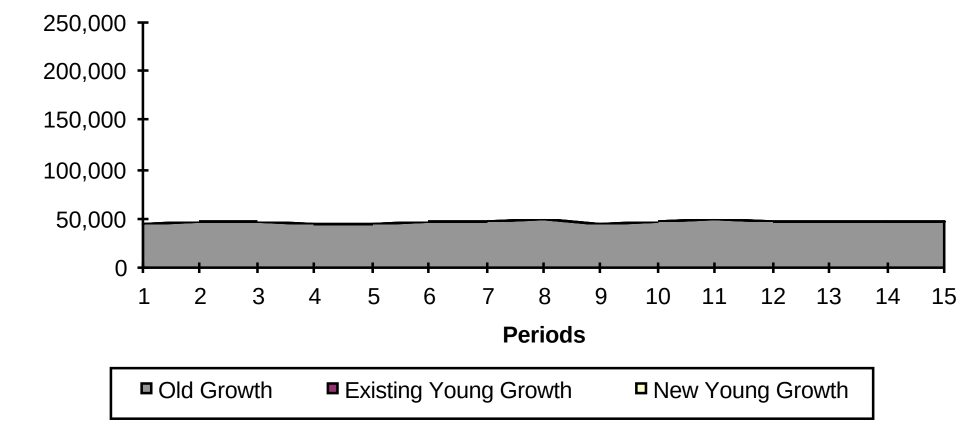
Figure 3-11
Acres of Old growth Volume Class and Young Growth Scheduled by Alternative



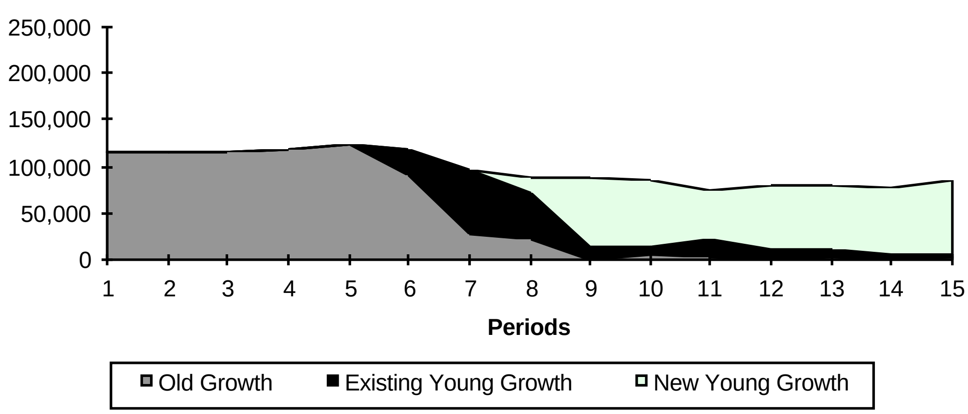




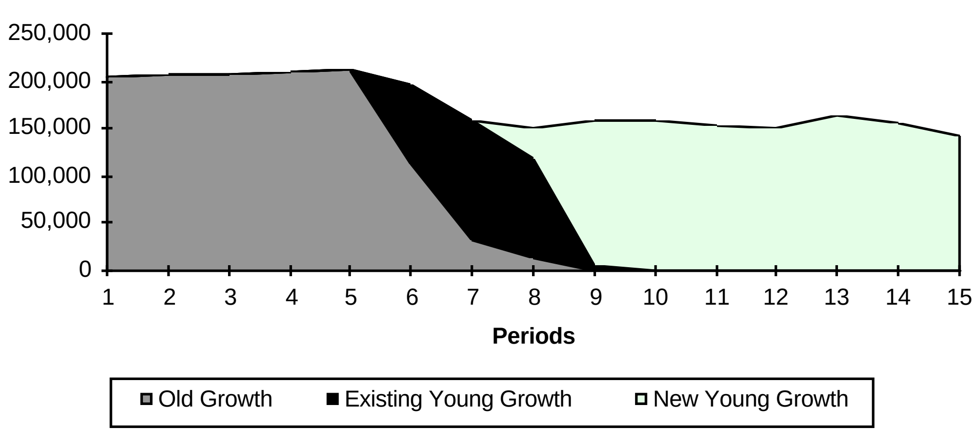
Alternative 5



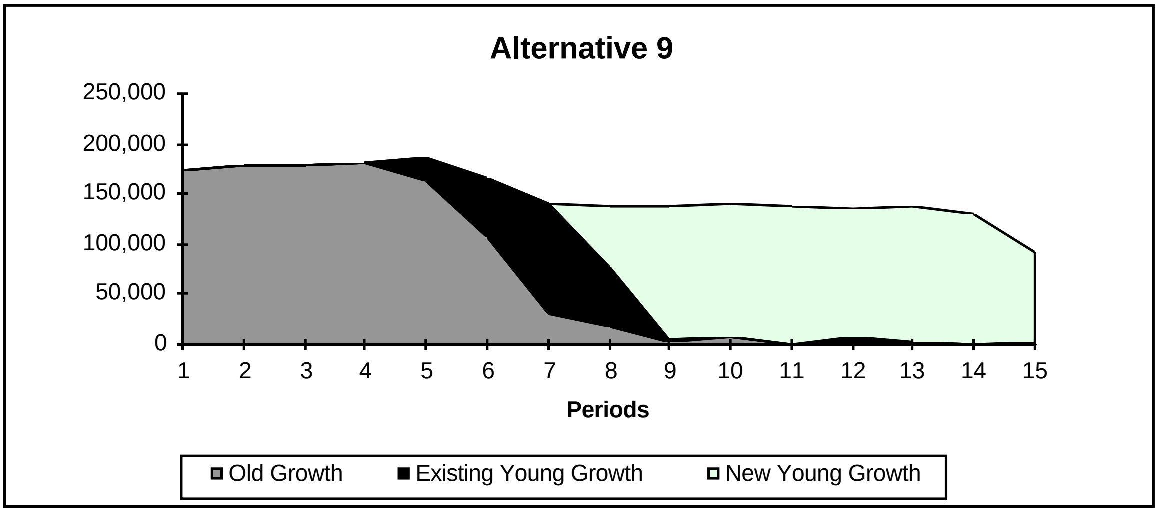
Alternative 6

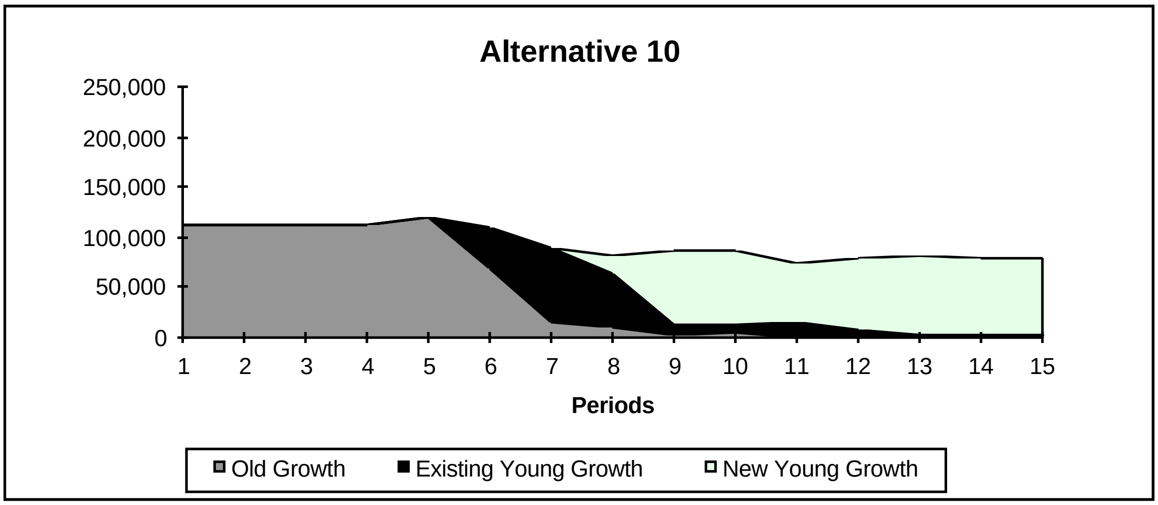


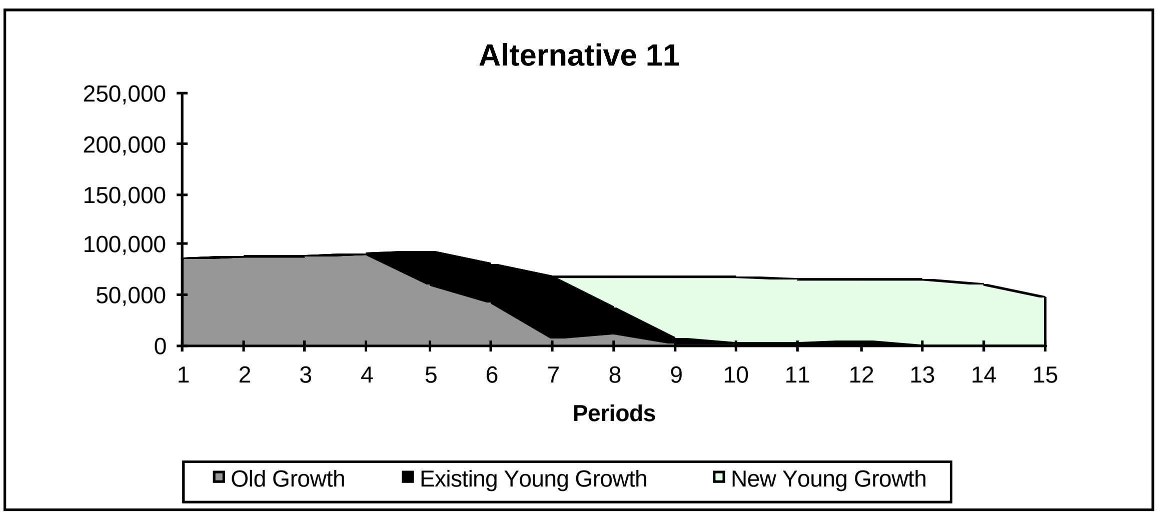
Alternative 7



Glossary


Alternative 9
250,000
200,000
150,000
100,000
50,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Periods
Old Growth
Existing Young Growth
New Young Growth


Alternative 10
250,000
200,000
150,000
100,000
50,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Periods
Old Growth
Existing Young Growth
New Young Growth


Alternative 11
250,000
200,000
150,000
100,000
50,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Periods
Old Growth
Existing Young Growth
New Young Growth

To achieve maximum site productivity, regeneration of these slower growing stands is needed. In all alternatives, harvesting of mature, old-growth stands would occur. Because only a portion of the Forest would emphasize timber management, most of the existing mature and old-growth stands on the Forest would be maintained. Various amounts of old-growth conifer stands are maintained or allowed to develop in each alternative. Alternatives which allocate the most acres to development-oriented land allocations will gradually have stands in younger timber age classes, and fewer stands of old-growth. However, at the end of the planning horizon (150+ years from now) the predominant age class on the Tongass will still be greater than 150 years. The percent of total timber lands that would be managed stands of less than 160 years of age is expected to be a relatively small component of the forest landscape on a Forest-wide basis for all alternatives. Old-growth will still be the predominant vegetative structure on the Tongass. The age class distributions and vegetative structures that would be present 160 years from now are displayed in Table 3-99, Table 3-100, and Figure 3-12.

The distributions take into account harvest that is projected to not occur because of project implementation factors and economic factors. Because of the two-aged silvicultural methods, Alternatives 3, 4, 5, 6 and 10 would contain significant old-growth structure within the harvest units. In 160 years, the proportion of the productive forest occupied by managed timber stands (stands less than 160 years old) would range from approximately 0 percent in Alternative 1 (this alternative has no scheduled timber harvest) to 21 percent in Alternative 7. Alternative 7 has the greatest allocation of acres to timber management. Conversely, the amount of total productive forest in an "old-growth" condition or trending towards old-growth would range from almost 100 percent in Alternative 1 to 79 percent in Alternative 7.

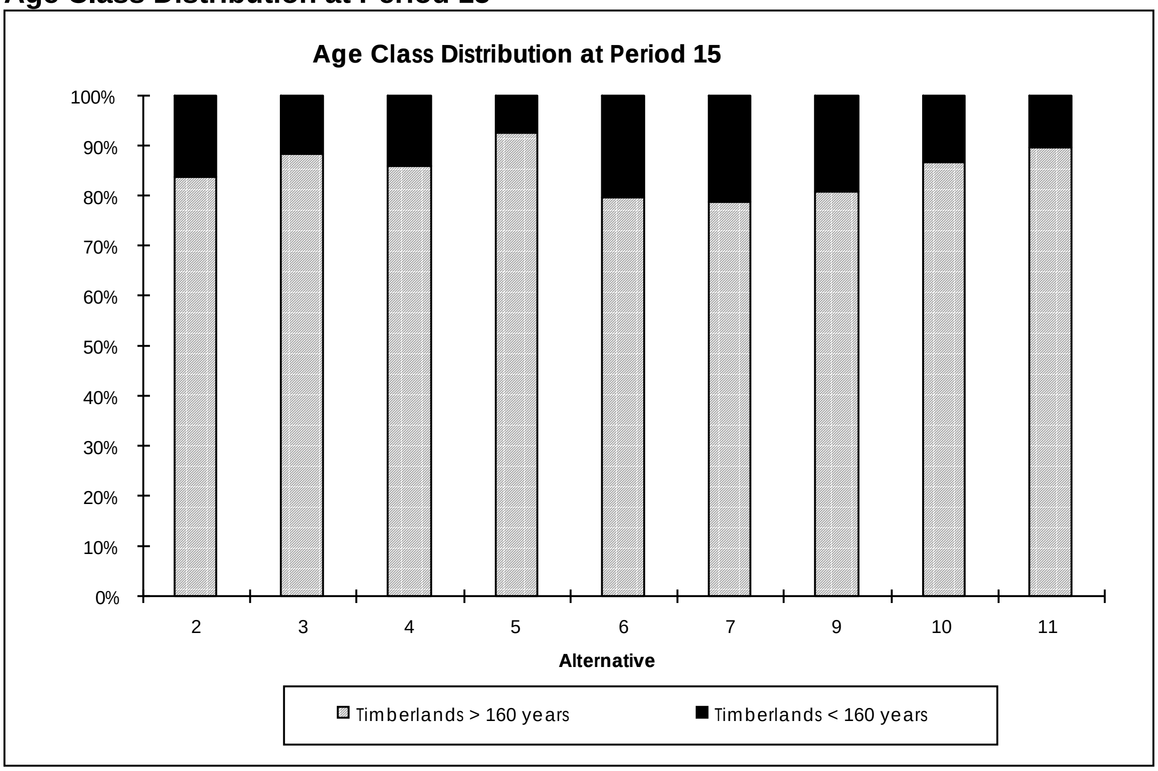
Table 3-99
Age class distribution (thousands of acres) at the end of the planning horizon (160 years), Timberlands

	Alternative								
Age Class	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
10	86.5	57.4	28.0	18.1	85.4	121.3	102.2	63.2	44.1
20	93.3	52.9	29.4	16.5	83.0	124.0	110.0	63.2	48.4
30	90.3	53.7	37.1	20.5	86.0	119.4	105.6	63.1	53.0
40	92.7	49.7	40.5	21.5	78.0	122.3	109.2	57.9	51.5
50	92.7	58.9	40.4	21.8	96.7	124.6	110.2	58.7	53.7
60	90.7	59.0	38.4	21.6	100.6	125.8	109.2	68.9	53.5
70	91.9	56.2	40.9	22.5	101.6	119.1	109.2	65.5	55.0
80	78.9	43.1	39.3	22.6	88.6	113.5	94.6	51.8	52.7
90	51.2	64.3	39.4	22.4	106.7	84.5	67.3	70.3	38.3
100	37.0	35.5	38.3	21.6	87.8	50.6	33.8	48.3	35.6
110	33.1	28.5	38.3	21.6	71.4	51.5	47.9	38.4	18.9
120	10.1	14.1	38.6	21.6	36.2	10.3	8.5	13.9	7.8
130	8.4	8.7	38.5	21.7	24.4	10.2	5.3	9.0	3.0
140	0.4	1.9	38.3	21.6	13.4	0.2	0.0	2.6	-
160	72.6	80.6	288.7	134.5	103.8	23.5	88.7	62.9	70.2
Total Timberland	**5,693**	**5,693**	**5,693**	**5,693**	**5,693**	**5,693**	**5,693**	**5,693**	**5,693**
<160 Years	**929.6**	**664.7**	**814.2**	**430.0**	**1,163.5**	**1,200.8**	**1,102.7**	**747.7**	**585.6**
>160 Years	**4,763.4**	**5,028.3**	**4,878.8**	**5,263.0**	**4,529.5**	**4,492.2**	**4,590.3**	**4,945.3**	**5,107.4**
% of Total Timberland >160 Years	**84**	**88**	**86**	**92**	**80**	**79**	**81**	**87**	**90**

Table 3-100
Forest-wide stand structures at the end of the planning horizon (160 Years), Timberlands (thousands of acres)

	Alternative								
Stand Structure	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Stand Initiation (0 - 20 Years)	179.9	110.3	57.5	34.6	168.4	245.4	212.9	126.4	92.5
Stem Exclusion (30-120 years)	668.4	463.1	391.2	217.6	853.5	921.6	795.7	546.8	420.0
Understory Reinitiation (130-160 years)	81.3	91.3	365.5	177.9	141.6	33.9	94.1	74.5	73.2
Old-growth (>160 years)	4,763.4	5,028.3	4,878.8	5,263.0	4,529.5	4,492.2	4,590.3	4,945.3	5,107.4
Total Forest lands	5,693.0	5,693.0	5,693.0	5,693.0	5,693.0	5,693.0	5,693.0	5,693.0	5,693.0
Stand Initiation	3%	2%	1%	1%	3%	4%	4%	2%	2%
Stem Exclusion	12%	8%	7%	4%	15%	16%	14%	10%	7%
Understory Reinitation	1%	2%	6%	3%	1%	1%	2%	1%	1%
Old growth (>160 years)	84%	88%	86%	92%	80%	79%	81%	87%	90%

Figure 3-12
Age Class Distribution at Period 15



Glossary

Conifer growth in young stands can be accelerated through silvicultural treatments which control conifer stocking, reduce competing vegetation and reduce the threat from pests and diseases. Benefits from such treatments may include larger piece size and consequently cheaper logging costs , increased stand variability, higher quality wood (particularly in spruce, if pruned), and employment opportunities. In addition, treatments may shorten the time period spent in the stem exclusion phase of stand development and offer other resource benefits. Carey and others (1995) concluded, on the basis of published reports, that young-growth forests actively managed for biodiversity could support virtually all the species occurring in western Washington. Carey (1994) has proposed a biodiversity pathway for forest management based on comparisons of biotic communities in old-growth, young natural, and managed forests. This is based on (1) conservation of biological legacies during harvest and regeneration, (2) minimizing time in the stem exclusion stage of stand development, (3) ensuring diversity and niche diversification in later stages through thinnings and coarse woody debris management (logs and cavity trees), and (4) using extended rotations on a significant part of the land base.

Enhancing wildlife and fish habitat carrying capacity in young-growth forests is an objective of the Tongass National Forest. To meet this objective, a young-growth management program was started in 1982 to develop and demonstrate silvicultural treatments for young-growth stands. The Forest has been developing some experience in precommercial thinning but commercial thinnings have yet to be thoroughly explored. Other information needs are : (1) given Alaska's competitive position in the world market, what kind of young-growth should be produced on the Tongass—should the Forest maximize fiber production, sawlog production, wood quality or a combination; (2) what would be the quality of young growth produced under different management scenarios; (3) would pruning be cost effective; (4) would fluting be a problem in the young-growth stands; and (4) what are the windthrow and stand damage affects from commercial thinning?

Mitigation of Impacts on Timber Supply

A range of activities can be used to avoid, minimize, or compensate for adverse effects on timber quantity and quality. The types of mitigation measures will not vary by alternative, but the degree to which they are applied will depend on the rate and location of timber harvest activities.

The effects of other resource activities on timber, especially on the Allowable Sale Quantity, can often be mitigated through intensity of timber management activities on lands scheduled for harvest. The degree to which these mitigation measures are applied is closely related to the amount and location of land available to be considered for timber management activities. The effects of other resource activities within areas available for timber harvest consideration have the potential of lowering the amount of timber actually offered for sale and thus affecting the established timber industry.

Reductions in timber yield can be mitigated in a number of ways: costs, returns on investments, developing new industries, and yields from second-growth stands. Each of these has the potential to play significant roles in timber supply for the future.

Costs. Areas categorized in the ASQ difficult/isolated operability component have very high anticipated road access and or logging systems costs associated with them. About one quarter of the suitable-available landbase in each alternative is classified as "difficult" or "isolated". Improvements in technology that would enable the harvesting of these stands in a cost-efficient manner may be developed. In addition, technological advances that reduce manufacturing costs, transportation costs, and harvest costs would expand the "economic" landbase of the Tongass.

Glossary

Returns on Investments. Timber yields from the Tongass are expected to increase substantially from the conversion of old-growth to second-growth. Previously harvested areas have roads in place and many have had precommercial thinning completed. The investments in these areas need to be protected if yields associated with the future harvest of old-growth as well as second-growth stands can be recaptured in later entries. Loss of these areas to land designations precluding timber harvest will have the potential of significantly impacting predicted timber supply in the future decades. In addition, investments in precommercial thinning need to be maintained in the future if the Allowable Sale Quantity of the Revised Forest Plan is to be maintained.

Rural Development and Value Added Industries. Cedars, both western redcedar and Alaska yellow-cedar, are not generally used by the industry in Southeast Alaska, but are sold in other markets. The creation of Southeast Alaska industries that could utilize this species would in effect increase the wood supply. The 1990 Farm Bill passed by Congress provides opportunities for rural communities to request assistance from the Forest Service in developing and implementing economic revitalization plans.

There are a number of possibilities and potentials for additional timber-based industries (so called “value added” industries) to create jobs and compensate for any job loss caused by limitations on timber supply. These include:

1. Special forest products such as musical instruments, greenery, mushrooms & berries, and totem pole carving.
2. Value-added products such as air dried finished lumber to be shipped to Puget Sound for kiln drying for use in finger-jointed wood products, wood pellets for stoves, log homes, pre-fab cedar gazebos, door moulding, and cedar shakes.
3. Harvest of sphagnum moss from the muskegs.
4. Electrical generation using modified diesel-fired systems or new wood-gasification systems, including pellet plants, and wood chip cogeneration systems. These systems would use logging slash, wood chips and sawmill waste.

Yields. Higher yields may also come from new technology, allowing commercial thinning in stand types typical to Southeast Alaska. Effectiveness will result if thinning operations can be achieved over long yarding distances with minimal damage to residual timber.

Fertilization of regenerated stands has been tested in some locations of the Tongass (such as Thomas Bay in the Stikine Area). Fertilization of stands on some soil types has increased per-acre yield and shows promise, although the costs associated with application and maintenance are high. Application of this method of increasing timber yields will be dependent on the effects on other resources, costs of application, and returns in timber volume as a result of use.

Transportation

Affected Environment

There are three principal types of travel in Southeast Alaska: air, water, and ground. Historically, marine transportation has been the major method of moving freight and passengers, and during the last three decades air services have developed to serve the growing demand for rapid transportation between communities within Alaska and to the contiguous United States. On National Forest land a roaded transportation system has developed, largely in support of timber harvesting.

Access from Southeast Alaska to the continental road system is currently available at only five points via the Alaska Marine Highway (all are water ports). Three of these connections are to the United States communities of Haines and Skagway, Alaska, and Bellingham, Washington, while the other two connections are to the Canadian communities of Stewart (via Hyder, Alaska) and Prince Rupert, British Columbia. Prince of Wales Island has the only road system in Southeast Alaska that interconnects island communities. Several possibilities exist for State Highways that could connect some communities of Southeast Alaska to the continental road system, and for new internal corridors (Southeast Alaska Transportation Plan, 1986). Some of these are currently under study.

The Alaska Power Authority has proposed corridors for transmission lines and/or undersea cables to link many Southeast Alaska communities to British Columbia. A powerline from Tyee hydropower site along the Bradfield Canal/Craig River road corridor route to Canada is one of the identified corridors for consideration.

When a Forest development road (see below): 1) provides a connection between communities; 2) serves local needs such as mail delivery; or, 3) connects public roads within the National Forest, it can be designated as a Forest Highway (see 23 U.S.C. 101 for technical definition). Usually, Forest Highways are upgraded to State Highway standards, and jurisdiction is relinquished to the State. To date, the Alaska Department of Transportation and Public Facilities, the Federal Highway Administration, and the Forest Service have agreed to designate a potential 362 miles as Forest Highways, of which the State has been given the jurisdiction and maintenance responsibility on 181 miles. Since the Forest Service does not have the authority to provide public road services, such as snow removal, the State's assumption of jurisdiction and maintenance responsibility usually benefits the surrounding communities. There are about 500 miles total of State Highway in Southeast Alaska.

Forest Development Roads

Forest development roads ("Forest roads") are constructed to provide access to National Forest lands, and are included in the Forest Development Transportation Plan (see Transportation Forest-wide Standards and Guidelines in Chapter 4 of the Forest Plan). They are functionally classified as arterial (serving large land areas and usually connecting to public highways), collector (serving smaller areas, usually connecting to arterials or public highways), and local (terminal roads, may connect to any other type). Forest roads are also managed by a system of maintenance levels, depending on their intended use and suitability for various types of vehicles. These range from level 1 (closed) to level 5 (suitable for passenger cars).

Except at a few administrative sites and campgrounds, all Forest roads are single lane, constructed with blasted quarry rock, and designed for off-highway loads. Typical collector and local roads are 14 feet wide, with a rough gravel surface; higher standard arterial roads are normally 16 feet wide, may have a smooth gravel surface, and are designed for speeds of up to 30 miles per hour. Travel speed on lower standard roads is often controlled more by surface roughness than by horizontal alignment or road gradient.

For the Tongass, the demand for roads has primarily been a function of the demand for access to timber resources. The maintenance and reconstruction requirements of the existing system depend mainly on the volume of timber hauled, and to a lesser extent on recreational use. The amount of future construction is anticipated to continue to be largely dependent on the need to access timber resources. Currently the Forest road system includes approximately 4,650 miles of road providing access to about 9 percent of the Tongass National Forest. About one-fourth of these road miles are not managed for car and truck use. Over one-half of the more than 2,000 miles of road open to public motorized vehicle use are connected to communities. Between 1984 and 1993 an average of 168 miles of road was constructed annually.

The transport of harvested timber from isolated islands in Southeast Alaska requires both land and water routes to reach processing facilities. Log Transfer Facilities are used to transfer logs to and from the water and to put together log bundles for towing. There are a total of 116 Log Transfer Facility sites existing in Southeast Alaska on National Forest lands, and an additional 17 sites which the Forest Service uses or is seeking agreements to use on State or private lands. Log Transfer Facilities can have adverse effects on the local marine environment.

Except for Wilderness, National Monuments, and Research Natural Areas, the Forest is designated open to Off-Highway Vehicles. In specific locations where conflicts with other uses, public safety problems, or damage to resources could occur, site-specific closures are considered. The goal of Off-Highway Vehicle management is to ensure resource protection and public safety, minimize user conflicts, and provide diverse opportunities for Forest users. A specific set of closures was consolidated in the Juneau area in November 1985 as the “Off-Road Vehicle Travel Plan” for the Juneau Ranger District. This travel plan is incorporated here by reference.

Transportation

Environmental Consequences

Direct, Indirect and Cumulative Effects

All alternatives except Alternatives 1 and 9 apply the Transportation and Utility Systems LUD to selected proposed or potential State highway linkages and transmission corridors mentioned above. This LUD will minimize potential conflicts, such as over-determining the appropriate Visual Quality Objective, should development of any of these occur. A Juneau-to-Haines linkage, and the East Bradfield River corridor, have received the most attention in recent years. (See also the Lands section.)

Table 3-101 displays the anticipated road construction by alternative for the first and fifth decades, expressed both in annual averages and cumulatively. These road miles are directly related to proposed timber harvesting activities.

Table 3-101
Annual and cumulative miles of new road construction by alternative.[1]

	Decade 1		Decade 5	
Alternative	Annual Miles	Cumulative (at end of Decade)	Annual Miles	Cumulative (at end of Decade)
1	0	4,650	0	4,650
2	190	6,547	73	9,934
3	104	5,685	71	7,828
4	52	5,173	10	5,946
5	49	5,138	10	5,868
6	124	5,888	77	8,563
7	263	7,277	144	12,481
9	225	6,903	116	11,310
10	121	5,858	84	8,386
11	110	5,753	28	7,533

[1] Includes all roads from the present (4,650 miles) to the end of the decade. Annual miles are rounded to the nearest mile.

Roads have the potential to affect fish habitat, soils, and water quality by increasing erosion and landslide potential, to change recreation settings and opportunities, to alter scenery, and to increase legal and illegal wildlife kills. These types of effects are discussed in the subject resource sections of this chapter, as applicable.

Based on current practices, about 35 percent of new roads would be closed to motorized traffic once their initial use is over, but may allow non-motorized and foot traffic. Bridges may be removed from these roads, and the roads themselves are likely to revegetate naturally. Another 30 percent would remain open to motorized vehicles, but would be isolated from large road systems or communities, primarily on remote islands. The remainder would be open to motorized vehicles and connected to communities, and would likely be maintained for continuous multiple-use activities.

Each alternative will require reconstruction of a portion of the existing road system in each decade. Reconstruction of a road maintains the original investment, protects forest resources, and makes the road suitable and safe for the intended use. Reconstruction involves the rehabilitation of the original roadbed, and can include cleaning ditches and culverts, replacing damaged drainage structures, re-installing bridges, and grading and shaping.

Log Transfer Facilities can adversely affect the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: structural embankment (placing rock in the water) and bark deposition (bark that accumulates underwater). Structural embankment is estimated to cover approximately one-quarter acre per site.

Log Transfer Facilities have impacted approximately two acres of marine benthic habitat for the average site (Faris and Vaughan, 1985). Bark and debris accumulation may decrease over time due to water currents, but no estimate on the length of time before a bark accumulation is completely eliminated is not known. Using this 2-acre average, about 232 acres of marine benthic habitat associated with the existing 116 Log Transfer Facilities on Forest Service lands are currently experiencing bark accumulations. This is roughly 0.05 percent of the total estuarine area less than 60 feet deep.

The largest effect of bark and debris accumulation is to littleneck clams and bay mussels which have been shown to be eliminated when 4 to 5 inches of bark accumulates (Freese and O'Clair, 1987). Further, Conlan and Ellis (1979) report that mollusks and several polychaetes (marine worms) were excluded by bark debris greater than one-inch thick and effects of bark may last several decades. From this evidence, it can be assumed that other plants and animals that live in and on the bottom (the marine benthic habitat) would also be affected. Toxic substances, occurring as leachates from bark, precipitate in saltwater. Leachates, therefore, do not appear to be a major problem in open water or where good water circulation exists (Sedell and Duval, 1985).

The 1991 SDEIS projected the number of new LTF's estimated to be needed by alternative (from 98 to 176 new Log Transfer Facilities over the next 30 years). For the FEIS the computer model does not separate LTF costs from other transportation costs for the future, and thus a numeral estimate cannot be made. Using the 1991 SDEIS figures (which were based on generally higher harvest levels than most FEIS alternatives), another 200 to 350 acres of marine benthic habitat could be adversely affected (roughly another 0.04 to 0.08 percent of estuarine habitat under 60 feet deep).

Travel plans are based on the concept that access is a resource to the people who want to enjoy and use the National Forest. In almost all places, travel through the National Forest is free from any restrictions. Where there are restrictions, they usually relate to the type of access permitted. An example is the limit on use of motor vehicles in designated Wilderness.

The steep, densely vegetated terrain of Southeast Alaska limits the use of typical Off-Highway Vehicles such as three-wheelers and all-terrain vehicles to beaches, communities, road systems, braided river channels, and frozen or snow-covered areas. Most trails in Southeast Alaska do not lend themselves well to the use of such vehicles due to wet ground conditions which often necessitate the use of boardwalks. Except in a few specific areas, the Tongass has not experienced the kinds of resource damage typically associated with Off-Highway Vehicles elsewhere.

Federal regulations prohibit the use of vehicles off roads "in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources" (36 CFR 261.13). Muskegs, when they are not adequately covered with snow, are extremely susceptible to damage from vehicle use. As the road system expands, more muskeg will be available to Off-Highway Vehicles and some damage may occur. At present, no broad closures of muskeg areas have been issued, but even with such closures, enforcement would be difficult. An educated and responsible public is needed for the protection of this resource.

Long-range transportation planning has not been systematically pursued for the transportation system because of the island geography, lack of infrastructure, and relatively low population of the Tongass National Forest. The identification and satisfaction of a variety of access-related issues has progressed in a number of forums. Arterial connections for transportation throughout Southeast Alaska have been coordinated through an interagency group, including the State of Alaska, involved with transportation and utility corridors. Project-level planning includes road management objectives that address local consideration for whether or not access is encouraged, restricted, or prohibited for any given road.

Mitigation

The Alaska Regional Guide, and the Transportation standards and guidelines in Chapter 4 of the revised Forest Plan, include requirements for transportation system development and planning, and rock quarry and pit development, including soil protection and water quality measures. The Best Management Practices, which include numerous road-related guidelines, also apply (see Forest Plan, Appendix C). The Riparian standards and guidelines have additional measures for roads located near streams. Log Transfer Facility guidelines are contained in the Alaska Regional Guide, and the revised Forest Plan adopts the "Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines" developed by the Alaska Timber Task Force (1986) (see Forest Plan, Appendix G). These have been approved by the Environmental Protection Agency as standard conditions for Log Transfer Facility permits issued under provisions of the Clean Water Act.

Standards and Guidelines that can be used to reduce or eliminate resource effects include: 1) closing roads to cars and trucks seasonally or permanently; 2) incorporating normal erosion control and stabilization measures for all human-caused soil disturbance; 3) avoiding locations near fish-bearing streams where feasible; and 4) avoiding areas of important wetland values, floodplains, estuaries, and tidal meadows. For Log Transfer Facility siting: 1) normally prohibiting sites near rearing and spawning areas; 2) considering bark dispersal and intertidal and subtidal productivity; and 3) avoiding bald eagle nest trees.

Water

Affected Environment

The Tongass National Forest can be characterized by its abundance of water. Southeast Alaska experiences a large amount of precipitation, primarily as rain at the lower elevations, and snow at the higher elevations. Much of the snow builds into glaciers which cover portions of the coastal mainland and some islands (e.g., Baranof). The maritime climate brings this precipitation nearly year-round, with the heaviest amounts occurring from September through January. Coastal low-elevation rain forests thrive in this maritime climate. The Tongass is influenced by the oceans and salt water. Thousands of miles of shoreline and hundreds of bays and inlets characterize the marine environment of the Tongass.

The water environment of the Forest can be described in terms of: climate, streamflow regimen, water quality, floodplains, wetlands, riparian areas, watershed condition and water use.

Climate

Sea level precipitation in Southeast Alaska ranges from 30 inches per year at Skagway to 220 inches per year at Little Port Walter. It is estimated that average annual precipitation may be as high as 400 inches on the southern end of Baranof Island and about 260 inches over the Juneau Icefield. Southeast Alaska has complete cloud cover about 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast.

The yearly distribution of precipitation is quite uniform over Southeast Alaska, although different areas receive different amounts. Precipitation exceeds evapotranspiration in all months of most years over most of Southeast Alaska. October is generally the wettest month. High precipitation persists as rain through the middle of November, when intermittent snowfall begins. In the south half of the panhandle, snow accumulation below 500 feet in elevation is short-lived, generally melting off within a few days because of warmer temperatures and rain. In the northern part of the panhandle, low elevation snow packs persist from December through March. At the higher elevations throughout the Forest, the snow cover usually persists until the spring. From the latter part of March through June, precipitation as rain continues to decrease. May through July are, on the average, the drier months. Rain becomes more frequent and of greater duration during September.

The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average 32°F in the winter and 60°F in the summer.

Streamflow Regimen

Glacial and non-glacial river and stream systems occur on the Tongass National Forest. Most of the glacial rivers are located on the mainland and have their origins in the glaciers and snowfields of the Coast Range. Some of the largest of the mainland rivers have glacial origins in Canada. Unlike the rivers and streams of the islands, which generally drain in an easterly or westerly direction into tidewaters, these mainland rivers, for the most part, flow westward.

Streams and rivers produce a large volume of water per unit of land. Runoff varies greatly between mainland and island river and stream systems. Runoff from glacially-fed streams usually starts in June, in response to snow and ice melt, reaching peak flows in July and August. Due to colder temperatures at higher elevations, runoff drops rapidly in October and low flows occur from December through April. Runoff from nonglacial island and Yakutat Forelands streams tend to respond to high precipitation events; therefore, the highest flows tend to be in October and December and the lowest flows between January and March, and mid-May to August.

The Tongass uses a stream channel classification system called channel typing. Stream channels are categorized into distinctly different groups, called process groups, which are used to assess watershed conditions, fish habitat production capabilities, and sensitivity to management activities. These process groups form the basis for the Riparian standards and guidelines (see revised Forest Plan, Chapter 4 and Appendix D). Approximately 63 percent of the stream channels on the Tongass are classified in the high gradient contained process group (see Table 3-14 in the Fish section of this Chapter).

Process groups are further defined by channel types - discrete segments of streams and rivers based on gradient, substrate, streambank vegetation, and other factors. This system provides a process for classifying and mapping streams by parameters that can then be used to estimate the response of different channel types to changes - natural or human-caused

An estimated 44,867 miles of stream are recorded on the Forest. These miles are adjusted for estimates of channels missed in the channel type inventories. There are also streams on the Forest considered unmappable during extensive inventory. At the present detail of channel type inventory, these unmappable streams are typically narrow and with low flow, but may contain valuable aquatic habitat.

Water Quality

Water Quality Management Plan. The State of Alaska (Department of Environmental Conservation) and the Forest Service have agreed that the Forest Service is the agency responsible for monitoring and protecting water quality on the National Forest System lands in Alaska, for the purposes of the Clean Water Act, as amended. Best Management Practices (BMPs) as prescribed in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22), the Alaska Nonpoint source Pollution Control Strategy, and the Alaska Water Quality Standards (18 AAC 70) together form the “Forest Service Alaska Region Water Quality Management Plan”, as agreed to in the Memorandum of Agreement dated April 6, 1992 (ADEC and USDA Forest Service, 1992). With implementation of this Plan, the State recognizes that the Forest Service BMPs are the primary means to protect water quality from nonpoint sources of pollution.

BMP Monitoring Results. The Tongass National Forest Annual Monitoring and Evaluation Reports for fiscal years 1993 through 1995 summarize the extent to which BMPs are being implemented and the extent to which BMPs are effective in protecting State designated beneficial uses of water.

The results of BMP implementation monitoring vary widely from project to project and over time (ranging from “No attempt was made to implement the BMP” to “BMP fully implemented”). Implementation of BMPs has generally improved over the last five years to the point where most BMPs monitored are usually rated as “BMP fully implemented” or “Intent or objectives of BMP met, but BMP not implemented exactly as prescribed." However, it is difficult to quantify these results Forest-wide due to the different reporting formats used by each Administrative Area.

BMP effectiveness monitoring results to date are as follows:

- A rapid bio-assessment (using macroinvertebrates as indicators of stream health) of five sites in Old Franks Creek shows some impairment of the downstream site relative to the four upstream sites, which show little to no impairment.

- A road condition survey of 79 miles of forest roads within the Kadake Creek watershed indicates that the road prism, with the exception of one road fill failure, was generally in good condition (i.e., few observed sediment sources affecting streams). Most drainage structures are also in good condition, although 15 percent were identified as fine sediment sources to fish habitat and five percent pose high maintenance risks to fish habitat or water quality. Several rock pits were also identified as sediment sources to fish habitat.

- Preliminary results of a stream buffer stability and effectiveness study indicate that the mean basal area of blowdown in sampled buffers was 13 percent of the total basal area, with a range of zero to 50 percent. This study is not completed.

- Monitoring of road drainage structures along 269 miles of forest roads indicates that 80 to 90 percent of culverts are in good condition (i.e., maintaining fish passage and protecting water quality). Culverts with a diameter greater than 48 inches had the highest failure rate (ten percent) and 27 culverts installed on higher gradient streams had resident fish passage problems.

- Results of a V-notch buffer study suggest that timber harvest within large V-notches (incision depth greater than 30 feet) may result in more soil disturbance than timber retention in large V-notches. Likewise, large V-notches without buffers may result in more soil disturbance than medium and small V-notches (with or without buffers). However, these conclusions are tenuous due to several limitations with respect to the study design (e.g., small sample size, some transects were not permanently marked, and transects were not randomly located).

Several other BMP effectiveness monitoring studies are under way, but the results of these studies are not available at this time.

Sediment. Changes in any of the physical or chemical properties of water can directly affect water use by people, fish, and wildlife. For understanding the effects of the Forest Plan alternatives, the most important water quality factor is sedimentation. (Other factors discussed in the 1991 SDEIS, such as temperature and dissolved oxygen, do not differ appreciably by alternative, and will not be affected to a significant degree. These will not be discussed further here.)

Sediment is water-transported earth material. Sediment may be transported as either suspended load or bedload. Suspended sediment is carried within the water column, while bedload material moves (rolls or bounces) along the bottom of the stream or riverbed. Suspended sediment causes water to have a turbid or murky appearance. Under natural conditions the great majority of suspended load and bedload transport occurs during storm runoff events. The rate of sediment transport is dependent on the velocity of the discharge and the availability of material.

Sediment production is controlled by natural geologic processes and can be accelerated by management activities. Soil mass movements (landslides), streams cutting new channels, and bank erosion are the main natural processes creating sediment. Landslides cause large, but temporary, increases in suspended and bedload sediments. Stream and riverbed or bank erosion may contribute to sediment over long periods of time. Steep terrain and large amounts of rainfall make the land sensitive to natural sediment production, and to sediment produced by road construction and timber harvesting activities. Factors limiting or decreasing sediment production include coarse-textured soils with thick organic surface layers, high soil permeability and infiltration, and conditions that favor rapid revegetation of disturbed soil. In addition, all roads are constructed of blasted quarry rock and nearly all logging uses cable yarding systems to minimize the disturbance of soil surface layers. Overland flow is limited to areas where the mineral soil is exposed, to saturated depressions, or in barely-definable ephemeral channels.

In Southeast Alaska suspended sediment loads in non-glacial streams in undisturbed watersheds are very low. Concentrations of suspended sediments normally are less than 10 parts per million (ppm) in winter, four to 30 ppm in summer, and occasionally over 100 ppm in the fall during storm runoff periods. These low levels are attributed to the dense vegetative groundcover.

Suspended sediment in glacial streams is highly dependent on the volume of water flow from snow and ice melt. At high flows, concentrations may reach from 200 to more than 600 parts per million (ppm); and midrange flows may contain 20-100 ppm. Because the amount of glacial meltwater is lowest between November and April, suspended sediment concentrations from November through April seldom exceed 20 ppm.

Information on suspended sediment as the result of management activities is limited, especially for timber harvest and road construction activities. The present knowledge is documented in the following discussions of actual project monitoring. Suspended sediment loads were low in two heavily logged Tongass watersheds. In these watersheds near Hollis, where clearcuts exceeded 2,000 acres in size, suspended sediments during and following logging in the Harris River never exceeded 3.7 ppm under average flow conditions or 148 ppm during peak flows. In the Maybeso watershed, suspended sediments never exceeded 7 ppm during average flow or 38 ppm during peak flows.

In investigations of bridge installations across streams, data were gathered before, during, and after construction. In 1977 a sedimentation monitoring study was conducted at Bonnie Creek on Prince of Wales Island, while equipment worked in the stream installing bridge stringers (Bartos, 1990). Best Management Practices (Bmp's) to protect water quality (discussed later under Mitigation) were not used. Samples taken approximately 100 feet downstream during the construction indicated a sediment discharge of 219 parts per million. Background sampling upstream from the construction found sediment discharge of only 0.2 ppm. The average discharge was 147 cubic feet per minute at the time of the investigation. This investigation showed that without application of Bmp's, a significant increase in sedimentation occurred over background levels for a short period of time.

In March 1978 an investigation of a small bridge installation showed no large increase over natural levels in sediment downstream from the construction site with the use of Best Management Practices. During this bridge installation, heavy equipment was restricted to a one-time stream crossing and required to sit on pads while in the stream. Two days of sediment measurements immediately downstream of the construction site measured 16.5 to 76.5 and 34 to 99.8 ppm respectively. The background level of sediment transport for the two days of investigation was 0.85 and 0.25 parts ppm respectively. The dropout rate within a 100-foot reach below the construction site was 61 percent. Discharge through the construction area and during the sampling period ranged from 6.73 cubic feet per second the first day to 5.58 cubic feet per second on the second day.

Paustian (1987) reported effects of sediment yields from application of Bmp’s in harvesting and roading in 11 square miles of the Indian River Watershed, and roading in three first and second order watersheds (30 to 80 acres) of the Kadashan Watershed. Both of these major watersheds are located opposite each other in Tenakee Inlet.

The results of the monitoring investigation in the Indian River Watershed indicated estimates of annual suspended sediment yields of 796 and 979 tons for the water years 1980 and 1981. These values where within the range of suspended sediment yields of 475 and 1,103 tons during the pre-logging baseline period of the water years 1978 and 1979. Regression analysis comparing suspended sediment concentration and discharge measurements showed no detectable change in suspended sediment delivery during the first two years of logging activities in the watershed.

At the time of the report, no timber harvest activity had taken place in the Kadashan drainages and the road had not been used by heavy trucks. Paustian reported that little deposition of sediment was observed in the sediment settling basin in the first year, but road construction did cause short-term increases in suspended sediment transport downstream of the sediment basins. During the post-road period, sediment yields were observed in the three streams of +.5 tons, +1.5 tons, and +4 tons, equating to a 20 percent, 33 percent, and 66 percent increase, respectively, compared to the pre-road period. Due to the short period of investigation record, it was impossible to determine statistically how much of this observed sediment increase could be attributed to road construction activity, and what portion to natural variations in sediment yield.

These monitoring investigations demonstrate the variability in sediment from natural and land management activities. They also indicate that there is inconclusive data to determine at the present time the effects of land management or the effective application of Best Management Practices (BMP's). The Forest is initiating a stricter program in implementation of BMP's and monitoring their effectiveness. Research studies have also been started on quantifying the sediment resulting from management activities, with cooperation of the Forestry Sciences Laboratory in Juneau.

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Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to: 1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives; 2) evaluate the potential effects of any proposed action on floodplains; 3) ensure planning programs and budgets requests reflect consideration of flood hazards and floodplain management; and 4) prescribe procedures to implement the policies and requirements of the Order.

Floodplains are usually composed of naturally-eroded sediments carried by the stream or river and deposited in slack water sections of channels during high water periods. Floodplains are considered to be areas subject to a one percent (100-year recurrence) or greater chance of flooding in any given year. Nutrient-rich sediments underlain by coarse-textured sediments make floodplains the most productive lowland timber, wildlife and fisheries resource sites on the Forest.

The Forest's floodplains are typically found in broad, flat, alluvial U-shaped valleys, are forested, and usually support plant communities having an overstory of Sitka spruce or Sitka spruce and western hemlock. The shrub understory is variable and may include blueberry, skunk cabbage, devil's club, salmonberry, and alder. The herb understory is dominated by ferns and broadleaf plants. Supporting this vegetation are well, moderately well, or somewhat poorly drained deep mineral soils with thin organic surface layers. Floodplains are associated with 12 percent of the 44,867 linear miles of the streams mapped on the Forest (Flood plain, Estuarine and Glacial Outwash (Class I only) Process groups. See the Fish Section).

Flooding may occur in a diversity of land types including steep, narrow mountain canyons, wide, flat alluvial valleys, lake shores, coastal areas and alluvial fans. The potential flooding sites in the Tongass National Forest are the varying width floodplains and terraces of the valley bottoms of U-shaped valleys. To date, no area-wide flood hazard or flood insurance studies have been conducted in the Forest. Soils and landform inventory data are the only available information for making initial determinations of the location and approximate boundaries of floodplain areas.

Wetlands

Executive Order 11990, as amended (42 U.S.C. 4321 et. seq.), requires Federal agencies that exercise statutory authority and leadership over Federal lands to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for 1) acquiring, managing, and disposing of lands and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting federal activities and programs affecting land use.

The Environmental Protection Agency (EPA) and the Army Corps of Engineers (COE) jointly define wetlands as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically

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adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

"No net loss" policy. The Administration's August 24, 1993, Wetlands Plan established a short-term goal of no overall net loss of the Nation's remaining wetlands and a long-term goal of increasing the quantity and quality of the Nation's wetlands resources. The 1993 Wetlands Plan also created an Alaska Wetlands Initiative to address concerns with the implementation of the Clean Water Act Section 404 permit program in Alaska. The Alaska Wetlands Initiative Summary Report (May 13, 1994) reaffirms that the "no net loss" policy is applied throughout the United States on a permit-by-permit basis. However, it also recognizes that in Alaska, the goal of "no net loss" may not be attained for each 404 permit issued, especially where a high proportion of developable lands within a watershed are wetlands and where practicable opportunities for compensatory mitigation (i.e., wetlands restoration or creation) are limited. This regulatory flexibility is consistent with the Clean Water Act Section 404(b)(1) Guidelines.

Wetlands delineation. The Corps of Engineers Wetlands Delineation Manual (Army Corps of Engineers, 1987) provides the standards for determining areas of wetlands and deepwater habitats. In addition, DeMeo and Loggy (Unpub. Paper, 1989) classified wetlands water habitats on the Tongass National Forest. Land areas are defined as wetlands when soil, hydrology, and vegetation all meet the technical criteria for establishing wetlands. Streams and lakes are classified using the criteria established by Cowardin (1979) and data from stream and lake inventory of the Forest's channel type inventory system. (See Chapter 3, "Water," Analysis of the Management Situation, Tongass National Forest, January 1990 for a more detailed discussion.)

Wetland functions include flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality protection. On the Tongass, wetlands are made up of forested sites on both poorly and very poorly drained organic soils and poorly and somewhat poorly drained mineral soils. Muskegs are found on poorly and very poorly drained organic soils. Wetlands may be found from sea level to alpine elevations, and may include estuaries. Wetland systems and classes are described briefly below, with amounts of each listed in Table 3-102.

Table 3-102
Acres or miles by wetland system and class

Wetland Systems	Wetland Classes	Acres[1]	Miles[1]
Palustrine	Forested	1,409,219	
	Peatlands (muskeg)	1,273,586	
	Scrub-shrub[2]	354,598	
Lacustrine		141,726	
Estuarine		18,782	
Riverine			44,867
Total Wetlands		**3,197,911**	**44,867**

Source. Revision Database. Q97NA October, 1992 and Q3012E, November 1992.
[1] Represents the acres of wetlands that have been mapped in non-wilderness areas on the Forest.
[2] 155,756 acres of Scrub-shrub meet the Forest Serviceís criteria of being forested lands. These forested lands are classified as Scrub-shrub wetlands because the trees are less than 20 feet in height.

Palustrine wetland system. The Palustrine wetland systems include the vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens and prairies. They include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent. Palustrine wetland classes include moss-lichen and emergent wetlands (muskegs), scrub-shrub wetlands and forested wetlands. Classes are described in the following paragraphs.

Forested class. Forested wetlands comprise 44 percent of the total mapped wetland acres. Soil drainage depending on soil type ranges from somewhat poorly to poorly drained. Vegetation ranges from scrubby mixed conifer forests (greater than 20 feet high) on the poorly drained sites to moderately productive mixed conifer, western or mountain hemlock stands on somewhat poorly drained sites. Shrubs and forbs dominate the understory.

Many forested wetland soils are capable of growing trees of "commercial" value, and are included in the suitable timber base. (The classification of suitable timber lands is discussed in the Timber section of this chapter.) Some wetland soil types currently considered suitable but that produce lower volume timber stands may not be supporting adequate re-growth of trees after logging. Further information is needed to determine whether or not these soils should be re-classified as not suitable (Forested wetlands Suitability for Timber Harvest, August 1995). Until studies are completed, harvest on these soils will be minimized or avoided.

Peatlands (Muskeg) class. Peatlands (muskegs), the most unique and distinct of the Palustrine wetlands, comprise 40 percent of the total mapped wetland area on the Forest. "Muskeg" according to Hanson (1962) denotes a bog in the northern part of North America characterized by an abundance usually of sphagnum moss and greater or lesser abundance of shrubs and low trees. In Southeast Alaska, all relatively open bogs that have a groundcover high in sphagnum mosses and/or sedges are called "muskegs", and are a type of peatland.

Scrub-Shrub class. Scrub-shrub wetlands areas are the most vegetatively varied wetland classes in Southeast Alaska. They comprise 11 percent of the total mapped wetland acres. Soil drainage on these wetland areas, depending on soil type, ranges from poorly to very poorly drained. Plant species may include true shrubs, young trees, and tree and/or shrubs that are small or stunted because of environmental conditions. Scrub-shrub wetlands are associated with three broad wetland plant communities named scrub-shrub alder/willow, scrub-shrub evergreen/muskeg, and forested scrub-shrub evergreen/muskeg.

Lacustrine wetland system. The lacustrine system includes all permanently flooded lakes, reservoirs, and tidal lakes with ocean-derived salinities below 0.5 parts per thousand. Four percent of the total mapped wetland acres are lacustrine.

Estuarine wetland system. Estuarine wetlands are those areas that are predominantly intertidal, and are those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea, where the sea water is diluted with fresh water derived from land drainage. They comprise one percent of the total mapped wetland acres. Since the Forest Service is not chartered to manage ocean areas, the Forest's wetland inventory data does not cover the areas below mean-high high tide.

Riverine wetland system. The Riverine wetland System includes all channel-contained streams and rivers, 44,867 miles Forest-wide. These areas are bounded by uplands, channel banks or wetlands dominated by trees, shrubs, emergent mosses or lichens. In braided streams, the riverine wetland system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

Riparian

Riparian areas are streamside zones which generally include stream-associated vegetation (plants dependent on a perpetual source of water), and may include features of the stream channel (such as floodplains). Riparian ecosystems previously harvested for timber are now in various states of secondary plant succession. Except where the ground is highly disturbed, the species composition on these secondary successional riparian areas is very similar to the riparian vegetation prior to timber harvest, with spruce and hemlock dominating the tree canopy. On the more disturbed sites, the vegetation is often similar to primary successional species, such as occurs following deglaciation, with alder the commonest component.

Currently the management emphasis in riparian areas is to maintain habitats for fish and other riparian-associated resources. Management direction for meeting the basic requirements for protecting riparian areas is included in the National Forest Management Act Regulations, the Tongass Timber Reform Act, and the Clean Water Act. In particular, the Tongass Timber Reform Act requires minimum 100-foot, no-commercial-timber-harvest corridors on either side of all class I fish streams, and all class II streams flowing directly into class I streams, "in order to assure protection of riparian habitat." Alaska State legislation also requires the use of stream buffers.

Between 1954 and 1995, approximately 62,000 acres of riparian productive old growth forest were harvested. This represents about 13 percent of the original 490,000 acres of riparian productive old growth outside Wilderness (Source: Revision Database Query QRIP54_95). Including an estimate for riparian areas within Wilderness, to date about eight percent of the Forest's riparian productive old growth has been clearcut.

Watershed Condition

During 1994 an Alaska Anadromous Fisheries Habitat Assessment (AFHA) was conducted, for the purposes of studying the effectiveness of current procedures for protecting anadromous fish habitat, and determining if any additional protection was needed. This assessment concluded that current measures, and their implementation, were not fully effective in preventing habitat degradation or protecting salmon and steelhead stocks in the long term. The primary deficiency was the lack of protection for headwater streams and their watersheds. AFHA included recommendations to consider for the Tongass Plan Revision, and additional recommendations were made by the team that conducted on-the-ground analysis for AFHA. These recommendations have been considered in options for the proposed Riparian standards and guidelines (see Chapter 2, the Fish section of this chapter, and the revised Forest Plan, Chapter 4). AFHA is discussed more fully in the Fish section of this chapter.

For lands within the Tongass National Forest exterior boundaries, including all ownerships, 77 percent of the watersheds in 1992 were classified as healthy (i.e., having watershed functions and conditions generally in balance) and 23 percent were classified as unhealthy (i.e., having watershed functions and conditions generally out of balance). For lands outside of Wilderness and roadless areas, 72 percent were classified as healthy watersheds, and 28 percent were classified as unhealthy watersheds (USDA Forest Service, Report to Congress, Anadromous Fish Habitat Assessment, January 1995, Appendix C, pages 15-16).

For Tongass National Forest lands, excluding other ownerships, 87 percent of the watersheds in 1992 were classified as having satisfactory watershed conditions, 10 percent were classified as having declining watershed conditions, and three percent were classified as having unsatisfactory watershed conditions (USDA Forest Service, Alaska Region Watershed Restoration Strategy, updated October 1995). The Alaska Region Watershed Restoration Strategy identifies watershed restoration needs in 37 waterbodies on the Tongass (16 on the Ketchikan Area, 11 on the Stikine Area and 10 on the Chatham Area) through fiscal year 1998.

The Alaska Department of Environmental Conservation (ADEC) is responsible for preparing a statewide water quality assessment report every two years. ADEC's 1996 Section 305(b) Water Quality Assessment Report identifies eight surface waterbodies in Southeast Alaska that are impaired due to pollutants from roads (Fubar Creek), Log Transfer Facilities (Thorne Bay, Rowan Bay, Hobart Bay and Hamilton Bay) and forest products industrial facilities (Ward Cove, Silver Bay and Shoemaker Bay). Two of these impaired waterbodies are direct effects of Tongass National Forest management (Fubar Creek and Rowan Bay) and four are indirect effects of Tongass management (Thorne Bay, Ward Cove, Silver Bay and Shoemaker Bay).

Water Use

Key water uses on the Forest include public water supply, recreation, growth and propagation of fish, and hydroelectric power generation. The Forest supplies domestic water for 18 permanent communities. Ketchikan, Sitka and Petersburg have congressionally-designated municipal watersheds. In addition, water is supplied from the Forest to nine fish hatcheries, three industrial sites, nine logging camps, and three resorts.

Hydroelectric generation continues to be used in many places throughout the Forest to provide electricity for mining, sawmills, pulpmills, communities and other uses. There are six major power installations on the Forest. These installations are the Snettisham, south of Juneau; Beaver Falls, Ketchikan Lakes and Swan Lake east of Ketchikan; and Blue and Green Lakes south and east of Sitka. Additional installations and interties between installations are proposed.

Water

Environmental Consequences

This section considers the effects of forest management activities on stream flows, wetlands, and public water supplies. The effects of timber harvest and roads on fish habitat and riparian resources are discussed in the Fish section of this chapter. The effects of sedimentation due to soil erosion and landslides are discussed in the Soils section of this chapter. The effects of Log Transfer Facilities on the marine environment are discussed in the Transportation section of this chapter.

Direct, Indirect and Cumulative Effects

Forest management activities affect water quality and quantity, and the timing of water flows, through alteration of soil and watershed conditions. Most watersheds are in a state of dynamic equilibrium where changes occur naturally due to changes in weather patterns. Because of the overriding influence of climate, and basin resiliency, changes in streamflow and sediment delivery resulting from management activities (such as timber harvest) are difficult to measure.

Little is known about the effects of timber harvest and roads on stream flows in Southeast Alaska watersheds. The potential effects of changes in stream flows within watersheds Forest-wide are expected to vary depending on the relative allocation of Land Use Designations and the applicable Forest-wide standards and guidelines for each alternative. The effects from changes in stream flows in a particular watershed can only be estimated during project planning, where the rate of entry into watersheds and locations of proposed roads and harvest units will be analyzed. The actual effects on stream flows can only be determined by site-specific monitoring.

The large amount and general distribution of wetlands throughout the Southeast Alaska landscape makes it difficult and expensive to avoid construction on wetlands if resource management activities are to occur. The chemical, physical and biological integrity of wetlands is affected mainly through timber harvest operations, which include the construction and maintenance of roads, landings, stream crossing structures, and Log Transfer Facilities. Silviculture operations such as harvesting trees are generally exempted from Army Corps of Engineers permitting requirements. The construction or maintenance of forest roads in support of silvicultural practices, and temporary roads for moving mining equipment, are also generally covered under this exemption for the discharge of dredged or fill material into waters of the United States. This exemption is contingent on the construction and maintenance being conducted in accordance with the federal Best Management Practices as stated in 33 CFR 323.4(a)(6).

Table 3-103 shows the acreages of roads constructed in wetlands as of 1995, and the projected acres to be constructed in wetlands, by alternative, for the first and fifth decades. The 1995 total of 4,185 acres represents about 0.13 percent of the total inventoried wetland acres on the Forest. In the first decade, removal of wetlands from production as the result of new roads ranges from no additional acres in Alternative 1 to 2,364 acres in Alternative 7. By the end of the fifth decade, the amount of new roads in wetlands ranges from no additional acres (Alternative 1) to 7,048 acres (Alternative 7). At the most this is slightly less than four-tenths of one percent (0.4 percent) of wetland acres Forest-wide. As road acres increase, some roads will cross wetlands. Those will be kept to a minimum number, width and total length consistent with the specific silvicultural operation.

Table 3-103
Existing (1995) and proposed roading in wetlands (in acres)[1]

Alternative	1995	Cumulative Acres at End of Decade 1	Cumulative Acres at End of Decade 5
1	4,185	4,185	4,185
2	4,185	5,892	8,941
3	4,185	5,117	7,045
4	4,185	4,656	5,351
5	4,185	4,624	5,281
6	4,185	5,299	7,707
7	4,185	6,549	11,233
9	4,185	6,213	10,179
10	4,185	5,272	7,547
11	4,185	5,178	6,770

[1] Based on an estimated average of 30 percent of road construction being on wetland soils and three acres per mile of road.

The Municipal Watershed LUD is applied to three enacted municipal watersheds in Alternatives 1-10. In response to public comments, Alternative 11 applies the Municipal Watershed LUD to eleven watersheds serving nine incorporated cities (see Forest Plan, Chapter 3, Municipal Watershed). Watersheds serving unincorporated communities and other non-municipal water systems will be managed under Forest-wide standards and guidelines (see Forest Plan, Chapter 4, Soil and Water).

Mitigation

At present, about 92 percent of all riparian areas, and 87 percent of all riparian areas outside Wilderness, are in a natural condition. Riparian areas, as a component of aquatic and riparian ecosystems, will be protected through use of the Riparian standards and guidelines in all alternatives. In addition, the application of Best Management Practices will minimize or prevent adverse effects on water quality from the limited amount of riparian area within yarding corridors and stream road crossings, and from any non-commercial timber harvest that may occur.

In all alternatives, mitigation for activities that affect wetlands include compliance with the Executive Order for the Protection of Wetlands and Section 404 of the Clean Water Act, and implementation of Best Management Practices contained in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22).

Wild and Scenic Rivers

Affected Environment

Background

This section describes the process for identifying rivers that are eligible for inclusion in the National Wild and Scenic Rivers System, issues and concerns surrounding such designation, and the inventory of the outstandingly remarkable values and potential classification of eligible rivers. A listing and discussion of individual rivers is found in Appendix E.

The Wild and Scenic Rivers Act of 1968, as amended, provides a means for recognizing and protecting the outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecological and other values of selected rivers. The intent of including a river in the National Wild and Scenic Rivers System is to preserve the free-flowing condition of the river itself, as well as the characteristics of the river's immediate environment, for the enjoyment and benefit of present and future generations.

The process for adding rivers to the National system includes four steps. First, there is a determination of eligibility; to be eligible the river must be free-flowing and must have at least one outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or ecological value. This value should be a unique or exceptional representation for the area studied. In the evaluation for the Tongass National Forest, seven Geographic Provinces representing different geologic, climatic and ecological conditions were used to determine representation.

Second, the river or its segments are classified according to the criteria in the Wild and Scenic Rivers Act. In Alaska, ANILCA allowed for the continuation of access by airplane, motorboat and other forms of surface transportation, where traditionally employed, on all public lands, and for the continuation of fish and wildlife research and other activities within Conservation System Units (which includes Wild and Scenic Rivers). The presence of such existing activities and uses was not considered to affect the potential classification of eligible rivers in this analysis.

- A river is defined in the Wild and Scenic Rivers Act as "a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, rills, and small lakes." A glacier could be considered a flowing body of water (as ice), although this interpretation is untested. Salt chucks with well-defined tidal falls or rapids are also included.

- Wild River areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive in character and waters unpolluted. These represent vestiges of primitive America.

- Scenic River areas are defined as those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- Recreational River areas are defined as those rivers or sections of rivers that are readily accessible by road or railroad, that may have undergone some development along their shorelines and that may have undergone some impoundment or diversion in the past.

The third step is the determination that a river is suitable for inclusion in the national system. Suitability refers to how designation of a river fits the overall management for the area, and considers the trade-offs with other resource values. The land manager's estimate of the worthiness of the river to be recommended as a component of the national system, as well as mixed land ownership, state and local government interests and the value of other resources and potential uses, may affect the decision to recommend a river as suitable. The suitability factors are described in general terms in Section 4 of the Wild and Scenic Rivers Act; they are not detailed criteria, are not entirely quantifiable, and no attempt was made to further define these factors, except for the factor relating to whether a river would make a "worthy addition to the National System." This factor considered how well the river represented the geographic province in which it is located.

Finally, if a river is considered eligible and suitable it may be recommended by the land-managing agency for designation as a Wild, Scenic or Recreational River. This is a preliminary administrative recommendation. Recommended rivers will be managed, within the existing authorities of the Forest Service, to retain their free-flowing character and outstandingly remarkable values. The preliminary administrative recommendation is forwarded to the Chief of the Forest Service by the Regional Forester as part of the approved Forest Plan. Congress then makes a Wild and Scenic River designation, as it did for 26 Alaskan rivers in 1980.

In general, compared to rivers in other parts of the United States, there is relatively little detailed information on some aspects of rivers in Southeast Alaska of the type that is typically considered in river studies. There are very few stream gauging stations and flow records. There are very few past or currently active hydroelectric or other water resource development proposals that typically provide great detail for river studies elsewhere. Since few of the rivers receive significant recreational boating use, there are very few river rafting or kayaking publications dealing with Southeast Alaska rivers. Due to the remoteness of many rivers, data on recreation use is extremely limited. Citizens, guides, and resource managers have abundant personal knowledge about some of the rivers, but this information is generally not documented in any consistent way. To the extent such information was available to the Forest Service, it was considered in the suitability studies.

Because so many eligible rivers exist in Southeast Alaska, and because there is strong interest in the state for maintaining options for future infrastructure development, the question of "ripeness" for decision to recommend rivers to the National System was considered. The river study participants concluded that since the Wild and Scenic Rivers Act was formulated against the background of development typical in the Lower 48 states, where the goal of the National System was to preserve some of the relatively few remaining undeveloped rivers, it was not intended that all eligible rivers be recommended even where there is no apparent conflict with other present or foreseeable management needs. As a result, the study team placed significant weight on the suitability factor related to whether the river would make a worthy addition to the National System, with a strong focus on the ability of suitable rivers to represent the geographic diversity of Southeast Alaska. There are seven major geographic provinces in Southeast Alaska (see the Research Natural Area section), differing in geologic development, climate, topography, ecology and other factors. The suitability analysis for each river in Appendix E notes how well the river represents the geographic province in which it is located, compared to other rivers in that province. The more exemplary rivers form the basis for recommendations in the Preferred Alternative.

Glossary

Current Situation

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) designated 26 rivers in Central and Northern Alaska as components of the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act of 1968. None of these rivers is within Southeast Alaska or the Tongass National Forest. An additional 12 rivers were designated as “study rivers” by ANILCA, of which only one, the Situk River near the community of Yakutat, is within Southeast Alaska and within the Tongass National Forest.

The Situk River, including the West Fork and Old Situk Creek, was studied in 1983 and found to possess outstandingly remarkable fish, wildlife and recreational values of national significance, but was not recommended for designation. The community of Yakutat, the local and Regional Native Corporations, the Citizens Advisory Council of Federal Areas, and the Alaska Land Use Council supported development of a management plan for the Situk River, rather than designation as a Wild and Scenic River. Because the local public opposition to designating Wild and Scenic Rivers in the Yakutat area still exists (as evidenced by comment to the RSDEIS on the proposed designation of the Dangerous River), no additional study of the Situk’s suitability was conducted during this plan revision.

Rivers on the Tongass National Forest were never considered for inclusion in the National Rivers Inventory maintained by the Department of Interior, National Park Service. As a result, no rivers other than the Situk have been evaluated for their potential eligibility for inclusion in the National Wild and Scenic River System.

The National Park Service (NPS) initiated an evaluation to determine the eligibility of the rivers within the National Parks and Preserves in Alaska. The Alsek River near Yakutat is included in that evaluation. One of the segments is bordered by Glacier Bay National Park and Preserve and the Tongass National Forest, the latter of which includes the surface and west bank of an 18-mile segment. They found the 18-mile segment eligible, and meeting a “Scenic” classification. Another 30 mile segment, entirely within the Park, was found eligible as “Wild.” The Alsek River was connected with the Windy-Craggy mine controversy in Canada, in which this mine was proposed for development on one of the major tributaries of the Alsek, the Tatshenshini. The Canadian government has since set aside the Tatshenshini area as wilderness and the river as a Canadian Heritage River (similar to a U.S. Wild and Scenic River). The Forest Service is willing to cooperate in a joint USFS/NPS river study, if the NPS pursues it, as they are considered the lead agency for such studies on the Alsek.

There are nearly 900 watersheds on the Tongass National Forest, containing some 42,500 miles of perennial stream. Some 2,000 individual streams and tributaries totaling about 12,000 miles support anadromous fisheries. Of these about 100, the major salmon streams, are responsible for production of more than half of the salmon in Southeast Alaska. The Alaska Department of Fish and Game has identified 64 watersheds as “important,” and 19 watersheds as “high quality,” for their commercial fish production and sport fishing values, and other wildlife and fish related attributes. Several rivers with a variety of important ecological features have been identified as potential Research Natural Areas (see the Research Natural Areas section of this chapter).

Several of the Forest’s major rivers originate in British Columbia or the Yukon Territory, and are currently subject to international fishery management agreements and other treaties. Some of the major rivers have historically been used as travelways into Canada, including steamboat travel, and are identified by the state as having potential as road corridors connecting Southeast Alaska with Canada. A number of rivers also have a record of prehistoric use for travel and subsistence activities. Some of the rivers, both historically and currently, have mining interest or provide access to mineralized areas. The State of Alaska claims jurisdiction over the water and stream bed of all "navigable" streams and rivers, which is the subject of long-standing dispute with the Federal government over interpretations of the Statehood Act, ANILCA, and enabling legislation.

The small size of communities, and (with a few exceptions) the lack of industrial development, has meant that water supply and hydroelectric projects are small and widely scattered. There are no large "mainstem" dams in Southeast Alaska. This lack of development, along with generally high scenic quality, and wildlife and fish habitat values, implies that many streams on the Tongass could be considered as possessing outstandingly remarkable values when compared to rivers in the "Lower 48" states.

Only a few rivers have road access, and fewer still have access to both upstream and downstream segments. Many have steep gradients, or numerous barriers to travel, usually in the form of fallen trees and thick vegetative cover. As a result, recreation opportunities that are commonly considered important in defining outstanding recreation value, such as the opportunity to float or kayak a river, are found on only a few rivers or river-lake systems at the present time. Powerboat access is common on the lower reaches of some rivers. Most public use of rivers occurs near the rivers' mouths, in bays and estuaries where saltwater provides access by boat to fishing, hunting and viewing opportunities.

Some rivers on the Tongass may present opportunities to represent ecosystems or features not represented by existing components of the National Wild and Scenic Rivers System. Some rivers contain native runs of anadromous fish that have not been altered through management. Some contain the full diversity of anadromous fish species. A few present unique "fly-in" recreation opportunities. Most are within a temperate coastal rain forest ecosystem and present opportunities in addition to those in Washington, Oregon and northern California to represent this ecosystem in the national system. Several represent active glaciers and glacial geology not found elsewhere in the United States. Some offer the opportunity to represent rivers that flow through the entire vertical range of ecosystems, from alpine tundra to the sea, in a distance of only a few miles. Some include intertidal lagoons and salt chucks with well-defined tidal falls or rapids. A few present opportunities for international river conservation efforts. Most rivers will retain their opportunities and features whether or not they are designated as a Wild, Scenic, or Recreational River.

Issues and Concerns

The Alaska National Interest Lands Conservation Act gives the State of Alaska the option of developing transportation linkages between communities and to areas outside Southeast Alaska. Some would view designation of Wild and Scenic Rivers as limiting these transportation system development options. At the same time, others see the current lack of development as presenting a unique opportunity to identify and protect eligible rivers before they undergo development. Potential transportation and utility corridors have been identified in a number of locations containing eligible rivers, including the routes from Haines or Skagway to Juneau; from Wrangell to Canada by way of river valleys such as the Stikine and Bradfield; from Juneau to Canada via the Taku River; from Ketchikan to Wrangell; from Ketchikan to Hydaburg via a ferry terminal proposed for Thorne Bay; from Wrangell to Petersburg with ferry connections; and from Kake to Petersburg.

The State of Alaska claims jurisdiction over submerged lands, including intertidal lands and the beds and water columns of all rivers which were used or "susceptible of use" for navigation for commercial purposes at Statehood in 1959. The issue of whether the Federal reservation of the Tongass National Forest included the submerged lands claimed by the State has never been conclusively resolved. It is not the purpose of a Wild and Scenic River study to determine whether a river meets the various legal tests to be considered navigable, and navigation on the river for commercial purposes does not preclude its inclusion in the National Wild and Scenic Rivers System. In addition, the Wild and Scenic Rivers Act provides for the inclusion of non-Federal lands, presumably including submerged lands, within the study corridor, and the question of whether the State or the United States holds title to the beds of streams is immaterial to the river study process. Since Wild and Scenic Rivers are defined by ANILCA as Conservation System Units, non-Federal lands within a designated Wild and Scenic River area are not considered a part of a Conservation System Unit and Federal regulations that apply to the Unit do not apply to the nonfederal lands.

One of the rivers studied, the Stikine, is subject to an international treaty (Treaty of Washington, May 8, 1871) which states that the river would "remain forever free and open for the purposes of commerce . . ." In this case, the navigability of the river is not in question. Several other rivers on the Tongass National Forest, including the Taku and Alsek, are subject to other international treaties governing anadromous fisheries.

Development of water and power resources is also an issue in Southeast Alaska. All the communities of Southeast Alaska are dependent on locally-produced electricity, generated by hydroelectric or diesel generators. There are virtually no options to connect to power grids "outside." Solid fuel generation is impractical due to the lack of rail transportation and the distance to the nearest bulk coal terminal at Seward is 600 miles across the Gulf of Alaska. Natural gas is unavailable and opportunities for pipeline construction are severely limited by the island character of the area, or by ice fields and glaciers along the Canadian border. Although hydroelectric projects are presently small and widely scattered, the high flow and gradient of many large rivers may present significant hydroelectric potential. Despite the fact that the Alaska Energy Authority identifies few of the eligible rivers as having hydroelectric potential likely to be developed in the next twenty years, some would argue that designation of Wild and Scenic Rivers could limit future development because non-hydroelectric alternatives are virtually non-existent.

Numerous eligible rivers are within the long-term sale area of the Ketchikan Pulp Company and within areas proposed for independent timber sales. Designation of rivers in these areas could affect timber supply or increase the cost of logging. (In the determination of eligibility, harvest units and roads previously approved in the records of decision for timber sale projects were considered as in place).

Although fisheries improvement projects are expressly allowed by Forest Service policy (FSH 1909.12 Chapter 8), some may view designation of Wild and Scenic Rivers as potentially limiting the development of fisheries improvement projects, such as fish passes, because of their potential modification to the primitive character of the landscape. In response to this concern, a policy was recently established outlining procedures for evaluating water resource projects in Wild and Scenic Rivers and study rivers. At the same time, many people perceive timber harvest and road construction as having adverse effect on salmon-producing streams, and may perceive designation as a means of protecting fishery values. Most of the eligible rivers and streams on the Tongass National Forest support anadromous fisheries and many contribute substantially to the fishing industry.

Many people in Alaska make all or part of their living following a subsistence way of life. While many seek to protect the wildlife habitat and fisheries in important subsistence activity areas, including many eligible river areas, there has historically been little support for additional Congressional land allocations by such persons because they fear that designations such as Wild and Scenic Rivers may attract additional and competing recreation use, or result in additional regulation of activities within the area.

Mineral interests express concern that designation of Wild and Scenic Rivers would limit the future development of mineral resources important to Alaska's economy. Wild River areas are withdrawn from mineral entry (subject to valid existing rights) 1/4 mile either side of the ordinary high water mark of the river after Congressional designation. Operating costs for existing mining activities in Wild Rivers could increase due to requirements to minimize impact on the river values. In Scenic and Recreational River areas which remain open to mineral entry, operating costs could also increase as operating plans would be designed to reduce effects on the outstanding values identified. Access through river corridors to mineralized areas outside of the corridors might also result in higher costs. Only a few of the eligible rivers are within high priority mineralized areas.

Some individuals and organizations have questioned whether ANILCA Section 1326(b) allows the Forest Service to pursue Wild and Scenic River studies. This section prohibits Federal agencies from undertaking "single purpose studies leading to the establishment of new Conservation System Units" without specific authorization by Congress. Because the Forest Plan Revision is a comprehensive land management planning document for all National Forest resources, subject to other Federal laws requiring the evaluation of rivers, including the National Forest Management Act and the Wild and Scenic Rivers Act Section 5(d), the Forest Service has determined that it is not conducting a single purpose study, and that the inclusion of the analysis of Wild and Scenic River potential in that document is not in conflict with ANILCA Section 1326(b) and is consistent with the Wild and Scenic Rivers Act.

In response to the 1991 SDEIS, several organizations (including Tongass Conservation Society, American Rivers, and Southeast Alaska Conservation Council) and individuals expressed support for adding all eligible rivers to the National Wild and Scenic Rivers System. Several organizations (including Alaska Forestry Association, Alaska Miners Association, and Sealaska Corporation), the State of Alaska, and individuals commented that no rivers should be added to the National Wild and Scenic Rivers System. The Narrows Conservation Coalition expressed support for designation of all eligible rivers on the Stikine Area for inclusion in the National Wild and Scenic Rivers System.

In late 1995, the Southeast Alaska Conservation Council published a document titled, "Tongass Rivers, the Lifeblood of the Rainforest" which describes and proposes 67 rivers for designation.

In response to the RSDEIS, those people commenting on proposed Wild and Scenic Rivers were split almost equally between those wanting no Wild and Scenic Rivers and those wanting at least some rivers to be recommended. Almost all of the comments related to wanting more rivers supported the Tongass River Coalition's proposal of 67 rivers.

Inventory, Eligibility and Classification

An evaluation was conducted for the purpose of determining the eligibility, potential classification, and suitability analysis for rivers and streams on the Tongass National Forest. This process began with an inventory of all areas of the Forest by Forest Service personnel and, as requested, by field personnel of the Alaska Department of Fish and Game and other individuals with knowledge of river

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resources. The inventory initially included listings of potentially eligible streams compiled from existing information sources, including the *Catalogue of Waters Important to anadromous fish* (maintained by the Alaska Department of Fish and Game, Habitat Division), the 1979 Forest Plan Value Comparison Unit (watershed) ratings for fish, wildlife and recreation, the ADF&G 1983 Sport Fish Habitat Improvement Program ratings of streams, inventoried potential Research Natural Areas, and other special Management Areas.

From these information sources, as well as from information provided by Forest Service fish biologists, hydrologists and other professionals personally familiar with river resources, streams and rivers that appeared to have potential outstandingly remarkable values were identified. Streams and rivers with possible outstandingly remarkable values were further evaluated following the processes outlined in *Guidelines for Eligibility, Classification and Management of Wild and Scenic Rivers* (U.S. Department of the Interior and U.S. Department of Agriculture, 1982) and in Chapter 8 of Forest Service Handbook 1909.12. Potential outstandingly remarkable fish and wildlife, recreation, scenic, geologic, cultural, historic and ecological values were examined.

This inventory and evaluation was confined to rivers and streams which are primarily on National Forest System lands. A number of other potentially eligible streams are present in Southeast Alaska but are either wholly or substantially on Native and private lands, State lands (such as the Chilkat River), or lands administered primarily by other Federal agencies, such as the Tsirku River, administered by the Bureau of Land Management, and the Alsek River, most of which is administered by the USDI National Park Service. These were not included in the inventory and evaluation for the Tongass National Forest.

All rivers on the Tongass were initially reviewed for outstandingly remarkable values. The initial evaluation identified 300 rivers and streams for further study. Of these, 188 were determined to not contain outstandingly remarkable values representative of the resource or geographic province. The evaluation resulted in the determination that 112 rivers with a total length of 1,394 miles are eligible for consideration as components of the National Wild and Scenic River System. Headwaters and tributaries are included when they contain outstandingly remarkable values. The 112 eligible rivers, their outstandingly remarkable values, and their current classification are displayed in Table 3-104. Additional information on the characteristics and resources of each of the eligible rivers is contained in Appendix E.

Table 3-104
Tongass National Forest Eligible Rivers

River Name	VCU	Wild (Mi.)	Scenic (Mi.)	Rec. (Mi.)	Geo-Prov.[1]	Outstandingly Remarkable Values: Fish	Wildlife	Recreation	Scenic	Hist./Cult.	Geology	Ecology
Aaron, Oerns, Berg Creeks	503S	37	-	-	CR	X	X	X	X	-	-	-
Alecks Creek and Lake	405S	3	-	-	II	X	-	X	-	X	-	-
Alpine Creek (local)	495S	3	-	-	CR	-	-	-	X	-	-	-
Anan Creek	522S	18	-	-	II	X	X	X	-	-	-	-
Andrews Creek	493S	18	-	-	CR	X	X	-	X	-	-	-
Antler River	14c	13	-	-	LC	-	X	X	X	-	X	-
Baird Glacier	482S	20	-	-	CR	-	X	X	X	-	-	-
Bakewell Creek-Badger Lake	826K	9	-	-	CR	X	-	X	-	-	-	-
Benzeman River and Lake	347C	14	-	-	NOI	-	-	-	X	-	X	-
Berners River	12C	10	-	-	LC	X	X	X	X	-	-	-
Big Branch Inlet Stream	341C	12	-	-	NOI	-	-	-	X	-	-	X
Big Creek	674K	5	-	-	SI	X	X	X	X	-	-	-
Big Goat Creek and Lake	802K	5	-	-	CR	-	X	X	X	-	-	-
Black River	272C	10	-	-	NOI	X	-	-	X	-	X	X
Blind River	451S	-	-	5	II	X	X	X	-	-	-	X
Blossom River	815K	11	14	-	CR	X	-	-	-	-	-	-
Blue River	787K	26	-	-	CR	-	X	-	X	-	X	X
Bradfield River East fork	517S	-	-	19	CR	X	X	-	X	-	-	-
Bradfield River North Fork	514S	-	-	27	CR	X	X	-	X	-	-	-
Canoe Point Stream	625K	2	-	-	SI	-	-	-	X	-	-	-
Cascade Creek	486S	5	-	-	CR	X	-	X	X	-	-	-
Castle River	435S	23	-	-	II	X	X	X	-	-	-	-
Cathedral Falls Creek	425S	-	-	1	II	-	-	X	X	-	-	-
Chickamin River	797K	94	2	-	CR	X	X	X	X	X	X	-
Chuck River	76C	15	-	-	CR	X	X	-	X	-	-	-
Dangerous River	377C	7	16	-	YAK	-	X	-	X	-	-	-
Duncan Salt Chuck Creek	441S	12	-	-	II	X	X	X	X	-	-	-
Eagle River	26C	-	-	6	LC	-	-	X	X	X	X	-
Eagle River and Lake	519S	12	-	-	CR	X	-	X	-	-	-	-
Earl West Creek (local)	478S	-	-	9	II	X	-	X	-	-	-	-
Endicott River	66C	21	-	-	LC	-	X	-	X	-	-	-
Essowah Lake and streams	659K	13	-	-	SI	X	X	-	X	-	-	-
Fall Dog Creek (local)	400S	4	-	-	II	X	X	-	X	X	-	-
Falls Creek and McHenry Lake	472S	3	-	-	II	X	-	-	X	-	-	-
Farragut River	90S	29	1	-	CR	X	X	-	X	-	-	-
Fish Creek	806K	-	-	4	CR	X	-	-	-	-	-	-
Freds Creek	308C	5	-	-	NOI	-	-	-	X	-	X	-
Gambier Bay tributaries	170C	14	-	-	NII	X	-	-	-	-	-	X
Gilkey River	15C	9	-	-	LC	-	-	-	X	-	X	-
Glacial River	314C	10	-	-	NOI	-	-	-	X	-	X	X
Gokachin-Mirror-Low-Fish Creek	754K	30	-	-	II	X	X	X	X	X	-	-
Granite Creek-Manzoni Lake	800K	8	-	-	CR	-			X	-	-	-
Hamilton Creek	425S	-	20	-	II	X	-	-	-	-	-	-
Harding River	511S	16	-	-	CR	X	X	X	-	-	-	-
Harris River	610K	-	-	7	SI	-	-	X	-	-	-	-
Hasselborg River and Lakes	157C	24	-	-	NII	X	X	X	-	X	-	-
Hatchery Creek and Lake	472S	2	-	-	II	X	-	X	-	X	-	-
Herbert River	26C	-	-	6	LC	-	-	X	X	-	-	-
Hulakon River	786K	6	-	-	CR	X	X	-	X	-	-	-
Humpback Creek and Lake	834K	8	-	-	CR	X	X	-	-	-	-	-
Hunter Bay lakes and streams	694K	19	-	-	SI	X	-	X	-	-	-	-
Irish Creek-Keku Creek	428S	17	-	-	II	X	-	-	-	X	-	-
Johnson Lake and streams	692K	6	-	-	SI	X	-	-	-	-	-	X
Kadake Creek	421S	4	-	19	II	X	X	X	X	X	-	-
Kadashan River	235C	8	-	-	NII	X	X	-	-	-	-	X
Kah Sheets Creek and Lake	434S	9	-	-	II	X	X	X	-	X	-	-
Karta River-Salmon Lake	605K	24	-	-	SI	X	X	X	-	X	-	-

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River Name	VCU	Wild (Mi.)	Scenic (Mi.)	Rec. (Mi.)	Geo-Prov.[1]	Outstandingly Remarkable Values: Fish	Wild-life	Recre-ation	Sce-nic	Hist./ Cult.	Geo-logy	Eco-logy
Katzehin River	9C	12	-	-	LC	X	-	-	X	-	X	-
Kegan Lake and streams	684K	9	-	-	SI	X	-	X	X	-	-	-
Keta River	841K	16	-	-	CR	X	-	-	-	-	-	-
King Salmon River	143C	8	-	-	NII	X	X	-	-	-	-	-
Klahini River	790K	27	-	-	CR	-	X	-	X	-	-	-
Klakas Lake and streams	687K	8	-	-	SI	X	X	-	X	-	-	-
Kook Lake and Creek	239C	-	-	2	NII	X	-	-	-	X	X	-
Kunk Creek and Lake	463S	2	-	-	II	X	X	X	X	-	-	-
Kushneahin Creek	431S	9	-	-	II	X	-	-	-	-	-	-
Kutlaku Creek and Lake	403S	2	-	-	II	X	-	-	-	-	-	-
Lace River	13C	20	-	-	LC	-	X	X	X	-	X	-
LeConte Glacier	491S	6	-	-	CR	-	-	-	X	-	X	-
Lisianski River	249C	5	-	-	NOI	-	X	-	-	-	-	X
Lost River-Tawah Creek	367C	-	-	10	YAK	X	X	-	X	-	-	-
Maksoutof River Complex	330C	10	-	-	NOI	-	-	-	X	-	-	-
Marten Lake and Creek	509S	6	-	-	CR	X	X	X	X	-	-	-
Marten River	838K	17	-	-	CR	X	X	-	-	-	-	-
Mud Bay River	193C	6	-	4	NII	X	X	-	X	-	-	
Naha River	742K	17	2	-	II	X	X	X	-	X	-	-
Niblack lakes and streams	683K	5	-	-	SI	X	-	-	-	-	-	-
Nooya Creek	802K	1	-	-	CR	X	X	X	X	-	-	-
Nutkwa streams	686K	12	-	-	SI	X	X	X	X	-	-	-
Olive Creek	469S	3	-	1	II	X	-	X	-	-	-	-
Orchard Creek and Lake	733K	26	-	-	II	X	X	X	X	-	-	X
Patterson River	487S	3	-	4	CR	-	X	X	X	-	X	-
Pavlof River	218C	-	-	10	NII	X	-	X	-	-	-	-
Petersburg Creek	445S	7	-	-	II	X	-	X	X	X	-	-
Porcupine Creek	466S	2	-	-	II	X	X	X	-	-	-	-
Portage Creek	778K	4	-	-	II	-	-	-	-	X	-	-
Punchbowl Creek	803K	1	-	-	CR	-	-	-	X	-	-	-
Red Bluff Bay tributaries	329C	13	-	-	NOI	X	-	X	X	-	X	X
Rudyerd Creek	798K	12	-	-	CR	-	X	X	X	-	-	-
Salmon Bay Lake and streams	534K	4	2	-	SI	X	X	-	X	-	-	-
Salmon River	806K	-	-	10	CR	-	-	-	-	-	X	-
Santa Anna Creek -Lake Helen	526S	4	-	-	II	X	-	X	-	-	-	X
Sarkar Lakes	554K	14	3	2	SI	X	X	-	X	X	-	-
Scenery Creek	485S	8	-	-	CR	-	-	-	X	-	-	-
Shakes Slough	495S	10	-	-	CR	-	X	X	X	-	-	X
Shipley Creek and Lake	541K	5	-	-	SI	X	X	-	X	X	-	-
Sitkoh Creek	244C	-	4	-	NII	X	-	X	-	-	-	-
Sockeye Creek-Hugh Smith Lake	836K	9	-	-	CR	X	-	-	-	-	-	-
Soda Creek and lake	632K	3	-	-	SI	-	-	-	-	-	X	-
Spring Creek-Lake Shelokum	726K	3	-	-	II	-	-	-	X	-	X	X
Stikine River	492S	-	25	-	CR	X	X	X	X	X	-	X
Taku River-Twin Glaciers Lake	46C	-	17	-	CR	X	-	-	X	-	-	-
Thorne River-Hatchery Creek	553K	-	36	6	SI	X	X	X	X	-	-	-
Trail River	190C	6	-		NOI	-	-	-	-	-	-	X
Tunehean Creek	428S	8	-		II	X	-	-	-	-	-	-
Unuk River	784K	23	-	-	CR	X	X	X	X	X	-	-
Virginia Lake and Creek	502S	-	9	-	CR	X	-	X	-	-	-	-
Walker Creek and Lake	797K	6	-		CR	X	X	X	X	-	-	-
Ward Creek and Lake	750K	-	-	3	II	X	-	X	-	-	-	-
Whiting River	61C	25	-	-	CR	X	-	X	X	-	-	-
Wilson River and Lake	817K	9	3	-	CR	X	X	-	-	-	-	-
Wolverine Creek-McDonald Lake	724K	6	-		II	X	X	X	-	-	-	-

[1] The geographic provinces are: CR - Coast Range, LC - Lynn Canal, NOI - Northern Outer Islands, NII - Northern Interior Islands, II - Interior Islands, SI - Southern Islands, YAK- Yakutat.

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Appendix E includes an analysis of the suitability of all 112 eligible rivers. These 112 suitability studies consider the factors outlined in Section 4(a) of the Wild and Scenic Rivers Act, as further described in the introduction to Appendix E. The river corridors were entered into the Geographic Information System data base, allowing an accurate compilation of acreage, information on resources, including total acres, tentatively suitable forest lands, miles of anadromous fish stream, and related resource information. This improvement to the electronic data base allows a detailed assessment of the suitability of river designations and effects on other resources contained in Appendix E.

Methodology and Scientific Accuracy

The 1982 Guidelines for Eligibility, Classification and Management of Wild and Scenic Rivers acknowledged that the determination of eligibility is a subjective process which involves the consideration of esthetic and other factors which are not quantifiable. The Guidelines provided general criteria for identifying "outstandingly remarkable" values, and the level of existing development related to classification. The determination of eligibility was made by Forest Service resource professionals in consultation, as necessary, with other agency professionals, as required by the Guidelines.

To guide this process, a general set of criteria was developed, based in part on the criteria used in river studies in the Pacific Northwest. These studies were chosen as a guide because rivers in the Pacific Northwest are most similar to rivers in Southeast Alaska, primarily due to the temperate rain forest, climate, and presence of anadromous fish.

Prior to the commencement of the eligibility determination, the general criteria used for identifying "outstandingly remarkable" values were reviewed by professionals of several Federal and State Agencies including the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, Alaska Department of Fish and Game, Alaska Department of Natural Resources and its Division of Parks and Outdoor Recreation.

In addition, a variety of existing information sources were reviewed that provided clues to the probable existence of outstandingly remarkable values. These sources included listings of high-value sport fishing waters, and other materials provided by the Alaska Department of Fish and Game (ADF&G); the task force report for identification of potential Research Natural Areas; detailed reports on high value and important watersheds identified in the ADF&G Forest Habitat Integrity Plan of 1982; independent publications containing information on individual rivers; and personal knowledge of local users.

Wild and Scenic Rivers

Environmental Consequences

Direct, Indirect and Cumulative Effects

The kinds and amounts of activities and changes acceptable within a river corridor depend on whether it is recommended to be designated as a Wild, Scenic or Recreational River. Because Forest Plan alternatives are not site-specific, it is not possible to describe precisely how an individual stream may be affected by future projects, since the exact locations and designs of those projects are not yet determined. It is possible, however, to describe and to display the general effects of various management activities on the eligibility and potential classification of rivers. These potential effects are described below in general terms. In Appendix E, the effects of alternatives on each eligible river are described in more detail through the individual river suitability studies.

Specific kinds of forest activities and uses can affect the classification or eligibility of rivers. These are described in the next few paragraphs:

Timber Harvesting. Timber harvesting and associated roads and Log Transfer Facilities can have a major effect on the potential for a river to be considered eligible, and, if eligible, which classification it meets. Extensive, highly visible, and ongoing timber harvesting within a river corridor could result in the river becoming ineligible for any classification. Where timber harvest maintains the natural appearance of the river corridor as seen from the river and its banks, the river may qualify for Scenic classification; more alteration may still be acceptable for a Recreational classification.

Water Project Development. Any major impoundment for water storage or hydroelectric power would cause a river segment to be ineligible. Two of the eligible rivers are under consideration for such projects at the present time. In the case of hydroelectric proposals that meet the criteria for licensing by the Federal Energy Regulatory Commission (FERC), the Forest Service is not the permitting agency, and serves only in an advisory role to FERC. Depending on their visibility and extent, low dams and diversions, penstocks, transmission lines and other facilities may affect the classification of the river. Where these facilities are visually subordinate, the river may be classified as a Recreational River. Where such features dominate the landscape, the river is likely to be ineligible.

Mining. Large-scale mining activity could result in an eligible river becoming ineligible, or result in its being eligible only in the Recreational classification. Some types of mineral exploration may not affect the classification of a river as Scenic or Recreational, as long as the outstandingly remarkable values and classification objectives are maintained.

Recreation Development. Development of trails, hike-in (or fly-in or boat-in) cabins, and campsites would not likely affect the Wild classification of a river, nor would continuation of traditional access by motorized equipment. In addition to the above, developments such as launch sites and modest recreation sites would not affect the Scenic classification, as long as the development did not greatly alter the natural character. Development of major recreation sites, boat launches, other visitor facilities, would generally cause a river to meet only the Recreational classification.

Roads. Any construction of roads in the river corridor would eliminate that segment of river from classification as a Wild River. Even roads outside of the river corridor might be incompatible with Wild classification, if they detracted from the primitive character or an outstandingly remarkable value, especially scenic values. Construction of roads and bridges which occasionally cross or reach the river would not affect the classification of a Scenic River, assuming such roads are infrequent and relatively inconspicuous. In broad valley settings, a major road might be compatible with the Scenic classification due to the scale of the landscape. Construction of a major highway or extensive road system could limit a river to the Recreational classification.

Fish Improvement Projects. Constructed fish passes and other structures associated with improvement of fish habitat are possible in all classifications, if determined on a case-by-case basis that the facility does not alter the free-flowing character of the river or conflict with the outstandingly remarkable values. Developments in the Wild classification would need to be compatible with the primitive character of the river area. Some fish improvements typical in Alaska may not be allowed or may be more expensive to build on a Wild River. Construction of an on-stream fish hatchery would be compatible only with the Recreational classification.

Wildlife Habitat Improvements. Manipulation of vegetation or improvements such as fencing or artificial nest structures, would likely be incompatible with Wild classification. They might be compatible with a Scenic designation, as long as the undeveloped character was maintained. Most improvements would be acceptable in a Recreational classification, consistent with the outstandingly remarkable values.

Conversely, designation of a river as a component of the National Wild and Scenic Rivers System can affect the management of various resources. The Wild and Scenic Rivers Act provides that the study boundary includes, at a minimum, the area within 1/4 mile either side of the ordinary high water mark of the river. Final boundaries can and do vary from this minimum, but generally follow the 1/4 mile guideline. Congressional designation as a Wild, Scenic or Recreational River in Alaska might result in the establishment of a Conservation System Unit as defined by ANILCA. Where rivers are designated in Wilderness, the Wild and Scenic Rivers Act provides that the most restrictive provisions of the laws apply. Since the two laws differ somewhat, any legislative action should address the specific differences.

Congressional designation as a Wild River results in the area being withdrawn from mineral entry. Scheduled commercial timber harvest is not allowed, and outputs of timber from tentatively suitable forest lands are foregone. Construction of major recreation facilities, roads, powerlines and other features are not allowed. However, if designated as a Conservation System Unit under ANILCA, Title XI defines a process whereby transportation and utility corridors may be allowed. The potential for hydroelectric power generation is also foregone. Within Wilderness, the President may authorize water resource projects, and designation under the Wild and Scenic Rivers Act that would provide an added degree of protection, requiring congressional approval. Some opportunities for fish and wildlife habitat enhancement would also likely be foregone. Congressional designation would not affect the rights of landowners within a Wild River area, except perhaps access constraints. Other restrictions could result from enabling legislation if zoning or other regulatory changes were enacted by local governments. Designation, particularly where tributary streams, important visual features, or outstandingly remarkable values lie outside the 1/4 mile corridor, could affect the management of lands adjacent to a Wild River by requiring more constraints or complimentary Land Use Designations. The Wild and Scenic Rivers Act also requires that upstream water projects may not significantly degrade the river values within the designated segments and that downstream impoundments may not back water up into the designated segments.

Congressional designation as a Scenic River places significant constraints on the management of timber in the river corridor, although timber harvest generally out of view of the river or recreation sites could occur. The area is not withdrawn from mineral entry, but costs of mining could increase as a result of standards to maintain identified values and Scenic River objectives. The potential for hydroelectric power generation is foregone. Construction of major recreation facilities could be limited. Roads, while allowed, could be more expensive as design seeks to minimize the visual impact and the number of bridge crossings. Effects on management of adjacent lands would be less than for a Wild River, although activities affecting sensitive visual features may be constrained resulting in increased cost or reduced output.

Congressional designation as a Recreational River places fewer constraints on management and development activities, although the potential for new diversions and hydroelectric power generation is foregone. Timber may be harvested, although visual constraints may increase the cost of timber harvest and reduce outputs.

Congressional designation of a system of Wild and Scenic Rivers has many positive effects. The undeveloped nature of the region presents a unique opportunity to identify the very best candidates for addition to the system, and avoid the situation of picking up the leftovers as has often occurred in the rest of the states. The opportunity presents itself to represent a wide range of outstanding values for a variety of geological and ecological settings, on a large geographic scale. A system of rivers would complement the conservation units already designated by Congress in Southeast Alaska, and could recognize the unique social, economic, and development needs through the enabling legislation, as was done in ANILCA.

A system of Wild and Scenic Rivers could open up new tourism marketing opportunities, as is often the result of the attention focused on Congressionally-designated areas. On a regional scale, this could be used as a tool to capture a larger segment of visitors to further stimulate tourism and the economies of the area. On a local scale, certain communities or service providers could promote different areas and activities, and attract specific market segments of users. Opportunities could vary from primitive experiences to those in more developed settings, and encompass a variety of activities. Promotion of a designated river might be the vehicle for a successful operation. The down side of this marketing opportunity might be the attracting too many people (in some people's opinion), resulting in user conflicts such as for subsistence use, and more regimented managerial controls.

Suitability

Appendix E contains the suitability reports for each of the 112 eligible rivers. They describe in detail the anticipated effects of designation and non-designation in respect to the six suitability factors referred to in Section 4 of the Wild and Scenic Rivers Act.

One of the factors in the suitability reports is consideration of a range of alternatives for managing the river, whether recommended for designation or not. The 112 rivers, with numerous segments, and three possible classifications, present hundreds of possibilities for structuring alternatives at the Forest Plan level. In some cases, a stream is shown as Wild classification in one alternative, in a different classification in another, and may not be included (or reflects fewer miles) in another alternative. The intent is to show the river in its current, most undeveloped condition in one alternative, and to provide recognition of resource opportunities and state and local infrastructure needs in other alternatives. Thus the alternatives were simply a starting point for comparing rivers, values, resource trade-offs, and opportunities. Assigning a river to a given alternative was a reflection of the alternative theme, recognizing other possible combinations for a particular river might exist. These alternative themes and their relationship to the suitability reports are summarized below; Table 3-105 displays the alternative recommendations by river. Alternative 9 has no rivers recommended and is not included in the table.

Alternative 1. This alternative reflects a non-commodity, natural condition emphasis. All 112 eligible rivers totaling 1,394 miles are included in this alternative at their highest level of eligibility.

Alternatives 2-6 and 10. These alternatives provide a mix of National Forest uses and activities. Twenty-five rivers are included in this alternative for a total of 431 miles.

Alternative 7. The theme of this alternative is to provide an economic timber supply from public lands to meet market demand in Southeast Alaska. Eleven rivers are included in this alternative for a total of 211 miles. Only one river is not within Wilderness, National Monuments, LUD II areas, but it is surrounded by a Remote Recreation Land Use Designation.

Alternative 11. As with alternatives 2-6 and 10, this alternative provides a mix of National Forest uses and activities, but with an additional emphasis on fish and wildlife habitat protection. Thirty-two rivers are included in this alternative for a total of 541 miles. Additional rivers were recommended based on public comment to the RSDEIS.

Table 3-106 displays the suitable rivers in each alternative by geographic province. (These provinces are briefly described in the Research Natural Area section of this chapter.) Most of the alternatives provide a mix in representing the range of ecosystems and features typical of the seven geographic provinces of Southeast Alaska, except for Alternative 7 which represents only five of the seven provinces, and Alternative 11 which represents six provinces. Alternative 9 contains no Wild and Scenic Rivers and is not included in the table.

Table 3-105
Wild and Scenic Rivers By Alternative

	Alternatives			
Eligible River	**1**	**2-6, 10**	**7**	**11**
Chatham Area				
Antler River	W-13			
Benzeman River and Lake	W-14			
Berners River	W-10			
Big Branch Inlet Stream	W-12			
Black River	W-10			
Chuck River	W-15			
Dangerous River	W-7/S-16	W-7/S-16		
Eagle River	R-6			
Endicott River	W-21			
Freds Creek	W-5			
Gambier Bay Tributaries	W-14			
Gilkey River	W-9			W-9
Glacial River	W-10	W-10	W-10	W-10
Hasselborg River	W-24	W-24	W-24	W-24
Herbert River	R-6			
Kadashan River	W-8	S-8		S-8
Katzehin River	W-12	W-10		W-10
King Salmon River	W-8	W-8	W-8	W-8
Kook Creek and Lake	R-2			
Lace River	W-20			
Lisianski River	W-5	W-5		W-5
Lost River and Tawah Creek	R-10			
Maksoutof River	W-10			
Mud Bay River	W-6/R-4			
Pavlof River	R-10			
Red Bluff Bay Tributaries	W-13			
Sitkoh Creek	S-4			
Taku River	S-17			
Trail River	W-6			
Whiting River	W-25			
Total miles by Alternative	**352**	**88**	**42**	**74**
Stikine Area				
Aaron, Oerns, Berg Creeks	W-37			S-21/R-16
Alecks Creek and Lake	W-3			
Alpine Creek	W-3			
Anan Creek	W-18	W-17.5/S-.5		W-17.5/S-.5
Andrews Creek	W-18			
Baird Glacier	W-20			
Blind River	R-5	R-5		R-5
Bradfield River East Fork	R-19			
Bradfield River North Fork	R-27			
Cascade Creek	W-5			
Castle River	W-23			
Cathedral Falls Creek	R-1			
Duncan Salt Chuck Creek	W-12			
Eagle River and Lake	W-12			
Earl West Creek	R-9			
Fall Dog Creek	W-4	W-4		W-4
Falls Creek & McHenry Lake	W-3			
Farragut River	W-29/S-1	W-29/S-1		W-29/S-1
Hamilton Creek	S-20			
Harding River	W-16	S-15		S-16

Glossary

Eligible River	Alternatives 1	2-6, 10	7	11
Hatchery Creek and Lake	W-2			
Irish, Keku Creeks	W-17			
Kadake Creek	W-4/R-19	R-23		R-23
Kah Sheets Creek and Lake	W-9	W-5/S-4		W-5/S-4
Kunk Creek and Lake	W-2			
Kushneahin Creek	W-9			
Kutlaku Creek and Lake	W-2			W-2
LeConte Glacier	W-6	W-6	W-6	W-6
Marten Lake and Creek	W-6	S-5		
Olive Creek	W-3/R-1			
Patterson River	W-3/R-4			
Petersburg Creek	W-7	W-7	W-7	W-7
Porcupine Creek	W-2			
Santa Anna Creek and Lake	W-4	S-4		S-4
Scenery Creek	W-8			
Shakes Slough	W-10		W-10	
Stikine River	S-25			
Tunehean Creek	W-8			
Virginia Lake and Creek	S-9	R-9		R-9
Total Miles by Alternative	**445**	**135**	**23**	**170**
Ketchikan Area				
Bakewell Creek-Badger Lake	W-9			
Big Creek	W-5			
Big Goat Creek & Lake	W-5			
Blossom River	W-11/S-14			
Blue River	W-26	W-26	W-26	W-26
Canoe Point Stream	W-2			
Chickamin River	W-94/S-2	W-94/S-2	W-94	W-94/S-2
Essowah Lakes and Streams	W-13			W-13
Fish Creek	R-4			
Gokachin, Mirror, Fish, Low Cks.	W-30			W-30
Granite Creek-Manzoni Lake	W-8			
Harris River	R-7			
Hulakon River	W-6			
Humpback Creek and Lake	W-8			
Hunter Bay	W-19			
Johnson Lake and Streams	W-6			
Karta River, Salmon Lake	W-24			
Kegan Lake and Streams	W-9			W-9
Keta River	W-16			
Klahini River	W-27			
Klakas Lake and Streams	W-8		W-8	
Marten River	W-17			
Naha River	W-17/S-2	W-17/S-2		W-17/S-2
Niblack	W-5			W-5
Nooya Creek	W-1			
Nutkwa River	W-12			
Orchard Creek and Lake	W-26			W-10/R-16
Portage Creek	W-4			
Punchbowl Creek	W-1			
Rudyerd Creek	W-12		W-12	
Salmon Bay Lake & Stream	W-4/S-2	W-4/S-2		W-4/S-2
Salmon River	R-10			
Sarkar Lakes	W-14/S-3/R-2	W-14/S-3/R-2		W-14/S-3/R-2
Shipley Creek and Lake	W-5			
Sockeye Creek, Hugh Smith Lk.	W-9			
Soda Creek and Lake	W-3			

Eligible River	Alternatives 1	2-6, 10	7	11
Spring Creek, Shelokum Lake	W-3			
Thorne River, Hatchery Creek	S-36/R-6	S-24/R-18		S-24/R-18
Unuk River	W-23			
Walker Creek and Lake	W-6		W-6	
Ward Creek and Lake	R-3			
Wilson River and Lake	W-9/S-3			
Wolverine Creek, McDonald Lake	W-6			W-6
Total Miles by Alternative	**597**	**208**	**146**	**297**
Forest Summary				
Forest-wide Totals of Rivers	**112**	**25**	**11**	**32**
Forest-wide Totals of Miles	**1,394**	**431**	**211**	**541**

[1] The classifications are W=Wild, S=Scenic, and R=Recreational.

Table 3-106
Suitable Rivers by Alternative by Geographic Province

Geographic Province	Alternatives 1	2-6, 10	7	11
Coast Range	40	7	6	8
Lynn Canal	8	1	0	2
Northern Outer Islands	9	2	1	2
Northern Interior Islands	8	3	2	3
Interior Islands	29	8	1	11
Southern Islands	16	3	1	6
Yakutat Forelands	2	1	0	0
Total Eligible Rivers = 112	**112**	**25**	**11**	**32**

Effects of Designation

Alternative 1. All 112 eligible rivers with 1,394 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, all or parts of 55 rivers with 712.5 miles are in existing Wilderness, National Monuments and Legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 698,196 acres in the National Wild and Scenic Rivers System. It would eliminate the opportunity for major water resource development projects on 1,394 miles of river.

Designation would include some 361,179 acres in existing Wilderness, National Monuments, and Legislated LUD II areas. These designations would have little effect on other resource uses, because of the restricted status of Wilderness, National Monuments, and LUD II areas, except that the land within the corridors would be withdrawn from mineral entry when not already withdrawn by Wilderness status. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, in addition to the Presidential approval required for a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific designation law includes these exceptions. About 277,142 acres would be managed as Wild Rivers outside of existing

Wilderness areas, and would be withdrawn from mineral entry if designated by Congress.

The rivers in this alternative contain around 91,000 acres of tentatively suitable forest within their corridors. For those river corridors adjacent to Land Use Designations allowing timber harvest, restricted harvest would be allowed on these lands within the Scenic and Recreational River corridors, but would be unavailable for timber harvest in Wild River corridors

Alternative 2-6 and 10. Twenty-five eligible rivers with 431 miles would be recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 12 rivers with 230 miles are in existing Wilderness, National Monuments and Legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of around 227,685 acres in the National Wild and Scenic Rivers System. This amounts to 22 percent of the eligible rivers, and 31 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 431 miles of river.

Designation would include some 127,000 acres in existing Wilderness, National Monuments, and Legislated LUD II areas. These designations would have little effect on other resource uses, because of the restricted status of Wilderness, National Monuments, and LUD II areas, except that the land within the corridors would be withdrawn from mineral entry when not already withdrawn by Wilderness status. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, in addition to the Presidential approval required for a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 47,000 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry if designated by Congress.

The rivers in these alternatives contain around 32,000 acres of tentatively suitable forest lands within their corridors. For those river corridors adjacent to Land Use Designations allowing timber harvest, restricted harvest would be allowed on these lands within the Scenic and Recreational River corridors, but would not be allowed in Wild River corridors.

Alternative 7. Eleven eligible rivers with 211 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 10 rivers with 201 miles are in existing Wilderness, National Monuments and Legislated LUD II areas. The classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of around 112,609 acres in the National Wild and Scenic Rivers System. This amounts to 10 percent of the eligible rivers, and 15 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 211 miles of river.

Designation would include some 109,202 acres in existing Wilderness, National Monuments, and Legislated LUD II areas. These designations would have little effect on other resource uses, because of the restricted status of Wilderness, National Monuments, and LUD II areas except that the land would be withdrawn from mineral entry when not already withdrawn by Wilderness status. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, in addition to the Presidential approval required for a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 3,400 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 600 acres of tentatively suitable forest within their corridors that is adjacent to Land Use Designations not allowing timber harvest, so no timber harvest would be allowed on these acres. In this alternative, no timber harvest would occur within recommended river corridors.

Alternative 9. This alternative does not recommend designation of Wild and Scenic Rivers. With no designation, there are no effects to other resources and uses. In this alternative, the eligible rivers would be managed in accordance with the Land Use Designations of adjacent lands. Eligible rivers in Wilderness, National Monuments and legislated LUD II areas would likely retain their free-flowing character and outstandingly remarkable values. The 669.5 miles of eligible rivers outside these areas would be subject to various levels of change over time, and retain the opportunity for water resource development.

Alternative 11. Thirty-two eligible rivers with 541 miles would be recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 11 rivers with 250 miles are in existing Wilderness, National Monuments and Legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 229,000 acres in the National Wild and Scenic Rivers System. This amounts to 30 percent of the eligible rivers, and 39 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 541 miles of river.

Designation would include some 128,170 acres in existing Wilderness, National Monuments, and Legislated LUD II areas. These designations would have little effect on other resource uses, because of the restricted status of Wilderness, National Monuments, and LUD II areas, except that the land within the corridors would be withdrawn from mineral entry when not already withdrawn by Wilderness status. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, in addition to the Presidential approval for a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 53,950 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 45,600 acres of tentatively suitable forest lands within their corridors. For those river corridors adjacent to Land Use Designations allowing timber harvest, restricted harvest would be allowed on these lands within the Scenic and Recreational River corridors, but would not be allowed in Wild River corridors

Effects of Nondesignation

In general, not designating the eligible rivers will not preclude them from future consideration as additions to the Wild and Scenic Rivers system. Management prescriptions for the Land Use Designations, along with the Forest-wide Standards and Guidelines, will ensure that many of the outstanding qualities remain. Key standards and guidelines include those for Soil, Water, Fish, Riparian, Scenery, Recreation and Tourism, and Wetlands; stream buffers are also required by the Tongass Timber Reform Act. Exceptions might be when the free-flowing characteristics of the river are changed through water resource developments, or other modifications such as rip-rap or major fish improvement projects. However, the potential classification of the eligible rivers may change depending upon the Land Use Designation a particular river falls within, and the subsequent level of development.

Non-designation will allow consideration of a full range of alternatives for various resource activities. These include fish improvement projects, recreation site development, transportation and utility corridors, mineral exploration and development, and timber harvest, consistent with adjacent Land Use Designations. This could result in increased resource outputs, cost savings, and fewer resource impacts as a result of having more options.

Eligible rivers that are allocated to the Natural Setting or Wilderness LUD's are likely to retain their eligibility and potential classification. However, unless they are in Wilderness, the river corridors remain open to mineral entry and the development of water resources. In addition, some of the Natural Setting Land Use Designations allow consideration for development of transportation and utility corridors. Since proposals for these activities cannot be predicted with any degree of accuracy, their potential effect on the eligible rivers was not analyzed. Appendix E does identify where these potential developments are more likely to occur.

Recommended Rivers

The rivers identified in the alternative that is selected as the revised Forest Plan will be recommended for possible inclusion in the national Wild and Scenic Rivers System. They will be recommended to the Chief of the Forest Service by the Regional Forester as part of the approval of the Forest Plan.

This will be a preliminary administrative recommendation that will receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. The Congress has reserved the authority to make final decisions on designation of rivers as part of the National Wild and Scenic Rivers System.

Before the Regional Forester signs a Record of Decision (ROD) to recommend Wild and Scenic Rivers, all eligible rivers will be managed to retain their free-flowing character and outstandingly remarkable values at their highest level of classification, within the existing authorities of the Forest Service. After the ROD is signed, the rivers recommended in the selected alternative will be managed to retain their free-flowing character and outstandingly remarkable values at their recommended level of classification, within the existing authorities of the Forest Service. The final outcome for designation of these rivers rests with Congress.

Wilderness

Affected Environment

Background

This section describes existing Wilderness and the general aspects of wilderness management direction in Alaska. The alternative maps in the map packet display the locations and boundaries of each Wilderness of the Tongass.

Congressionally designated Wilderness in the Tongass National Forest comes from two pieces of legislation. The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 established 14 Wildernesses totaling 5.5 million acres within the Tongass. Two of the areas, Admiralty Island and Misty Fiords, were also designated as National Monuments. Prior to ANILCA there was no designated wilderness on the Tongass. In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new Wildernesses and one Wilderness addition totaling 296,080 acres. This brings the total to 5.7 million acres in 19 Wildernesses on the Tongass National Forest. The 14 ANILCA Wildernesses are described in detail in the Analysis of the Management Situation (1990); the TTRA Wildernesses are described briefly below. All are included in Table 3-107. No additional Wilderness proposals, or any changes to existing Wilderness, are being proposed at this time.

The Wilderness acreages in Table 3-107 reflect the legal descriptions as reported to Congress. These acres are not the same figures as those generated by the Geographic Information System (GIS) used in the analysis for the Forest Plan revision. The differences in the GIS system are due to different resolutions in mapping and the method of generating acres. GIS uses a point grid system based on the legal descriptions. In addition there were slight differences in mapping small islands or large rocks in saltwater. The total National Forest acreage for all Wilderness on the Tongass, using GIS, is 5,721,733, compared to the legal description total of 5,752,221. This difference, about one-half of one percent, is not considered significant.

The following areas were added to the National Wilderness Preservation System in 1990:

Chuck River

This 74,990-acre area stretches from the Chuck River drainage and upper Windham Bay north to Point Ashley on Holkam Bay (also known as Sumdum Bay) and includes the south side of Tracy Arm. The area is about 10 miles northeast of the community of Hobart Bay and about 70 miles south of Juneau. It is adjacent to the Tracy Arm-Fords Terror Wilderness on the east, and abuts areas of current and planned logging activity on the south and southeast. There are known mineral deposits, including previously-producing mines, and numerous unpatented mining claims. Recreation use has increased with the development of nearby Hobart Bay and private lands within the Chuck River area. Subsistence use is moderate and may increase if Hobart Bay becomes a stable long-term community. Fish habitat values are high and the area is a large producer of pink, chum and coho salmon. Bear and furbearers are important recreational and subsistence resources.

Glossary

Table 3-107
Wilderness Areas on the Tongass National Forest

Name	Total Acres	Non-National Forest Acres	National Forest Acres
Wilderness Areas Established December 2, 1980 by ANILCA			
Kootznoowoo Wilderness (Admiralty Island Nat. Monument)	988,050[1]	32,129	955,858[1]
Coronation Island Wilderness	19,232	0	19,232
Endicott River Wilderness	98,729	0	98,729
Maurelle Islands Wilderness	4,937	0	4,937
Misty Fiords National Monument Wilderness	2,142,907	600	2,142,307
Petersburg Creek-Duncan Salt Chuck Wilderness	46,849	0	46,849
Russell Fiord Wilderness	348,701	0	348,701
South Baranof Wilderness	319,568	0	319,568
South Prince of Wales Wilderness	91,018	50	90,968
Stikine-LeConte Wilderness	449,951	1,025	448,926
Tebenkof Bay Wilderness	66,839	27	66,812
Tracy Arm-Fords Terror Wilderness	653,179	0	653,179
Warren Island Wilderness	11,181	0	11,181
West Chichagof-Yakobi Wilderness	265,529	1,038	264,491
Wilderness Areas Established November 28, 1990 by TTRA			
Chuck River Wilderness	74,990	692	74,298
Karta Wilderness	39,894	5	39,889
Kuiu Wilderness	60,581	0	60,581
Pleasant-Lemusurier-Inian Islands Wilderness	23,151	55	23,096
South Etolin Wilderness	83,371	752	82,619
Total Acreage	**5,788,657**	**36,436**	**5,752,221**

[1] Kootznoowoo Wilderness includes 18,486 acres, including 24 acres of non-National Forest land, in the Young Lake Addition established by TTRA, November 28, 1990.

Source: Total acreages are as reported to Congress with official boundary maps. These wildernesses include only the public lands above mean high tide.

Karta River

This 39,894-acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about five miles from the communities of Kasaan and Hollis. Hollis, about three hours by ferry from Ketchikan, is the only community on Prince of Wales Island served by the Alaska Marine Highway System. The Karta River area contains high value fish habitat for coho salmon. The two major lakes, Salmon Lake and Karta Lake, are important spawning sites for sockeye salmon. One mine previously produced gold, and there are other known mineral deposits. Recreation use is high: the four Forest Service recreation cabins are in such demand that reservations are managed using a lottery system. Subsistence use is also very high.

Kuiu

This area is comprised of 60,581 acres south of the adjacent Tebenkof Bay Wilderness on Kuiu Island, about 35 miles south of the community of Kake, and 20 miles from Rowan Bay. Its shoreline is characterized by bays and islands. Fishery values are high, and several bays and anchorages provide fishing and subsistence opportunities for residents of Kake, Port Protection, Point Baker and other communities. The area is currently closed to deer hunting. A portage trail from Affleck Bay crosses the area and provides access to Petrof Bay in the Tebenkof Bay Wilderness.

Pleasant-Lemesurier-Inian Islands

This 23,151-acre area consists of Pleasant Island, Lemesurier Island and the Inian Islands in Icy Strait between Chichagof Island and Glacier Bay National Park. Although no major fish streams are located on the islands, there is some deer and grouse habitat, and subsistence use does occur. The nearest communities are Gustavus, Elfin Cove, and Hoonah. A Research Natural Area has been considered on Pleasant Island but not pursued because of use by the three communities.

South Etolin Island

This area comprises 83,371 acres on the south end of Etolin Island and several smaller islands. It is located about midway between Ketchikan and Wrangell on the Inside Passage, and about 15 miles north of the community of Thorne Bay. The area's main attractions are its fish and wildlife values and its value as a popular subsistence use area for the residents of Wrangell. Elk have been introduced to Etolin Island and may have become established within the area. The multitude of small islands and passages provide numerous anchorages for recreation activities, and opportunities for small boat travel. These same features have led to the study of potential sites for mariculture activities.

Young Lake Addition to Kootznoowoo Wilderness

This 18,486-acre area occupies the drainage of Admiralty Creek on the north end of Admiralty Island, and includes Young Lake and Admiralty Cove. These popular recreation destinations are the site of three public recreation cabins and a trail managed by the Forest Service. The Young Lake area is popular for fishing and deer hunting, and supports abundant brown bear. It is adjacent to a large silver mining operation at Green's Creek. The Admiralty National Monument boundary was also expanded to include this addition to Kootznoowoo Wilderness.

Current Situation

The various wildland ecosystems of Southeast Alaska are represented within the Tongass' Wilderness. These areas include glaciers and ice fields, off-shore islands and seacoasts facing both the open Pacific Ocean and inland passages, major river systems, and 1.5 million acres of old-growth temperate rain forests. Two of the largest areas, Kootznoowoo (Admiralty Island) Wilderness and Misty Fiords National Monument Wilderness, contain vast, virtually intact ecosystems. The Wildernesses are mostly in a pristine condition, with the imprint of humans generally not noticeable. They offer outstanding opportunities for solitude and primitive recreation.

Monitoring has been minimal in most of the Wilderness, but has shown some resource damage and user conflicts in localized concentrated use areas. Monitoring in some of the more remote areas, such as South Prince of Wales and Coronation Island Wildernesses, indicates very little use but some resource damage and occupancy trespass. The areas with the greatest use and most management activities tend to have the greatest need for additional management direction to help resolve user conflicts and preserve the wilderness resource.

Implementation of existing direction has varied greatly between the various wildernesses. Some areas, such as Kootznoowoo (Admiralty Island) and Misty Fiords Wildernesses, have had significant management programs and accomplishments, while others have had minimal management activities. Some of these activities, such as fisheries enhancement projects and the authorization of temporary facilities for the taking of fish and wildlife, have resulted in administrative appeals by user groups who view these activities as conflicting with their use or with wilderness values.

The Role of Wilderness

Wilderness Act

The National Wilderness Preservation Act of 1964 mandates that designated “wilderness areas…shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as Wilderness.”

Subject to existing private rights, the Act prohibits permanent roads and, except as necessary for realizing the recreation and other wilderness purposes of the area, commercial enterprises. Temporary roads, the use of motor vehicles, motorized equipment, other mechanized equipment, motorboats, the landing of aircraft, and structures and installations are prohibited except as necessary to meet minimum requirements for the administration of the area as Wilderness. The Act provides that the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to restrictions by the Secretary of Agriculture. Wildernesses were withdrawn from mineral entry as of December 31, 1983, and patenting of valid claims is limited to subsurface mineral rights.

ANILCA

In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the prohibitions of the Wilderness Act. Some of these follow. These apply equally to TTRA Wilderness.

Subsistence policy. Section 811 mandates that the Secretary “shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands.” This section further directs that, other laws (including the Wilderness Act) notwithstanding, the Secretary “shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation.”

Special access. Section 1110(a) requires that the Secretary “shall permit” on Conservation Units, which include Wilderness, “the use of snowmachines (during periods of adequate snow cover or frozen river conditions, in the case of Wild or Scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites.” Such use is subject to reasonable regulation but shall not be prohibited unless after notice and hearing the Secretary finds that such use would be detrimental to the resource values of the area.

Inholding access. Section 1110(b) assures adequate and feasible access to state and private land and to valid occupancies including valid mining claims.

Navigation aids and facilities. Section 1310(a) provides that reasonable access to, and operation and maintenance of, existing air and water navigation aids, communication sites, facilities for national defense, and related facilities and existing facilities for weather, climate and fisheries research and monitoring shall be permitted. “Nothing in the Wilderness Act shall be deemed to prohibit such access, operation and maintenance within wilderness areas designated by this Act.” Section 1310(b) provides that the establishment, operation and maintenance of new such facilities shall be permitted within wilderness after consultation with the Secretary and in accordance with mutually agreed upon terms and conditions to minimize the adverse effects within the Unit.

Aquaculture. Section 1315(b) provides that the Secretary may permit fishery research, management, enhancement, and rehabilitation activities within National Forest System Wilderness, in a manner which adequately assures protection, preservation, enhancement and rehabilitation of the wilderness resource. Subject to reasonable regulations, permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, and stream clearance, egg planting and other accepted means of maintaining, enhancing, and rehabilitating fish stocks may be permitted.

Public use cabins. Section 1315(c) provides for the continued use, maintenance and replacement of existing public use cabins within Wilderness. Section 1315(d) authorizes the construction and maintenance of a limited number of new public use cabins and shelters, if necessary, for public health and safety, and also requires the Secretary to notify Congress of his intention to remove an existing or construct a new public use cabin or shelter.

Beach log salvage. Section 1315(f) allows the Secretary to permit or otherwise regulate the recovery and salvage of logs from the coastlines of National Forest wilderness and monuments.

Temporary hunting and fishing facilities. Section 1316(a) provides that the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuation of existing uses and future establishment and use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and game. Facilities and equipment shall be constructed, used and maintained in a manner consistent with the protection of the area where they are located. New facilities shall be constructed of materials which blend with and are compatible with the surrounding landscape. Section 1316(b) allows the Secretary to deny new facilities and equipment upon making a determination, after public notice, that the establishment and use of new facilities or equipment would constitute a significant expansion of existing facilities or uses which would be detrimental to the purposes for which the unit was established, including “wilderness character.”

Wilderness Act Applies

In spite of its many exceptions to the Wilderness Act, ANILCA defines “wilderness” as having the same meaning as when it is used in the Wilderness Act (Sec. 102(13)). Further, Sec. 707 states that except as expressly provided in ANILCA, Alaskan wilderness “shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as Wilderness.”

Wilderness

Environmental Consequences

The principal effect of implementing any of the alternatives will be to apply the Wilderness and National Monument Wilderness Land Use Designations to all designated wilderness. The management prescription standards and guidelines will provide for more consistent management. All existing Tongass Wilderness is withdrawn from mineral entry (subject to valid existing rights); no additional effects on other resources and uses are anticipated.

Wildlife

Affected Environment

The Tongass National Forest provides habitat for 54 species of mammals (including the recently introduced elk on Etolin Island), 231 species of birds, and five species of amphibians and reptiles. There are an additional 18 species of marine mammals found in Southeast Alaska which depend entirely on the ocean environment, and 45 bird and 3 amphibian or reptile species considered casual or accidental visitors to Southeast Alaska. These species provide many opportunities for consumptive and nonconsumptive uses, including commercial, sport, and subsistence hunting, and photographic and viewing activities. The Forest is rich in its varied and unique species; some of the species found on the Forest in relative abundance (such as bald eagle and brown bear) are threatened or endangered in other parts of the United States.

The Affected Environment portion of this Wildlife section is divided into two parts: a discussion of important wildlife species and their habitat needs, including management indicator species and other species of concern; and a short discussion of consumptive uses of wildlife (primarily hunting and trapping). Information on key wildlife species and habitats, including information from several assessments and reports is included.

Indicator Species

Management indicator species (MIS) are vertebrate or invertebrate species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. Through the MIS concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. MIS are also used to help establish management goals for species in public demand. The National Forest Management Act regulations prescribe the use of management indicator species. However, the concept of MIS should be viewed with caution. Limitations in the concept of MIS have been identified (Landres et al. 1988); most notably the concept that the habitat relationships of one species can reasonably represent those of another species, a precept that is inconsistent with the concept of ecological niches to which each species has individually adapted.

For the Tongass Forest Plan Revision, 13 management indicator species have been identified. Species-by-species information is briefly summarized below, with more attention given to those MIS species having special management concerns (brown bear, marten, Sitka black-tailed deer, and gray wolf). The gray (or Alexander Archipelago) wolf information is also updated based on a recent assessment of that species. Two other species of special management concern and for which assessments were conducted, northern goshawk and marbled murrelet, will be discussed after the MIS discussions. Table 3-109, which follows these discussions, summarizes some of the information for these six species of concern.

Although some of the MIS are associated with several habitat types, all are associated with the spruce and hemlock forests of Southeast Alaska. It is these forests which represent 98 percent of the productive old-growth forests of the Tongass (see Biodiversity section). Six of the 13 species also specifically use stream (riparian) habitats, and 5 estuarine habitats. (These and other habitat components, and conifer forest successional stages, are described in the

Biodiversity section.) Table 3-108, indicates the relative importance of conifer successional stages as habitat for the MIS. It can be seen that productive old growth (that is, conifer stands greater than 250 years in age and having a volume of 8,000 board feet per acre or higher) provide essentially all of the highly-important habitats, and the preponderance of the moderately-important habitats, for all the MIS.

Prior to the 1996 Revised Supplement, habitat capability models (Suring 1993) were used to estimate existing and future habitat for each MIS. These models were used primarily as relative measures of the effects on habitat of Forest Plan alternatives by indicating relative habitat capability. Few of the models had received field review or testing. Model "outputs" were often expressed in species population numbers, giving the misleading impression that actual numbers of individuals were being indicated. Population numbers for many species can vary widely from year to year as a result of many factors other than habitat capability. The models were never intended to represent population models that consider fecundity, mortality, population age structure, etc. and often incorporate an element of 'random' environmental events that can effect populations.

Table 3-108
Relative importance of conifer Successional stages as habitats for management indicator species

	Successional Stages					
	Early (in years)	Mid (in years)		Late (>200 years)		
				Unproductive Old-growth	Productive Old-growth	
Species (Season)	0-25	26-150	150-200		Low-Med	High
Red Squirrel (5)	L	L-H	H	L	M-H	M-H
Black Bear (2,3,4)	M	L	L	M	M-H	M-H
Brown Bear (3)	L	L	L	M-H	M-H	M-H
Marten (1)	L	L	L	L	M	H
River Otter (2,3)	L	L	M	L	H	H
Sitka B-t Deer (1)	L-M	L	L-M	L-M	M	H
Mountain Goat (1)	L	L	L	L	M-H	H
Gray Wolf (5) *	-	-	-	-	-	-
Van. Can. Goose (2,3)	L	L	L	H	H	H
Bald Eagle (2,3)	L	L	L	L	H	H
Red-br. Sapsucker (2,3)	L	L	L	L	H	M
Hairy Woodpecker (1)	L	L	L	L	L	M-H
Brown Creeper (1)	L	L	L	L	L	L-H

H = Highest importance, high population densities
M = Moderate importance, moderate population densities
L = Least importance, low population densities
Season codes: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year
* Gray wolves use habitats according to the abundance and availability of prey species (primarily Sitka black-tailed deer).

Other limitations of the models are: there were designed to be used with a timber volume classification scheme which has been subsequently replaced with an updated scheme (see Biodiversity Section of this Chapter); they were not developed for some of the species of concern; and they are not necessarily appropriate for use in population viability analysis. For all these reasons, most of the habitat capability models are not being used. Information on the MIS and other species follows.

Mountain Goat

Mountain goats represent species using cliffs, alpine and subalpine, and old-growth forest habitats. Hunted populations may be sensitive to overharvest and human disturbance. The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska: old-growth trees with large dense crowns have the highest value because they intercept the most snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages, reduces their value as habitat. They may also be sensitive to low-level aircraft flights over summer alpine habitats. Historically, mountain goats in Southeast Alaska were present only on the mainland, but have more recently been transplanted to many of the islands.

Sitka Black-tailed Deer

Sitka black-tailed deer are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia; this subspecies of mule deer occupies the northern-most extreme of black-tailed deer habitat. Deer are strong swimmers, and have occupied almost all islands of the Alexander Archipelago capable of supporting them. On the mainland, deep snow and harsh winters limit populations more than on the islands.

Sitka black-tailed deer are the wildlife species receiving the highest sport hunting and subsistence use of all terrestrial species in Southeast Alaska. The State of Alaska and the Federal Subsistence Board are responsible for the numbers of deer allowed to be taken for harvest. Sitka black-tailed deer represent species using lower elevation old-growth forest habitats during the winter period. The quantity and quality of winter habitat is considered the most limiting factor for Sitka black-tailed deer in Southeast Alaska. There are about 7.0 million acres of forested land (all age classes and types of conifer forests) below 1,500 feet elevation within occupied deer habitat on the Tongass National Forest.

The deer winter habitat capability model, as discussed in more detail under Environmental Consequences, takes into account snow depths/winter severity, the value of lower elevations and the more-southerly aspects, and conifer forest successional stages. Old-growth forests have the highest value because they intercept snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages, reduce their value as habitat.

Sitka black-tailed deer disperse through and use a variety of vegetation communities throughout the year, and no specific corridor requirements have been identified. Effects of patch size or induced forest fragmentation on deer habitat capability remain uncertain. Predation can act as a significant controlling factor on deer populations.

River Otter

River otters are associated with coastal and fresh water aquatic environments and the immediately adjacent (within 100-500 feet) upland habitats. Their distribution is Forest-wide in suitable habitats. Beach characteristics affect the availability of food and cover, and adjacent upland vegetation is also important in providing cover for otters. Old-growth forests have the highest habitat value, providing canopy cover, large-diameter trees and snags, and burrow and den sites. Younger successional stages provide lower quality habitat.

Marten

Marten naturally inhabit the mainland of Southeast Alaska, and natural populations occur on Kuiu, Kupreanof, Mitkof, and Revillagigedo Islands. Marten were transplanted to Prince of Wales, Chichagof, and Baranof Islands between 1930 and 1950 and whether these transplants were new introductions or just supplemented existing populations is unknown. Marten represent species using lower elevation old-growth forest habitats during the winter season. The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. There are about 7.0 million acres of forested land (all age classes and types of conifer forests) below 1,500 feet elevation within occupied marten habitat on the Tongass. Due to lower snow accumulation, habitats at lower elevations have higher value for wintering marten. Coastal habitats (beach fringe) and riparian areas have the highest value, followed by upland habitats below 1,500 feet in elevation. Of the successional stages, old-growth forests have the highest value because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by marten. Early successional stages do not provide these habitat components and have lower habitat value. Dispersal between islands is limited, but marten are fairly mobile on land. Conifer corridors may enhance movement and dispersal. (See also Table 3-109.)

Marten are easily trapped and can be overharvested. Forest management activities resulting in increasing access may result in the potential for overtrapping. New roads provide additional access for trappers and may indirectly cause increased harvests.

Brown Bear

Brown bears are present on the mainland and on the islands north of Frederick Sound. They are occasionally reported on Mitkof, Etolin and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. Brown bear use areas from sea level to the alpine. Some of the highest brown bear population densities in the world are found within the Tongass. There are about 7.9 million acres (excluding rock, permanent ice fields, and acres of lakes) within occupied brown bear habitat on the Tongass, with 7.5 million acres of that considered roadless.

The late-summer season has been identified as the most critical or limiting period for brown bear. During this season, many brown bears concentrate along low-elevation valley bottoms and salmon streams. These are often the same areas of highest human use and most intense resource development activities. During this season, brown bears use a variety of habitats, with estuaries and riparian areas having the highest habitat value. Streams and rivers that produce anadromous fish have a higher value for brown bears than resident fish streams. Brown bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They are not known to have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions. (See also Table 3-109.)

Increases in human activity in an area may result in increased direct human-induced deaths of bears. This can result from increased legal hunting, illegal kills, wounding losses, and from the defense of life or property. From 1990 to 1995, 67 known brown bear kills not associated with legal hunting seasons occurred.

Black Bear

Black bear are present throughout the mainland, and on the islands south of Frederick Sound. They use habitats from sea level to the alpine. Black bear are not as susceptible to human disturbance as brown bear. There are about 9.4 million acres (excluding rock, permanent ice fields, and acres of lakes) within occupied black bear habitat on the Tongass National Forest. Estuarine, riparian, and forested coastal habitats receive the highest use by black bears and appear to have the highest habitat values. Within forested areas, both early and late (old-growth) successional stages provide the best forage and/or cover for black bears. Black bears prefer anadromous fish streams to resident fish streams, are very mobile on land, and are not known to have specific vegetation corridor requirements.

Although black bears can adapt to changes in their environment caused by humans, human-related mortality often reduces the total density of black bears. From 1990 to 1995, 87 black bear kills not associated with legal hunting seasons occurred.

Gray (Alexander Archipelago) Wolf

Two Alaskan subspecies of the gray wolf are currently recognized. The wolf found in Southeast Alaska is known as the Alexander Archipelago wolf. It inhabits the mainland and the islands south of Frederick Sound. Wolves require an adequate prey base of ungulates, beaver, and salmon; in most areas of Southeast Alaska the Alexander Archipelago wolf depends heavily on deer. Suitable habitats for wolves equate to areas capable of supporting this prey base. Wolves use a wide variety of habitats when prey are present, and can affect prey populations in those areas.

Due to social interactions, wolf densities do not exceed certain levels even when prey abundance is high. Densities of 0.1 adult wolf per square mile are considered high, and this density is often considered as a saturation point beyond which wolf populations would not expand. Wolves have large home ranges (about 100 square miles per pack), use a wide variety of habitats, and are very mobile. They do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain, vegetative conditions, and among islands separated by relatively narrow bodies of water (e.g. at least hundreds of yards). (See also Table 3-109.)

Wolves are legally hunted and trapped in Southeast Alaska. Increased roaded access and increased human activity likely increase wolf deaths, both from legal and illegal hunting and trapping. Road management and increased regulation of legal harvests are seen as short-term needs to reverse population declines.

A concern for the viability of this subspecies was illustrated by a petition to list the Alexander Archipelago wolf as Threatened under the Endangered Species Act. The Fish and Wildlife Service (FWS) accepted the petition, confirming the concern, but concluded that listing was not warranted at this time. A recent court decision requires the FWS to reconsider this determination. The viability concern has two components: a short-term concern that current mortality rates may not be sustainable; and a long-term concern over potential declines in Sitka Black-tailed deer habitat capability, the principal prey of wolves.

An interagency wolf conservation assessment has been conducted to synthesize available information on wolf ecology and identify management considerations for sustaining viable wolf populations on the Tongass (Person et al. 1996). The assessment concluded that wolf densities are generally lower on the mainland and higher on islands in the southern half of the Tongass. Principal concerns exist on Prince of Wales and Kosciusko Islands where past timber harvest has reduced deer habitat capability and resulted in road densities exceeding 0.7 road miles/square mile of land. Wolf mortality rates averaged 50 percent within a sample of radio-marked wolves from 1993-1995 on Prince of Wales Island; trapping and hunting harvest rates were positively correlated with road density. Planned timber harvest will continue to reduce deer habitat capability through reductions in important deer winter range (Person et al. 1996). Important components of a wolf conservation strategy include providing minimally-roaded core habitats, maintaining wolf harvest within sustainable limits through regulations, and providing adequate deer habitat to support an abundant and stable deer population.

Red Squirrel

Before 1930, red squirrels in Southeast Alaska existed only on the mainland. In 1930 and 1931 they were introduced to Baranof and Chichagof Islands as a potential prey species for the transplanted marten, and today red squirrels are abundant on many of the islands and the mainland. Red squirrels require forests with cone-producing trees and cavities in trees and snags. They represent a species which can do fairly well in seed-producing second-growth timber stands. There are about 8.4 million acres of forested land (including all age classes and types of conifer forests) within occupied red squirrel habitat on the Tongass National Forest. Habitat usually does not exist for red squirrels above 2,000 feet in elevation; spruce trees and mature to old-growth forests have the highest values for red squirrel habitat. Optimum habitat is believed to occur when patches of preferred habitat are greater than 30 acres. Corridors of pole timber or older stands of trees facilitate movement and dispersal.

Bald Eagle

North America's bald eagle population reaches its highest density in southeast Alaska. The most recent adult population estimate (1992) was over 13,000 adult birds; more than 8,000 nest sites have been identified to date (1996). Their nesting habitat is primarily old-growth trees along the coast and within riparian areas. The FWS and Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region, which includes standards and guidelines for regulating human disturbance within identified bald eagle use areas. All identified eagle nest trees are surrounded by a minimum 330 foot radius protective habitat management zone.

Red-breasted Sapsucker

The red-breasted sapsucker is found throughout Southeast Alaska during the spring, summer and early fall seasons, wintering in the coastal portion of its breeding range as far north as Prince of Wales Island. Red-breasted sapsuckers are summer residents which use old-growth forest habitats with snags. They are called primary excavators because they create cavities for other cavity-using wildlife species. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied red-breasted sapsucker habitat on the Tongass National Forest. The quantity of snags has a direct relationship to the number of red-breasted sapsuckers within an area. Old-growth forests provide the best snag habitat over the long term, with the low volume classes of old growth receiving more use than high volume classes. Optimum habitat use is believed to occur when patches of preferred habitat are greater than 250 acres.

Hairy Woodpecker

The hairy woodpecker is considered an uncommon, permanent resident throughout Southeast Alaska. Hairy woodpeckers use old-growth forest habitats with snags and partially dead trees for foraging and nesting. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species. Their winter habitat may be their most limiting. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied hairy woodpecker habitat on the forest. Snag quantity has a direct relationship with the potential of an area to support hairy woodpeckers. Old-growth forests provide the best long-term snag habitat, with high volume old-growth stands receiving more use than low volume stands. Optimum habitat use is believed to occur when patches of preferred habitat are greater than 500 acres.

Brown Creeper

The brown creeper is considered an uncommon, permanent resident throughout Southeast Alaska. This species is associated with large old-growth trees is most closely associated with high volume old growth. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied brown creeper habitat on the forest. Winter habitat has been suggested as the limiting factor for cavity-nesting birds including the brown creeper. Optimum habitat use is believed to occur when patches of preferred habitat are greater than 15 acres.

Vancouver Canada Goose

Vancouver Canada geese are distributed throughout the Alexander Archipelago of Southeast Alaska, with an estimated resident population of 10,000 birds in the northern half of Southeast. This population is relatively non-migratory, with the majority of birds moving only locally between nesting, brood rearing, molting, and winter concentration areas. Vancouver Canada geese use wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the forest. Nesting and brood rearing habitats (estuaries, non-forested wetlands, and certain old-growth forest types) are potentially affected by various Forest management activities. Vancouver Canada geese are highly mobile and are found throughout the islands of Southeast Alaska. Vegetative corridor requirements have not been identified.

Other Species of Concern

Although not a management indicator species, information on moose habitats and populations has been included at the request of the Alaska Department of Fish and Game (ADF&G). Two other wildlife species are currently species of concern for which recent assessments (similar to the one for the Alexander Archipelago wolf) have been conducted. These are the Queen Charlotte (or northern) goshawk, and the marbled murrelet.

Moose

Moose migrated down the major river systems from Canada into Southeast Alaska during the early 20th century; they were first reported at Yakutat between 1930 and 1932. All moose in Southeast result from these natural migrations except those at Berner's Bay, which were transplanted there in the mid-1960's. The current post-hunt moose population for Southeast Alaska is estimated to be 2,530 animals (1991), with about 75 percent of them residing in the Tongass National Forest.

Moose habitat in Southeast Alaska is associated primarily with riparian and post-glacial early-successional vegetation types. In most areas, much of the moose habitat is declining as a result of natural plant succession. Succession in some areas is transforming deciduous vegetation types (cottonwood, willow, etc.) into conifer stands. In other areas, climax deciduous vegetation is growing to sizes less valuable as moose browse. In some moose habitat areas, clearcut logging has returned conifer stands to early successional vegetation types which may temporarily (for about 25 years) create or enhance forage for moose. These short-term advantages of clearcutting may be offset by the longer period of reduced forage in the second-growth conifer forest.

Marbled Murrelet

The marbled murrelet is a robin-sized seabird. It feeds below the water's surface on small fish and invertebrates, and is usually found within five miles of shore. Marbled murrelets nest on land and lay only one egg. Unlike most other species in the family Alcidae, they do not nest in colonies, although at some sites they may nest in small aggregations. Except for the fall period when they are molting, flightless, and stay on the ocean, murrelets are known to fly to tree stands throughout the year.

Throughout much of its range in the Pacific Northwest, British Columbia, and Alaska, the marbled murrelet nests in large, mature coniferous trees within stands of structurally complex, coastal old-growth forest. Marbled murrelet nesting habitat relationships are poorly understood in Southeast Alaska. Data from forested areas elsewhere within their range indicate that high volume stands of old-growth conifer forests in relatively close proximity to the coast are essential nesting habitat. (See also Table 3-109.)

Recent surveys suggest that marbled murrelets are numerous and widespread throughout the coastal waters of Southeast Alaska, with estimates ranging from 70,000 to 250,000 with the most estimated by the FWS of 434,000 birds. Population trends are generally unknown, but published estimates range from a 4-6 percent annual decline rangewide to a 50 percent decline over 20 years throughout Alaska. However recent analysis of data from Southeast Alaska does not indicate population declines. Possible causes of estimated overall Alaska declines are oil spills, mortality from gill netting, cyclic changes in marine food productivity, and the harvesting of productive old-growth forests (which are likely their primary nesting habitat).

The listing of this species as threatened in Washington, Oregon, and California, and the reductions in habitat from timber harvesting, have raised concerns for the viability of this species in Southeast Alaska. An interagency conservation assessment (DeGange 1996) was conducted to synthesize literature and data from Southeast Alaska to describe the natural history, habitat relationships and conservation status of the marbled murrelet. The assessment noted the uncertainties over how best to maintain habitat for viable, well-distributed populations of marbled murrelets in Southeast Alaska. Conceptually, uneven-aged silvicultural practices or extended harvest rotations may maintain sufficient forest structure to support nesting murrelets. However, given the uncertainties, the assessment concluded that a murrelet conservation strategy should consider a reserve-based approach, especially in those biogeographic provinces where substantial timber harvest has been concentrated and is projected to continue.

Queen Charlotte (Northern) Goshawk

The northern goshawk inhabits forested lands throughout North America, favoring dense stands of conifer or deciduous old growth for nesting habitat. The Queen Charlotte goshawk is recognized as a distinct subspecies, and as such is found only in coastal areas of British Columbia and in Southeast Alaska. Within Southeast Alaska, the goshawk appears to be non-migratory, although it may occupy different, or overlapping, winter and breeding territories. Goshawks are medium-sized hawks and prey primarily on other birds (within Southeast Alaska, Steller's jay and varied thrush are common prey species). Prior to recent field studies, very little was known about goshawks within the Tongass. (See also Table 3-109.)

A viability concern exists for the northern goshawk in Southeast Alaska due to its association with mature and old-growth forests and the decline in these habitats from timber harvesting. This concern was highlighted when the FWS received and accepted a petition to list the Queen Charlotte Goshawk as endangered under the Endangered Species Act. Although the FWS determined that listing is not warranted at this time, they did express concern over goshawk population viability. A recent court decision requires the FWS to reconsider its determination not to list.

A conservation assessment (Iverson et al., 1996) has been conducted to synthesize literature and original data from Southeast Alaska to describe the habitat relationships and conservation status of the northern goshawk. Productive old-growth forest is an important component of goshawk habitat use patterns. Radio-marked goshawks consistently select this forest habitat type relative to availability, with 68 percent of all relocations occurring in productive old growth forest. Most other habitat types (such as alpine, subalpine, peatland (muskeg), and clearcuts) were used infrequently or avoided by goshawks. Timber harvesting in the Tongass (and on private lands in Southeast Alaska) results in the conversion of old-growth forest - a selected habitat type, to young-growth forest - an avoided habitat type, and thus suggests decline in goshawk habitat capability.

Iverson et al. (1996) evaluated a variety of silvicultural techniques and concluded that stand structures selected by goshawks could be maintained using uneven-aged practices. Additionally, they concluded that goshawk habitat theoretically could be maintained across the landscape under a 300-year rotation. A risk assessment using a conceptual 300-year rotation revealed that several landscapes (including the North Prince of Wales biogeographic province) within the Tongass may be at increased risk of not sustaining goshawks under current management. The assessment suggests that a combination of reserve-based and dynamic-landscape management approaches could sustain well-distributed viable populations of goshawks across the Tongass.

Table 3-109 summarizes some of the above information for the six "species of concern" (Alexander Archipelago wolf, northern goshawk, marbled murrelet, Sitka black-tailed deer, brown bear, and marten - deer is not listed separately, but included under wolf), and presents additional information on habitat and possible conservation approaches from the Viability Synthesis (June 1995).

Table 3-109
Some important habitat components and conservation options for the species of concern

Habitat Components or Considerations	Conservation Options
Marten	
High Volume old growth Mean dispersal range = 16 miles Forested riparian corridors and beach fringe Other considerations: Roaded access/level of trapping	Large, medium and small habitat areas: areas of 34,000 acres, 25 miles apart; areas of 6,800 acres, 9 miles apart, or 13,600 acres, 16 miles apart; and areas of 2,100 acres, 1/large watershed Consider road density and management
Northern Goshawk	
Productive old growth Nest sites below 800 ft. elevation Large (10,000-30,000 acres) use areas of mixed habitats	Maintain productive old growth within large watersheds so that at least 33 percent is 100-200 years old, and 33 percent 200-300 years old. Nesting habitat (600+ acres) available in each 10,000-30,000 acre watershed
Marbled Murrelet	
Productive old growth within 31 miles of the ocean, and at lower elevations in heads of bays Other considerations: Gillnet mortality and other at-sea effects	Maintain productive old growth in heads of bays, emphasizing those near aquatic or terrestrial concentration areas
Alexander Archipelago Wolf	
Suitable habitat for prey species, especially Sitka black-tailed deer Other considerations: Road density and roaded access for trapping	Maintain habitat to support ample prey populations. For deer maintain High Volume old growth in winter range. Consider a deer-density objective within wolf range; control roaded access and work with ADF&G to manage illegal kills.
Brown Bear	
Productive anadromous fish habitat Large unroaded areas with availability of summer alpine habitat Other considerations: Road density and roaded access. Camp and community waste disposal sites.	Unroaded areas of 40,000 acres containing productive fisheries, 20 miles apart. 333' buffers on low-gradient anadromous fish streams to provide screened foraging habitat Manage human activity to minimize encounters and illegal kills; consider ways to concentrate human activity within landscapes.

Source: Viability Synthesis Workshop, June 1995

Consumptive Use of Wildlife

A number of the wildlife species on the Tongass are important for subsistence and sport hunting, and some for trapping. Sitka black-tailed deer, mountain goat, brown bear, black bear, moose, wolf, marten, river otter, and waterfowl (collectively) are all species hunting and/or trapping seasons managed by the ADF&G, (although the Federal Subsistence Board has recently assumed management of subsistence taking of fish and wildlife, including subsistence hunting). Thus the primary source of information on annual hunting and trapping is the ADF&G. Except for a summary for Sitka black-tailed deer, consumptive use information is not repeated here. (See also the Subsistence section for more information on subsistence uses of wildlife.)

Sitka black-tailed deer is by far the most important, and most "harvested," terrestrial wildlife species for subsistence purposes, and for sport hunting. Between 1987 and 1995, an average of 14,823 deer were killed annually within the Tongass National Forest. The following information is summarized from Iverson (1996a). Over the past 15 years deer harvests in Southeast Alaska have increased by 170 percent. Deer harvests have not been evenly distributed throughout Southeast Alaska. Of the total deer harvested between 1980 and 1990, approximately 73 percent were taken from Admiralty, Baranof, and Chichagof Islands (including adjacent smaller islands) (this is ADF&G Game Management Unit (GMU) 4). Another 18 percent came from Prince of Wales Island and adjacent islands (GMU 2). Only one percent of the deer harvest occurred in the central portion of the Tongass (GMU 3 - including Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, and Wrangell Islands); however, much of that area was closed to deer hunting during the 1980's. The other eight percent of the deer harvest occurred on the mainland (GMU 1). Total annual deer harvest has remained stable in GMU 4 since 1987, but has increased over the same period in GMU's 1, 2 and 3.

The number of deer hunters increased with the number of deer killed, from 5,110 in 1980 to 10,147 in 1987. In 1990 there were 8,449 deer hunters. Although it varies from year to year, the average success rate for deer hunting from 1980 to 1990 was about 1.6 deer per hunter. In 1987-88, the ADF&G conducted a survey within Southeast Alaska, asking deer hunters how many deer they desired to harvest (annually). The average from this survey was 4.2 deer. They were also asked how many deer they would be satisfied with. Here the average was 2.7 deer.

It has been estimated that a deer population at carrying capacity could support an annual harvest (i.e., kill) by hunters of up to about 10 percent of winter carrying capacity, with the population remaining stable and hunter satisfaction (success/effort) remaining fairly high (Flynn and Suring 1993). When harvest approaches 20 percent of carrying capacity, hunter satisfaction may diminish, and the harvest may be unsustainable over time, particularly in areas with high predator populations. If deer populations are above long-term carrying capacity, such as after several mild winters, hunter success may remain temporarily high. Deer harvest data is collected by the ADF&G, using a geographic division called the Wildlife Analysis Area (WAA). There are approximately 190 WAA's covering the Tongass; their boundaries are displayed on the "Community Deer Harvest" map in the map packet. Average deer harvest in relation to current estimates of deer habitat capability by WAA and community are discussed in the subsistence section.

Wildlife

Environmental Consequences

Introduction

The discussion of environmental consequences (effects) to wildlife is divided basically into three parts: management indicator species in brief; Sitka black-tailed deer; and wildlife species viability. Habitat capability estimates by alternative are projected for deer only, using a new model as discussed below. As a part of the demand for subsistence resources, deer supply and demand is discussed in the community-by-community effects sections.

As discussed earlier, the management indicator species approach has potential problems. It is based on the known (or estimated) requirements of several wildlife species, but although for the Tongass these all have varying needs related to old-growth forest, there is no assurance that all or even most other old-growth associated species have similar needs or are adequately represented. Even our knowledge of some of the MIS is scanty. There is an even more fundamental concern. Our knowledge of the specific viability requirements of most Tongass wildlife species is limited. We do know that the old-growth forest ecosystem is the dominant forest system in Southeast Alaska and provides habitat for most of these species. Therefore, an analysis that focuses primarily on the old-growth ecosystem is likely to better address or capture the requirements of all the old-growth associated species. This latter analysis is often called the "coarse filter" approach, as contrasted to the "fine filter" analysis of individual species. The coarse filter, old-growth ecosystem, in general is discussed in the section on Biodiversity, but is briefly addressed here relative to a forest-wide old growth habitat conservation strategy to maintain viable populations of old growth associated species.

All MIS, however, are given at least a brief fine filter analysis here. In addition, there are several species - some MIS, some not-that have been identified as species of special management concern, and for which an in-depth fine filter analysis is necessary. As discussed under Affected Environment, these include two species recently evaluated for possible Endangered Species Act listing (Alexander Archipelago wolf and northern goshawk), one species that is listed in its range outside of Alaska (marbled murrelet), the most important wildlife species for consumptive use (Sitka black-tailed deer, also important as the principal prey for the wolf), and two other species important as old growth habitat indicator species and long-term viability concerns (brown bear and marten). These six species are each evaluated individually. The group of species consisting of all other terrestrial mammals inhabiting the Tongass will also be evaluated as an individual unit.

Direct, Indirect and Cumulative Effects

In order to accomplish the wildlife analyses, the FEIS is relying in part upon expert panel evaluations of alternatives in terms of the estimated relative risks to the species or habitat of concern. Eight "panel assessments" were conducted, one each for the six species listed above, one for "other terrestrial mammals," and one for the old-growth ecosystem. (A ninth panel assessment, of risk to fish habitat, is discussed in the Fish section.) The old-growth ecosystem panel results are included in the Biodiversity section, and the other seven are included here. These panel assessments provide important information for the effects analysis for Wildlife, but they are not the only information. The panel results are used along with other information for estimating the effects of the alternatives. Sitka black-tailed deer (which is not in itself a viability concern) effects are discussed separately; the other focus species are discussed under "Wildlife Species Viability."

Alternatives 10 and 11 were not available to the panelists. These alternatives are discussed in relation to the panel results as appropriate (see specific discussions below).

Many of the MIS, as well as the other species of concern, are covered by specific and general standards and guidelines in the Forest Plan (Chapter 4, Wildlife Forest-wide standards and guidelines). These are designed to reduce, minimize or avoid adverse effects potentially occurring at the project level during forest plan implementation. For several of the MIS, a Forest-wide analysis based on general habitat changes can not provide enough detail or "fine-tuning" to reliably predict alternative consequences. However, as discussed below, the species-specific and other standards and guidelines can be relied upon to maintain some of the habitat features and other factors necessary for these species. Thus an analysis combining an overall forest-wide old-growth conservation strategy at a more general level, with the reliance on standards and guidelines to address project-level effects, is used. For most old-growth-associated species not specifically assessed here it can be assumed that, to the extent that functional and inter-connected old-growth ecosystems are maintained, the various specific habitats within them important to these species will also be maintained.

Management Indicator Species In Brief

Bald Eagle

Eagle nesting habitat is primarily old-growth trees along the coast and within riparian areas. Over 90 percent of the known nests on the Tongass are within 500 feet of the saltwater beach. The Bald Eagle and Riparian Forest-wide Standards & Guidelines are specifically designed to protect nesting habitat in all alternatives. There is some evidence that additional beach fringe protection may further lower the risk that activities may degrade eagle habitat (Gende et al. 1996). Of the alternatives, some provide less risk to eagle habitat than others. The alternatives are listed as follows in the order of increasing nesting habitat protection.

1. Alternatives 7 and 9 rely on their respective pattern of wilderness and natural setting LUD's, and the Riparian and Bald Eagle Forest-wide Standards & Guidelines. The Bald Eagle Standards & Guidelines, among other things prohibit timber harvest within 330 feet of an eagle nest tree.

2. Alternatives 2 and 10 add the 500 foot Beach and 1,000 foot Estuary Forest-wide Standard & Guidelines to the measures listed above (#1).

3. In addition to the measures listed in #1 and #2, Alternatives 3, 4, 5 and 6, provide additional protection to lands within 500 - 1,000 feet of the beach. Only single tree and small group selection timber harvest will be allowed in this zone.

4. In addition to the measures listed in #3, Alternative 11 prohibits timber harvest within 500-1,000 feet of the beach fringe.

5. Alternative 1 provides the most protection by dramatically increasing the acreage of non-Development LUD's in addition to the measures listed in #1, #2, and #4.

River Otter

Habitats immediately adjacent to coastal and fresh water aquatic environments are preferred by river otters. Old-growth forests in these areas provide the highest value habitat, providing cover and burrow and den sites. Although the majority of otter habitat is secure under all alternatives, some alternatives offer less risk to otter habitat than others. The alternatives are listed as follows in the order of decreasing risk.

1. Alternatives 7 and 9 provide the greatest risk to otter habitat. These alternatives rely on their respective pattern of wilderness and natural setting LUDs and Riparian Option 3 Forest-wide Standards & Guidelines and TTRA/BMP direction, respectively.

2. Alternatives 2 and 10 add the 500 foot beach and 1,000 foot Estuary Standards & Guidelines to the measures listed for Alternative 7, thereby reducing risk to otter habitat.

3. Alternatives 4, 5 and 6, provide additional protection to lands within 500-1,000 feet of the beach. Only single tree and small group selection timber harvest is allowed in this zone. In addition, these alternatives provide less risk in the highest value FHIP 1 watersheds (Riparian Option 2).

4. Alternative 3 provides the same beach protection as #3 above, but applies less riparian risk in all watersheds (Riparian Options 1 and 2).

5. In addition to the measures listed in #3, Alternative 11 prohibits timber harvest within 500-1,000 feet of the beach and applies Riparian Option 2A forest-wide.

6. Alternative 1 provides the least risk by dramatically increasing the acreage of natural setting" LUD's, in addition to the measures listed in #4.

Vancouver Canada Goose

Vancouver Canada Geese use wetlands (forested and non-forested) in the estuary, riparian, and uplands areas of the forest. Habitat needs for these species are specifically provided for under the Waterfowl Standards & Guidelines, which are applied to all alternatives. Additional levels of protection providing for less risk to habitat are offered by the alternatives by implementing differing levels of Beach, Estuary, and Riparian Forest-wide Standards & Guidelines by alternative. The relative ranking of alternatives is the same as displayed for the river otter.

Red-breasted Sapsucker
Brown Creeper
Hairy Woodpecker
Red Squirrel

These species habitats are conserved by applying the Reserve Tree/Cavity-nesting habitat Standards & Guidelines in all alternatives and two-aged management that is applied in Alternatives 3, 4, 5, 6, 10 and 11. Additional protection is provided by the application of Forest-wide standards and guidelines and LUDs that retain patches of old growth forest, which contain such features as large live and dead trees. A simple index of the amount of increased protection provided by each alternative is the amount of productive old-growth conserved in 100 years (2095). The alternatives are ranked from least to most protection as follows: 7, 9, 2, 6, 4, 10, 5, 11 and 1 using acres of productive old-growth forest scheduled for harvest over the next 100 years (see Table 3-115 in the discussion of wildlife viability).

Mountain Goats
Black Bears

These species have differing niches but both are associated with old-growth forest and can be potentially over hunted if roaded access is improved. The amount of roaded access is assumed to be inversely related to the amount of productive old-growth conserved in 100 years. This only provides a rough index access risk, since roads can be designed (or closed) at the project level to avoid key habitats. Transportation Forest-wide Standards & Guidelines provide that travel access road objectives be developed for all roads. Mountain goat and bear Forest-wide standards and guidelines provide for site specific analysis to assess and minimize disturbance and access to meet management objectives. The alternatives are generally ranked from least to most protection as follows: 7, 9, 2, 6, 4, 10, 5, 11, and 1 using acres of productive old-growth forest scheduled for harvest over the next 100 years (see Table 3-115 in the discussion of wildlife viability).

Sitka Black-tailed Deer: Model and Effects

Deer Habitat Capability Model

The deer panel took a different approach than the other species panels, choosing to develop a systematic process for evaluating landscapes for deer habitat capability rather than doing the actual evaluation of landscapes for each alternative. The panel thus focused on habitat capability modeling for Sitka black-tailed deer. The model, with subsequent refinements discussed below, is used below to estimate the effects on deer habitat.

Old-growth forest types and their division into high, medium and low volume classes are discussed in the Biodiversity section of this chapter. The panel evaluated these old-growth types and also younger-growth types for their general capability as deer habitat. Deer habitat considerations are listed below. The panel also used existing snow accumulation, elevation, and aspect information.

High Volume Old-growth Forest. (See Biodiversity section for definitions and general descriptions of this and the other old-growth types.) Canopy cover is 65-95 percent, with western hemlock dominating most sites. Stands are typically uneven-aged with small gaps in the overhead canopy. Understory (forage) production is moderate, but snow interception is high, making forage more readily available during winter than in other areas. Winter thermal cover is good.

Medium Volume Old-growth Forest. Compared to the high volume habitat type, these stands have shorter trees (under 100 feet) and a more open canopy (70-85 percent). The stands are uneven-aged, with numerous gaps in the overhead canopy. The more open canopy results in a more abundant understory, but forage is subject to burial by deep snow in winter, and forage availability may be strongly influenced by snow depth. Thermal cover is moderate.

Low Volume Old growth Forest. The overstory is relatively open, with a 50-70 percent canopy cover and tree height typically less than 60 feet. The understory is very brushy, with lower forage production. Snow interception is low, and thermal cover poor.

Other forest lands. Although many of these stands may be described as old-growth forest, the trees are typically small (under 40 feet), and canopy cover is 10-70 percent. Understory plants are relatively low in digestible protein, and may lose a higher percentage of their leaves over fall and winter. Snow interception in these stands is very low, thermal cover poor.

Even-aged Harvest Young Growth. These are second-growth stands under 25 years in age. Canopy cover during this stage is effectively zero. For the first 15 years, clearcuts produce an abundance of forage in the form of forbs, ferns, half-shrubs, and shrubs, and total understory biomass may be 10-15 times greater than in old growth. After 15 years, shrubs and conifers dominate most sites, causing a reduction in herb-layer plants. At age 25-30, conifers completely dominate most sites and most forage has been, or soon will be, shaded out. Excessive slash may inhibit understory growth and deer access in some areas during the first 5-10 years after logging. Plants growing in clearcuts during the first 25 years are relatively low in digestible protein. Thermal cover is relatively poor.

"Older" Young Growth. These are stands 25-100 years in age, most of them a result of previous clearcut logging, but some may have resulted from natural disturbance events such as windthrow. The trees are even-aged, and the canopy is closed (greater than 90 percent canopy cover). Understory production is very low, typically less than 1/10th that of a productive old-growth stand. The limited understory of most older young-growth stands is dominated by mosses and ferns, with shrubs and forbs largely absent. Thermal cover and snow interception are generally good, although deep, wet snows can cause the branches of young-growth trees to deflect, with the snow then being deposited on the forest floor.

Other Post-harvest Types. Some of the alternatives replace traditional clearcut harvest with two-aged and uneven-aged timber harvest systems. These types of harvesting, especially uneven-aged systems such as group selection, have been little used in the Tongass, and have not been studied with respect to deer. For the panel assessment, group selection that would allow 10 percent of a 100-acre patch to be harvested in any 50-year period was assumed. Group selection patches would average one acre with a maximum of two acres. In the short-term, these small openings would produce abundant forage for deer and be interspersed within a stand of residual old growth. In the long-term, such a stand would be expected to take on the characteristics of a multi-aged stand with numerous small pockets of like-aged trees ranging in age from very young growth to 500 years.

The panelists evaluated these vegetation types for three snow levels, three elevation zones, and four aspects for suitability as deer winter range. The effect of wolves at the three snow levels was also estimated. Independent of the panelists themselves, the deer resource specialist and the facilitator also scored the habitat types, and a final model was developed by averaging all scores. The final model turned out to be very similar to the deer habitat capability model (Suring 1994) used in previous Forest Plan Revision analyses. Notable differences in the new model over the old model include:

1. Incorporation of a new forest-type volume class stratification scheme (as presented above and discussed in the Biodiversity section);

2. Use of habitat coefficients for group selection harvest;

3. Assignment of higher coefficients to young growth less than 25 years old in low snow areas; and

4. A simplified model with fewer variables.

The model was refined again after the RSDEIS to incorporate suggestions from a subsequent inter-agency deer habitat modeling workshop among technical specialists from the Forest Service, FWS, and ADF&G (DeGayner 1996). This workshop reviewed all aspects of the deer model presented in the RSDEIS and adjusted the model coefficients so that model outputs better represented information from independent data sets such as deer harvest levels and deer pellet group transects. The participants increased the influence of predators on habitat scores, lowered the habitat values of second growth, and increased the maximum carrying capacity estimate.

The model assigns the highest habitat capability scores (for deer winter habitat) to the high-volume old-growth stands on south-facing slopes at lower elevations within watersheds that have a low propensity for deep snow winters. Recent clearcuts in the shrub-sapling stage received fairly high habitat capability scores in low and intermediate snow-level areas (such as Prince of Wales Island in the southern portion of the Tongass), but low scores in high snow areas (such as the mainland). In general, the more open stand types are more adversely affected by higher snow levels.

Other than non-forested areas, the lowest habitat capability scores are assigned to the older second-growth stands (the stem-exclusion phase) that have shaded out the understory forage.

Where group selection is applied, the model predicts habitat scores between high and medium volume old growth; however, these average scores had some of the largest variances since the panelists were uncertain on how this practice would actually affect deer habitat values.

Habitat suitability scores (HSI) (0 to 1.3) were transformed into “numbers” of deer (for planning purposes only) by multiplying the habitat scores by a maximum long-term habitat carrying capacity. The interagency deer habitat modeling workshop (DeGayner 1996) estimated this to be 125 deer per square mile for an HSI score of 1.0. The maximum carrying capacity was estimated by reviewing ADF&G deer density data (ADF&G unpublished data) and nutritionally-based estimates ranging from 70-185 deer per square mile (Kirchhoff, ADF&G memo 11/27/96). In areas that support both black bears and wolves, the maximum carrying capacity was reduced by 36 percent. This value was estimated by reviewing deer pellet densities (ADF&G unpublished data) in areas with and without predators (DeGayner, 1996). The estimates of deer habitat capability produced by this model are consistent with ADF&G hunter harvest data and winter deer densities reported elsewhere in North America.

Deer Effects

This analysis evaluates relative changes in habitat capability and not actual on-the-ground deer numbers, which for any given time period are likely to be below, or occasionally above, the populations estimated by the habitat capability model. Winter severity, hunting pressure, predation pressure, and other variables are beyond the scope of the model. In fact, the primary purpose of this model is not to estimate deer populations but rather to provide a measure to estimate and compare relative effects of alternatives on habitats believed important to Sitka black-tailed deer. Alternatives with a greater abundance of habitat features associated with deer habitat capability will rate higher than those that have lesser abundance of these features.

The model results presented here assume the maximum level of timber harvest permitted for each alternative is harvested. More specifically, this analysis assumes that: 1) 100 percent of the lands available for timber harvest other than uneven-aged management would be harvested by 2095 (using a 100-year rotation); 2) 60 percent of the lands available for extended rotation harvest would be harvested by 2095 (using a 200-year "rotation" as in Alternatives 4 and 5); and 3) 25 percent of the young growth would be in the stand initiation phase (25 years old or younger) and 75 percent would be in the stem exclusion phase (26-100 years old) by 2095.

After the initial years following logging there is a rapid increase in deer forage production due to the large amount of light penetration created by open stand conditions. However, after the initial 20-30 years, there is a 100-150 period in which the vigorously growing hemlock and spruce shade out the understory forage. Under even-aged and two-aged harvest systems, the amount of habitat capability reduction over the 100-year analysis period is substantial and is directly related to the amount of timber harvest. While the short-term (20-30 year) effect is also related to the amount of timber harvest, the modeled effect of timber harvest will vary with the average seasonal snow accumulation (since higher accumulations reduce forage availability).

Under uneven-aged systems (such as group selection), available forage within any given area will be maintained for a longer time, as will adjacent thermal cover. However, in areas with lower snowfall and limited forage, even-aged or two-aged systems may be better for deer winter habitat by keeping more of the landscape in the early serial stages, producing more available forage.

This section contains three tables to display the effects the alternatives on deer habitat. Hunter harvest is displayed in each table to allow the reader to identify the most heavily hunted WAAs. All three tables are limited to National Forest lands and do not include State, City, or private lands. Many of these lands have been or will be developed for intensive forestry at the expense of deer habitat capability. Therefore, a conservative approach is taken and deer harvest (an estimate of current demand) reported in relation to the land's capability to produce deer. For this analysis, it is assumed that lands in non-federal ownerships have zero habitat capability. However, the average hunter kill reported includes deer harvested from these lands. This understates the current habitat capability on many of these lands, but the model projects dramatic declines in deer habitat capability in the timber harvest areas as the second growth ages. As habitat capability declines on other ownerships it is assumed that this demand will move onto the National Forest. The distribution of State, City, and private lands are displayed on all maps in the map package.

Table 3-110 displays the cumulative effect of timber harvest on estimated deer habitat capability, from the beginning of large scale timber harvest in 1954 to the present and to year 2095, by alternative for each Wildlife Analysis Area (WAA). WAAs that contain ADF&G's "Highest Value Community Use Areas" (VCUs) are noted. WAAs are land divisions used by the ADF&G for deer inventories and planning; they are displayed on the "Subsistence" map in the map packet.

Forest-wide, the alternatives are estimated to retain from 89 to 73 percent of the 1954 habitat capability in 2095 (Table 3-110). Ranked from highest to lowest, the alternatives exhibited this pattern: 1, 5, 11, 4, 3, 10, 6, 2, 9 and 7, where Alternatives 4 and 11 are tied at 83 percent.

To address wolf viability and hunter success/satisfaction issues we have displayed the proportion of the highest quality deer winter habitats conserved in each alternative over the next 100 years (Table 3-111), and provided rough estimates of deer habitat capability density (deer/sq. mile) estimates by alternative (Table 3-112).

Table 3-111 displays the percentage of the upper 25 percent quartile deer habitat, as identified in the deer model, that is not available for timber harvest because it is either in a LUD that does not permit timber harvest or is protected by a Forest-wide Standard and Guideline such as Riparian or Beach and Estuary Fringe. This table tends to overstate the amount of timber harvest by 5 to 15 percent because the "modeling implementation reduction factors" have not been accounted for (see Timber section of this chapter).

Alternative 1 would have little effect on deer habitat capability: the only changes result from existing young-growth stands entering the stem exclusion phase at about 25 years of age. Alternatives 4 and 5 use extended rotation harvest methods and provide some opportunity to maintain or in some cases improve habitat quality while harvesting a modest amount of timber, although this is somewhat offset in Alternative 6 by its use of a shorter stand rotation age. Alternatives 3 and 11 include a forest-wide system of large, medium and small (mapped in Alternative 11) old-growth habitat reserves. Collectively these old-growth reserves contribute to maintenance of deer habitat capability distributed across the Forest. Alternatives 2, 7 and 9 all rely on even-aged management with no system of reserves, and show the greatest reductions in habitat capability.

These tables also show that, at the WAA level, some areas under some alternatives lose more than 50 percent of their habitat capability for deer. The effects of these reductions are discussed in the community-by-community subsistence effects analysis elsewhere in this chapter.

In summary, Tables 3-110, 3-111, and 3-112 indicate: 1) a loss of deer habitat capability has taken place from 1954 to 1995 and varying degrees of additional loss of deer habitat capability will occur under all alternatives; and 2) some of the declines will be in WAAs that currently receive relatively high hunting pressure.

Alternative 11 (the preferred) ranks relatively high in the conservation of deer habitat. Other than Alternative 1, Alternative 11 protects the most of the highest quality deer winter range, and ties for the 2nd highest rank in overall conservation of habitat quality from 1954 to 2095. Alternative 11 also maintains relatively high deer densities. These high scores are attributed to the 1,000-foot beach fringe, larger riparian reserves, large, medium, and small old-growth habitat reserves, and other large reserved areas such as south Cleveland Peninsula and South Kuiu Island, that result in scheduling a relatively low level of old growth for timber harvest (474,000 acres of old-growth forest).

Deer hunting in relation to current deer harvests and habitat capabilities was discussed above under Affected Environment and will be further discussed in the subsistence section. Deer densities in relation to wolf viability will be discussed in the wolf viability section.

Table 3-110
Remaining 1954 Deer Habitat Capability on National Forest Lands at 1995 and 2095 by Alternative, WAA, and ADF&G Highest Value Community Use VCUs [5]

WAA[3]	Average deer hunting harvest	percent of 1954 Habitat Capability at 1995[2]	percent Deer Habitat Capability at 2095[2] Alternatives 1	2	3	4	5	6	7	9	10	11	ADF&G Highest Value Community Use Areas (VCUs) within WAA[4]	Vicinity
101	127	97	98	98	98	98	98	98	75	98	98	93	0	Gravina Is.
303	6	98	98	98	98	98	98	98	87	98	98	98	0	Duke Is.
404	9	100	100	100	100	100	100	100	100	100	100	100	0	Revilla Is
405	21	90	88	72	76	79	79	71	68	70	76	79	0	Revilla Is
406	92	86	84	64	70	72	71	64	59	62	70	72	7530	Revilla Is
407	61	93	92	67	73	76	76	65	68	69	73	74	7470	Revilla Is
408	36	100	100	100	100	100	100	100	100	100	100	100	0	Revilla Is
509	66	94	94	84	87	88	87	84	73	84	87	90	0	Revilla Is
510	44	75	76	56	60	64	64	55	43	50	60	65	7390	Revilla Is
511	0	100	100	100	100	100	100	100	100	100	100	100	0	Revilla Is
612	54	99	99	74	78	83	84	70	68	64	75	85	7190,7220,	Cleveland
613	90	96	96	82	86	88	88	83	68	80	85	96	7150, 7160, 7130, 7140	Cleveland
614	13	100	100	72	73	84	84	72	64	69	72	100	0	Cleveland
715	4	100	100	100	100	100	100	100	60	100	100	100	0	Cleveland
716	0	100	100	100	100	100	100	100	100	100	100	100	0	Cleveland
717	1	100	100	100	100	100	100	100	100	100	100	100	0	Misty Fiords
719	1	100	100	100	100	100	100	100	100	100	100	100	0	Misty Fiords
821	2	100	100	100	100	100	100	100	100	100	100	100	0	Misty Fiords
822	0	100	100	100	100	100	100	100	100	100	100	100	0	Misty Fiords
823	3	100	100	100	100	100	100	100	100	100	100	100	0	Misty Fiords
901	43	99	97	78	84	86	86	78	66	64	84	85	6340	Suemez Is
902	33	100	100	100	100	100	100	100	97	96	100	100	0	Outer Islands
1003	136	73	59	41	52	52	52	46	38	36	53	50	5610	Heceta Is.
1105	3	99	99	93	97	97	98	96	66	61	96	98	0	Dall Is
1106	62	100	100	100	100	100	100	100	67	67	100	100	0	Long Is
1107	49	99	98	83	92	90	92	86	71	71	92	87	6210, 6320	POW
1108	14	100	100	100	100	100	100	100	100	100	100	100	0	POW
1209	7	100	100	90	97	96	95	92	71	69	97	97	0	POW
1210	20	100	100	72	81	85	85	74	63	70	80	85	6920	POW
1211	180	94	91	65	75	77	77	66	63	63	75	76	6790	POW
1212	25	99	99	87	91	93	94	88	77	77	89	91	0	POW
1213	14	99	99	85	87	93	91	82	71	88	85	94	6740, 6750	POW
1214	93	82	80	51	66	66	70	63	49	49	66	66	6180, 6200	POW
1315	178	62	60	46	49	53	54	48	43	46	48	53	0	POW
1316	71	100	100	100	100	100	100	100	100	100	100	100	0	POW
1317	76	58	59	44	50	51	53	48	39	41	51	53	6210, 6220	POW
1318	328	93	91	59	70	75	74	61	58	57	66	76	5940, 5950	POW
1319	309	76	74	53	60	63	65	59	45	45	58	66	5750, 5760, 5780, 5971, 5960	POW
1323	140	98	96	84	87	90	90	85	81	79	87	92	5920, 5930, 5910	POW
1332	67	88	86	67	75	77	78	73	63	61	74	78	6240, 6250, 6310	POW
1420	114	55	50	37	41	42	44	40	35	36	41	45	5810, 5830	POW
1421	243	76	72	53	60	62	67	63	45	50	61	64	5730, 5740, 5750, 5770	POW
1422	358	71	60	45	51	53	54	50	42	43	50	52	5542, 5710, 5880, 5890,	POW
1524	2	100	100	100	100	100	100	100	100	100	100	100	0	Warren
1525	42	56	51	33	45	45	48	47	31	30	45	45	5440, 5460,	Kosciusko Is.
1526	52	94	92	87	89	90	90	88	86	86	89	90	5490	POW
1527	41	79	70	55	60	62	63	58	50	46	61	62	0	POW
1528	50	77	79	67	73	72	75	73	57	69	73	74	0	POW
1529	182	74	68	50	56	58	60	54	45	51	58	60	5270, 5290, 5320	POW
1530	161	64	60	49	54	56	57	55	47	47	54	55	5380,	POW
1531	35	69	54	39	43	48	49	45	35	33	45	46	0	POW
1601	2	100	99	77	80	84	87	76	60	58	82	83	0	Farragute Bay
1602	7	97	97	97	97	97	97	97	57	97	97	97	0	Farragute Bay
1603	4	93	93	86	92	89	90	86	68	76	92	88	0	Thomas Bay
1605	47	78	79	60	62	68	67	60	53	51	62	64	4890	Thomas Bay
1706	18	100	100	100	100	100	100	100	100	100	100	100	0	LeConte Bay
1707	3	100	100	100	100	100	100	100	100	100	100	100	0	Stikine River

Glossary

WAA[3]	Average deer hunting harvest	percent of 1954 Habitat Capability at 1995[2]	percent Deer Habitat Capability at 2095[2] Alternatives 1	2	3	4	5	6	7	9	10	11	ADF&G Highest Value Community Use Areas (VCUs) within WAA[4]	Vicinity
1708	0	100	100	100	100	100	100	100	99	100	100	100	0	Stikine River
1810	1	100	100	77	80	87	87	77	50	77	80	79	5020,	Back Channel
1811	0	99	99	96	96	97	97	96	57	85	96	96	0	Back Channel
1812	4	99	99	90	91	94	94	90	66	85	92	92	0	Bradfield
1813	0	68	73	63	65	68	68	64	62	63	65	65	5140,	Bradfield
1814	0	99	99	86	89	93	93	87	76	82	89	92	0	Bradfield
1815	0	93	94	87	87	93	93	88	92	94	94	93	0	Cleveland
1816	5	90	89	70	74	80	80	72	68	63	74	73	0	Cleveland
1817	23	100	100	64	91	79	92	84	62	56	91	90	7180, 7200	Cleveland
1901	14	92	91	68	75	80	79	69	53	69	77	77	4670, 4680	Etolin Is
1902	2	91	88	88	88	88	88	88	88	88	88	88	0	Cleveland
1903	41	89	87	69	76	79	79	72	56	63	77	76	0	Wrangell
1904	62	62	61	57	59	60	60	58	28	52	61	59	0	Woronkoski
1905	100	81	75	60	65	68	67	61	49	60	65	66	4570, 4580,	Zarembo Is.
1906	20	84	66	66	66	66	66	66	66	66	66	66	0	Shruby Is.
1910	36	97	97	95	95	96	96	95	93	92	95	96	0	Etolin Is.
2007	184	80	77	59	63	67	68	63	47	59	64	64	4470, 4500, 4510, 4520, 4540	Mitkof Is
2008	3	96	95	88	90	91	92	89	69	89	90	90	0	Woewodski
2305	4	100	101	94	101	98	100	94	102	100	101	100	0	Lynn Canal
2306	4	93	98	52	78	75	75	60	44	45	73	65	0	Cross Sound
2408	0	100	100	99	102	96	93	99	101	100	64	101	0	Lynn Canal
2514	0	100	100	84	94	93	96	86	75	83	92	87	230, 240	Juneau
2515	1	100	100	100	100	100	100	100	90	100	100	100	0	Juneau
2621	68	98	98	98	98	98	98	98	91	98	98	98	0	Shelter Is.
2722	358	100	100	100	100	100	100	100	70	100	100	100	0	Douglas Is
2926	6	98	99	68	78	85	86	69	51	46	66	77	0	Hobart Bay
2927	2	100	100	66	79	86	90	70	54	47	68	76	840, 790	Port Houghton
3001	690	83	83	75	81	78	77	77	82	75	77	81	2990, 3000, 3010, 3020, 3090, 3100	NW Baranof
3002	555	71	69	66	66	67	67	66	63	66	64	68	3120, 3130	Sitka
3003	331	98	96	85	96	90	89	85	83	83	95	93	0	Sitka
3104	261	84	77	69	73	71	71	72	71	69	65	74	3090,	Kruzof Is
3105	176	99	99	97	99	98	98	97	92	90	99	98	0	Kruzof Is
3206	144	99	99	99	99	99	99	99	99	99	99	99	0	Baranof Is
3207	147	100	100	100	100	100	100	100	100	100	100	100	0	Baranof Is
3308	200	72	67	49	54	57	56	49	39	41	51	58	2390, 2440, 2400, 2430, 2450	Chichagof Is
3309	145	97	97	88	90	92	93	88	84	81	88	91	2460	Chichagof Is
3310	236	91	92	92	92	92	92	92	92	92	92	92	0	Chichagof Is
3311	285	97	97	84	87	89	88	85	81	80	80	89	2790, 2800, 2810	Chichagof Is
3312	130	92	92	82	90	90	87	85	82	86	82	91	0	Baranof Is
3313	124	66	67	44	53	56	56	45	41	36	45	53	2920, 2940	Baranof Is
3314	144	85	86	67	86	72	74	69	70	73	85	86	0	Baranof Is
3315	145	90	88	70	83	80	80	71	60	69	82	78	2970	Catherine Is
3416	186	100	100	100	100	100	100	100	100	100	100	100	0	Chichagof Is
3417	222	100	100	100	100	100	100	100	100	100	100	100	0	Chichagof Is
3418	105	100	100	100	100	100	100	100	100	91	100	100	0	Chichagof Is
3419	86	100	100	100	100	100	100	100	100	100	100	100	0	Chichagof Is
3420	87	100	100	100	100	100	100	100	100	100	100	100	0	Chichagof Is
3421	82	100	100	100	100	100	100	100	100	94	100	100	0	Elfin Cove
3523	164	84	81	56	75	70	72	69	51	65	69	82	2020, 2030, 2040	NE Chichagof
3524	196	100	100	58	81	86	83	68	58	57	62	85	0	NE Chichagof
3525	194	79	75	53	61	64	65	55	47	56	55	66	2150, 2170, 2180	NE Chichagof
3526	184	81	79	56	69	71	72	67	51	47	64	74	2220, 2230,	NE Chichagof
3551	215	83	80	58	67	68	70	64	52	47	62	71	2100	NE Chichagof
3627	73	78	74	53	61	61	62	53	51	47	57	65	2360	Chichagof Is
3628	32	98	98	98	98	98	98	98	98	98	98	98	0	Chichagof Is
3629	152	92	91	66	76	80	77	67	62	67	70	79	2280, 2290	Chichagof Is
3630	36	99	99	81	89	91	92	82	81	88	72	91	2240, 3630, 3630	Chichagof Is
3731	145	95	94	82	94	89	89	85	74	58	94	91	0	Baranof Is
3732	31	100	100	100	100	100	100	100	100	100	100	100	0	Baranof Is
3733	128	100	100	100	100	100	100	100	100	100	100	100	0	Baranof Is
3734	116	100	100	100	100	100	100	100	100	100	100	100	0	Baranof Is
3835	301	100	100	100	100	100	100	100	100	94	100	100	0	Admiralty
3836	329	100	100	100	100	100	100	100	94	98	100	100	0	Admiralty

WAA[3]	Average deer hunting harvest	percent of 1954 Habitat Capability at 1995[2]	percent Deer Habitat Capability at 2095[2] Alternatives 1	2	3	4	5	6	7	9	10	11	ADF&G Highest Value Community Use Areas (VCUs) within WAA[4]	Vicinity
3837	71	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
3938	249	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
3939	283	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
3940	227	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4041	75	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4042	98	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4043	74	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4044	209	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4054	49	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4055	96	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4145	150	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4146	143	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4147	183	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4148	153	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4149	137	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4150	214	100	100	100	100	100	100	100	100	100	100	100	0	Admiralty
4222	173	97	97	78	83	87	87	78	77	76	81	92	1960	Chichagof
4252	213	100	100	59	77	78	78	59	53	50	75	75	0	Chichagof
4253	132	85	83	62	69	70	72	63	59	49	66	71	2010, 2020	Chichagof
4256	76	100	100	100	100	100	100	100	100	100	100	100	0	Pleasant Is
5012	15	80	77	47	53	61	61	51	41	36	54	56	3980, 3990, 4000, 4020,	Kuiu Is
5013	5	95	94	77	80	86	85	78	52	73	80	82	4200,	Kuiu Is
5014	0	96	97	59	64	78	78	60	54	49	66	71	4160	Kuiu Is
5015	0	100	100	100	100	100	100	100	100	100	100	100	0	Coronation
5016	0	99	99	99	99	99	99	99	97	99	99	99	0	Kuiu Is
5017	0	98	98	84	88	91	91	86	82	91	88	98	0	Kuiu Is
5018	2	89	87	56	60	70	70	57	52	48	62	64	0	Kuiu Is
5130	14	99	99	81	84	89	90	83	71	83	83	87	4290	Kupreanof
5131	21	91	89	78	79	83	83	79	67	78	80	81	4250	Kupreanof
5132	40	74	70	53	56	61	61	55	53	48	56	58	4250	Kupreanof
5133	19	99	98	75	79	86	86	77	72	73	78	81	4350, 4360,	Kupreanof
5134	46	89	88	77	78	83	82	78	78	73	79	83	4320, 4330, 4340,	Kupreanof
5135	3	100	100	77	86	87	90	83	77	77	86	84	4240	Kupreanof
5136	6	87	84	60	64	70	70	62	50	58	65	67	0	Kupreanof
5137	0	96	96	95	95	95	95	95	95	96	95	95	0	Kupreanof
5138	58	85	80	47	51	62	63	48	46	43	51	55	0	Kupreanof
	14,823	**91**	**89**	**78**	**82**	**83**	**84**	**80**	**73**	**75**	**81**	**83**		

1 FORPLAN solutions are specific to VCU's that were split by ADF&G WAA boundaries were assigned to the WAA that contained the majority of the acreage. Examples of split VCU's include Rocky Pass, Wrangell Narrows, and Tuxecan Island. Numbers in this table should be viewed as approximations and are intended for alternative comparison only.

2 Includes only National Forest Lands. Habitat capability from State and private lands are not included.

3 Some WAAs with naturally very low deer densities have been omitted (e.g. 4302-4607).

4 As identified in ADF&G August 26, 1996 letter. These VCU's tend to be associated with planned timber sales and may not necessarily represent all "high use" deer hunting areas where timber sales are not planned (e.g. Angoon and Juneau areas).

5 This analysis assumes: 1) maximum timber harvest levels over the 100 year period, 2) timber harvest from 1954 to 1995 occurred in the high volume stratum, 3) at 2095 25 percent of the 2nd growth would be <25 years old, and 4) at 2095 60 percent of the 1995 available old-growth would be harvested in alternatives with a 200 year rotation.

Table 3-111
Percent of High Value Winter Deer Range Not Available for Timber Harvest by Alternative, WAA, and ADF&G Highest Value Community Use VCUs

WAA [3]	%t Other Ownership[2]	High Value Winter Deer Range not Available for Timber Harvest[1] Alternatives										Avg. Deer Harvest	ADF&G Highest Value Community Use Areas (VCUs)within WAA [4]	Vicinity
		1	2	3	4	5	6	7	9	10	11			
101	25	100	100	100	100	100	100	36	100	100	82	127	0	Gravina Is.
303	0	100	100	100	100	100	100	82	100	100	100	6	0	Duke Is.
404	0	100	100	100	100	100	100	100	100	100	100	9	0	Revilla Is
405	0	100	69	80	72	72	72	58	69	80	81	21	0	Revilla Is
406	4	100	62	79	65	65	65	47	61	79	75	92	7530	Revilla Is
407	33	100	56	74	59	59	59	58	63	74	67	61	7470	Revilla Is
408	36	100	100	100	100	100	100	100	100	100	100	36	0	Revilla Is
509	8	100	85	91	85	85	85	60	86	91	92	66	0	Revilla Is
510	0	100	63	74	66	66	66	27	53	74	79	44	7390	Revilla Is
511	0	100	100	100	100	100	100	100	100	100	100	0	0	Revilla Is
612	0	100	41	62	44	44	44	30	30	62	62	54	7190,7220,	Cleveland
613	1	100	76	83	76	77	77	30	77	83	100	90	7150, 7160, 7130, 7140	Cleveland
614	29	100	41	51	41	41	41	25	39	51	100	13	0	Cleveland
715	0	100	100	100	100	100	100	24	100	100	100	4	0	Cleveland
716	0	100	100	100	100	100	100	100	100	100	100	0	0	Cleveland
717	0	100	100	100	100	100	100	100	100	100	100	1	0	Misty Fiords
719	0	100	100	100	100	100	100	100	100	100	100	1	0	Misty Fiords
821	0	100	100	100	100	100	100	100	100	100	100	2	0	Misty Fiords
822	0	100	100	100	100	100	100	100	100	100	100	0	0	Misty Fiords
823	0	100	100	100	100	100	100	100	100	100	100	3	0	Misty Fiords
901	2	100	67	81	70	70	70	41	41	81	73	43	6340	Suemez Is
902	0	100	100	100	100	100	100	93	93	100	100	33	0	Outer Islands
1003	3	100	34	69	47	47	47	27	27	69	59	136	5610	Heceta Is.
1105	23	100	91	96	94	96	96	35	36	96	96	3	0	Dall Is
1106	30	100	100	100	100	100	100	26	26	100	100	62	0	Long Is
1107	21	100	68	87	72	76	76	40	44	87	76	49	6210, 6320	POW
1108	0	100	100	100	100	100	100	100	100	100	100	14	0	POW
1209	0	100	78	94	82	82	82	32	32	94	94	7	0	POW
1210	3	100	55	70	59	59	59	32	52	70	73	20	6920	POW
1211	27	100	51	73	57	57	57	45	45	73	70	180	6790	POW
1212	0	100	73	80	76	76	76	49	49	80	80	25	0	POW
1213	12	100	72	78	74	74	74	45	81	78	85	14	6740, 6750	POW
1214	18	100	46	75	53	68	68	41	41	75	77	93	6180, 6200	POW
1315	26	100	53	64	59	60	60	44	60	64	69	178	0	POW
1316	3	100	100	100	100	100	100	100	100	100	100	71	0	POW
1317	13	100	61	82	64	76	76	34	49	82	84	76	6210, 6220	POW
1318	50	100	38	54	46	46	46	34	34	54	66	328	5940, 5950	POW
1319	1	100	55	69	64	71	71	32	39	69	81	309	5750, 5760, 5780, 5971, 5960	POW
1323	3	100	66	77	69	72	72	53	53	77	87	140	5920, 5930, 5910	POW
1332	18	100	51	71	56	66	66	32	32	71	78	67	6240, 6250, 6310	POW
1420	7	100	45	65	50	61	61	41	49	65	61	114	5810, 5830	POW
1421	2	100	60	75	63	83	83	33	57	75	80	243	5730, 5740, 5750, 5770	POW
1422	4	100	46	57	51	54	54	34	40	57	59	358	5542, 5710, 5880, 5890,	POW
1524	0	100	100	100	100	100	100	100	100	100	100	2	0	Warren
1525	9	100	27	69	39	60	60	14	14	69	64	42	5440, 5460,	Kosciusko Is.
1526	0	100	88	94	90	92	92	85	85	94	94	52	5490	POW
1527	10	100	67	78	71	75	75	43	42	78	75	41	0	POW
1528	0	100	75	92	80	93	93	53	84	92	91	50	0	POW
1529	3	100	60	77	65	71	71	35	65	77	79	182	5270, 5290, 5320	POW
1530	6	100	61	80	63	73	73	50	56	80	79	161	5380,	POW
1531	3	100	48	67	59	59	59	23	23	67	66	35	0	POW
1601	0	100	69	75	69	69	69	37	37	75	76	2	0	Farragute Bay
1602	0	100	100	100	100	100	100	35	100	100	100	7	0	Farragute Bay
1603	0	100	89	98	89	89	89	49	71	98	91	4	0	Thomas Bay
1605	2	100	61	64	61	61	61	41	41	64	65	47	4890	Thomas Bay
1706	0	100	100	100	100	100	100	100	100	100	100	18	0	LeConte Bay
1707	1	100	100	100	100	100	100	100	100	100	100	3	0	Stikine River
1708	0	100	100	100	100	100	100	98	100	100	100	0	0	Stikine River
1810	7	100	74	77	74	74	74	23	76	77	77	1	5020,	Back Channel

WAA[3]	%t Other Ownership[2]	High Value Winter Deer Range not Available for Timber Harvest[1] Alternatives										Avg. Deer Harvest	ADF&G Highest Value Community Use Areas (VCUs)within WAA[4]	Vicinity
		1	2	3	4	5	6	7	9	10	11			
1811	0	100	98	99	99	99	99	37	89	99	99	0	0	Back Channel
1812	0	100	89	92	90	90	90	49	78	92	91	4	0	Bradfield
1813	2	100	83	85	84	84	84	75	83	85	86	0	5140,	Bradfield
1814	0	100	85	87	86	86	86	56	80	87	92	0	0	Bradfield
1815	0	100	98	99	99	99	99	87	100	99	99	0	0	Cleveland
1816	0	100	66	75	70	70	70	53	53	75	71	5	0	Cleveland
1817	0	100	43	89	46	79	79	30	30	89	79	23	7180, 7200	Cleveland
1901	0	100	65	78	68	68	68	28	65	78	81	14	4670, 4680	Etolin Is
1902	0	100	100	100	100	100	100	100	100	100	100	2	0	Cleveland
1903	9	100	74	82	77	77	77	29	63	82	80	41	0	Wrangell
1904	0	100	99	99	99	99	99	25	99	99	99	62	0	Woronkoski
1905	0	100	74	80	75	75	75	41	72	80	84	100	4570, 4580,	Zarembo Is.
1906	0	100	100	100	100	100	100	100	100	100	100	20	0	Shruby Is.
1910	0	100	96	97	97	97	97	92	92	97	98	36	0	Etolin Is.
2007	14	100	68	74	69	73	73	36	66	74	74	184	4470, 4500, 4510, 4520, 4540	Mitkof Is
2008	0	100	93	95	94	94	94	24	92	95	96	3	0	Woewodski
2202	2	100	100	100	100	100	100	47	76	100	100	7	0	Lynn Canal
2305	0	100	87	99	87	87	87	40	98	99	90	4	0	Lynn Canal
2306	4	100	33	62	46	46	46	25	24	62	57	4	0	Cross Sound
2408	3	100	48	50	49	49	49	48	100	50	67	0	0	Lynn Canal
2409	2	100	54	59	57	57	57	49	100	59	70	0	0	Berners Bay
2514	14	100	86	94	88	88	88	66	88	94	89	0	230, 240	Juneau
2515	12	100	100	100	100	100	100	32	100	100	100	1	0	Juneau
2517	22	100	97	100	97	97	97	64	97	100	100	14	0	Juneau
2621	18	100	100	100	100	100	100	67	100	100	100	68	0	Shelter Is.
2722	30	100	100	100	100	100	100	42	100	100	100	358	0	Douglas Is
2823	0	100	67	69	70	70	70	41	63	69	77	4	540	Whiting River
2926	14	100	64	65	64	64	64	40	41	65	68	6	0	Hobart Bay
2927	3	100	55	61	57	57	57	36	36	61	63	2	840, 790	Port Houghton
3001	1	100	71	86	71	71	71	97	84	86	91	690	2990, 3000, 3010, 3020, 3090, 3100	NW Baranof
3002	14	100	92	93	92	92	92	62	96	93	96	555	3120, 3130	Sitka
3003	7	100	72	100	72	72	72	35	72	100	86	331	0	Sitka
3104	0	100	50	63	53	53	53	60	75	63	62	261	3090,	Kruzof Is
3105	0	100	91	100	91	91	91	56	67	100	91	176	0	Kruzof Is
3206	4	100	100	100	100	100	100	100	100	100	100	144	0	Baranof Is
3207	0	100	100	100	100	100	100	100	100	100	100	147	0	Baranof Is
3308	0	100	61	71	64	64	64	31	42	71	77	200	2390, 2440, 2400, 2430, 2450	Chichagof Is
3309	0	100	88	89	88	88	88	77	77	89	90	145	2460	Chichagof Is
3310	0	100	100	100	100	100	100	100	100	100	100	236	0	Chichagof Is
3311	0	100	70	72	71	71	71	52	71	72	76	285	2790, 2800, 2810	Chichagof Is
3312	0	100	69	81	69	69	69	50	90	81	84	130	0	Baranof Is
3313	0	100	41	53	44	44	44	29	29	53	52	124	2920, 2940	Baranof Is
3314	0	100	45	99	46	46	46	33	72	99	99	144	0	Baranof Is
3315	0	100	58	90	61	61	61	25	65	90	72	145	2970	Catherine Is
3416	0	100	100	100	100	100	100	100	100	100	100	186	0	Chichagof Is
3417	0	100	100	100	100	100	100	100	99	100	100	222	0	Chichagof Is
3418	2	100	100	100	100	100	100	100	90	100	100	105	0	Chichagof Is
3419	3	100	100	100	100	100	100	100	94	100	100	86	0	Chichagof Is
3420	0	100	100	100	100	100	100	100	100	100	100	87	0	Chichagof Is
3421	0	100	100	100	100	100	100	100	92	100	100	82	0	Elfin Cove
3523	10	100	47	78	51	71	71	29	66	78	90	164	2020, 2030, 2040	NE Chichagof
3524	48	100	29	41	37	37	37	29	29	41	46	196	0	NE Chichagof
3525	0	100	39	65	53	59	59	28	64	65	77	194	2150, 2170, 2180	NE Chichagof
3526	6	100	60	80	66	79	79	31	46	80	89	184	2220, 2230,	NE Chichagof
3551	0	100	52	71	55	68	68	33	33	71	74	215	2100	NE Chichagof
3627	0	100	61	77	63	63	63	54	54	77	76	73	2360	Chichagof Is
3628	0	100	100	100	100	100	100	100	100	100	100	32	0	Chichagof Is
3629	0	100	52	66	54	54	54	37	60	66	70	152	2280, 2290	Chichagof Is
3630	0	100	55	59	55	55	55	35	83	59	76	36	2240, 3630, 3630	Chichagof Is
3731	2	100	76	100	83	83	83	51	39	100	94	145	0	Baranof Is
3732	0	100	100	100	100	100	100	100	100	100	100	31	0	Baranof Is
3733	0	100	100	100	100	100	100	100	100	100	100	128	0	Baranof Is
3734	0	100	100	100	100	100	100	100	100	100	100	116	0	Baranof Is
3835	2	100	100	100	100	100	100	100	86	100	100	301	0	Admiralty

WAA [3]	%t Other Ownership[2]	High Value Winter Deer Range not Available for Timber Harvest[1] Alternatives										Avg. Deer Harvest	ADF&G Highest Value Community Use Areas (VCUs)within WAA [4]	Vicinity
		1	2	3	4	5	6	7	9	10	11			
3836	0	100	100	100	100	100	100	78	98	100	100	329	0	Admiralty
3837	0	100	100	100	100	100	100	100	100	100	100	71	0	Admiralty
3938	0	100	100	100	100	100	100	100	100	100	100	249	0	Admiralty
3939	0	100	100	100	100	100	100	100	100	100	100	283	0	Admiralty
3940	0	100	100	100	100	100	100	100	100	100	100	227	0	Admiralty
4041	0	100	100	100	100	100	100	100	100	100	100	75	0	Admiralty
4042	11	100	100	100	100	100	100	100	100	100	100	98	0	Admiralty
4043	0	100	100	100	100	100	100	100	100	100	100	74	0	Admiralty
4044	23	100	100	100	100	100	100	100	100	100	100	209	0	Admiralty
4054	0	100	100	100	100	100	100	100	100	100	100	49	0	Admiralty
4055	0	100	100	100	100	100	100	100	100	100	100	96	0	Admiralty
4145	0	100	100	100	100	100	100	100	100	100	100	150	0	Admiralty
4146	0	100	100	100	100	100	100	100	100	100	100	143	0	Admiralty
4147	1	100	100	100	100	100	100	100	100	100	100	183	0	Admiralty
4148	0	100	100	100	100	100	100	100	100	100	100	153	0	Admiralty
4149	0	100	100	100	100	100	100	100	100	100	100	137	0	Admiralty
4150	3	100	100	100	100	100	100	100	100	100	100	214	0	Admiralty
4222	0	100	71	79	71	71	71	68	70	79	92	173	1960	Chichagof
4252	44	100	53	76	53	53	53	33	33	76	74	213	0	Chichagof
4253	0	100	51	80	60	60	60	24	51	80	80	132	2010, 2020	Chichagof
4256	0	100	100	100	100	100	100	100	100	100	100	76	0	Pleasant Is
5012	2	100	55	67	60	60	60	31	31	67	70	15	3980, 3990, 4000, 4020,	Kuiu Is
5013	0	100	75	80	78	78	78	26	67	80	83	5	4200,	Kuiu Is
5014	0	100	50	60	52	52	52	37	37	60	63	0	4160	Kuiu Is
5015	0	100	100	100	100	100	100	100	100	100	100	0	0	Coronation
5016	0	100	100	100	100	100	100	98	100	100	100	0	0	Kuiu Is
5017	0	100	76	85	82	82	82	66	88	85	100	0	0	Kuiu Is
5018	0	100	71	75	71	71	71	23	71	75	77	2	0	Kuiu Is
5130	0	100	62	67	65	67	67	43	63	67	74	14	4290	Kupreanof
5131	0	100	73	76	75	76	76	36	74	76	79	21	4250	Kupreanof
5132	40	100	45	52	49	49	49	34	33	52	59	40	4250	Kupreanof
5133	0	100	62	66	63	65	65	46	60	66	69	19	4350, 4360,	Kupreanof
5134	0	100	77	81	80	80	80	68	68	81	89	46	4320, 4330, 4340,	Kupreanof
5135	0	100	51	68	51	62	62	47	47	68	66	3	4240	Kupreanof
5136	0	100	66	72	68	68	68	38	62	72	74	6	0	Kupreanof
5137	3	100	97	98	97	97	97	97	100	98	98	0	0	Kupreanof
5138	11	100	60	65	61	62	62	29	53	65	67	58	0	Kupreanof
Total		**100**	**76**	**85**	**79**	**80**	**80**	**60**	**72**	**85**	**86**	**14,823**		

[1] High value winter range is defined as the top 25 percent ranked habitat (acres) on National Forest lands as identified by the deer model.

[2] Includes only National Forest Lands. Does not include State, City, or Private lands which are expected to experience additional habitat decline due to development over the next 100 years.

[3] Some WAAs with naturally very low deer densities have been omitted (e.g. 4302-4607).

[4] As identified in ADF&G August 26, 1996 letter. These VCU's tend to be associated with planned timber sales and may not necessarily represent all "high use" deer hunting areas where timber sales are not planned (e.g. Angoon and Juneau areas).

[5] This analysis assumes maximum timber harvest levels and does not fully account for MIRF.

Table 3-112 - Rough Estimates of Deer Habitat Capability Densities for lands at 1995 and 2095 by Alternative and WAA. **(Densities are shown for combined federal and non-federal lands <1,500' elevation, representing deer winter range. Densities are based on deer habitat capability for federal lands and assume no deer production from non-federal lands.)**

WAA [1, 3]	Vicinity	Density Deer/sq. mile [2] Federal and Private < 1,500 ft. Elevation Alternatives at 2095											Total Area < 1,500' (acres)	1995 Deer Habitat Capability		Total Private Land (acres)	Deer Harvest - % of 1995 Capability
		1995	1	2	3	4	5	6	7	9	10	11		Federal	State-Private [4]		
101	Gravina Is.	13	13	13	13	13	13	13	10	13	13	12	57,143	1,145	179	22,890	11
303	Duke Is.	19	19	19	19	19	19	19	17	19	19	19	46,724	1,394	0	0	0
404	Revilla Is	22	22	22	22	22	22	22	22	22	22	22	128,289	4,357	0	0	0
405	Revilla Is	24	23	19	20	21	21	19	18	19	20	21	49,596	1,850	1	180	1
406	Revilla Is	20	19	15	16	16	16	15	14	14	16	17	89,238	2,737	27	3,417	3
407	Revilla Is	13	13	9	10	11	11	9	9	10	10	10	54,486	1,107	196	25,123	6
408	Revilla Is	7	7	7	7	7	7	7	7	7	7	7	25,682	274	143	18,288	13
509	Revilla Is	17	17	15	16	16	16	15	13	15	16	16	57,641	1,520	59	7,540	4
510	Revilla Is	17	18	13	14	15	15	13	10	12	14	15	94,531	2,553	3	340	2
511	Revilla Is	15	15	15	15	15	15	15	15	15	15	15	22,726	522	0	0	0
612	Cleveland	20	20	15	16	17	17	14	14	13	16	17	63,704	2,017	1	180	3
613	Cleveland	24	24	20	21	22	22	20	17	20	21	24	39,117	1,453	6	740	6
614	Cleveland	15	15	11	11	13	13	11	10	11	11	15	17,083	409	56	7,193	3
715	Cleveland	15	15	15	15	15	15	15	9	15	15	15	55,739	1,332	0	0	0
716	Cleveland	3	3	3	3	3	3	3	3	3	3	3	101,082	500	3	440	0
717	Misty Fiords	8	8	8	8	8	8	8	8	8	8	8	59,617	741	0	80	0
719	Misty Fiords	4	4	4	4	4	4	4	4	4	4	4	78,158	439	0	0	0
821	Misty Fiords	15	15	15	15	15	15	15	15	15	15	15	72,716	1,701	0	0	0
822	Misty Fiords	10	10	10	10	10	10	10	10	10	10	10	217,386	3,526	4	480	0
823	Misty Fiords	11	11	11	11	11	11	11	11	11	11	11	154,368	2,733	0	20	0
901	Suemez Is	32	32	26	27	28	28	25	22	21	27	28	35,756	1,803	0	0	2
902	Outer Islands	29	29	29	29	29	29	29	29	28	29	29	104,397	4,803	12	1,578	0
1003	Heceta Is.	35	28	20	25	25	25	22	18	17	25	24	43,209	2,361	0	80	6
1105	Dall Is	20	20	19	20	20	20	20	13	12	20	20	150,398	4,720	467	59,828	0
1106	Long Is	7	7	7	7	7	7	7	5	5	7	7	30,940	342	184	23,614	18
1107	POW	17	17	15	16	16	16	15	13	12	16	15	185,546	5,063	531	67,949	0
1108	POW	25	25	25	25	25	25	25	25	25	25	25	80,445	3,127	0	0	0
1209	POW	25	25	22	24	24	23	23	17	17	24	24	79,152	3,045	6	720	0
1210	POW	20	20	15	17	17	17	15	13	14	16	17	77,452	2,475	28	3,526	0
1211	POW	18	18	13	15	15	15	13	12	12	15	15	54,007	1,539	164	20,999	12
1212	POW	19	19	16	17	17	17	16	14	14	17	17	32,628	947	1	160	3
1213	POW	21	21	18	19	20	20	18	15	19	18	20	24,780	829	37	4,743	2
1214	POW	13	13	8	10	11	11	10	8	8	11	11	75,073	1,530	178	22,843	6
1315	POW	13	13	10	10	11	11	10	9	10	10	11	90,031	1,833	294	37,681	10
1316	POW	21	21	21	21	21	21	21	21	21	21	21	30,250	971	9	1,199	7
1317	POW	14	15	11	12	13	13	12	10	10	13	13	51,893	1,154	73	9,371	7
1318	POW	8	7	5	6	6	6	5	5	5	5	6	102,402	1,212	535	68,504	27
1319	POW	20	19	14	15	16	17	15	12	12	15	17	85,210	2,605	10	1,220	12
1323	POW	23	22	19	20	21	21	20	19	19	20	21	40,800	1,453	17	2,167	10
1332	POW	17	16	13	14	15	15	14	12	12	14	15	76,058	1,993	153	19,559	3
1420	POW	14	13	10	11	11	11	10	9	9	11	12	37,372	826	33	4,279	14
1421	POW	19	18	14	15	16	17	16	11	13	15	16	85,227	2,591	18	2,279	9
1422	POW	19	16	12	14	14	15	14	11	12	13	14	117,286	3,505	38	4,810	10
1524	Warren	57	57	57	57	57	57	57	57	57	57	57	9,983	887	0	0	0
1525	Kosciusko Is.	25	23	15	20	20	22	21	14	14	20	20	47,726	1,877	56	7,163	2
1526	POW	26	25	24	24	24	25	24	23	23	24	25	58,292	2,332	3	381	2
1527	POW	26	23	18	20	20	20	19	16	15	20	20	36,834	1,476	42	5,315	3
1528	POW	11	12	10	11	11	11	11	8	10	11	11	23,124	409	0	40	12
1529	POW	23	21	15	17	18	18	17	14	16	18	18	60,288	2,157	16	2,020	8
1530	POW	15	14	11	13	13	13	13	11	11	13	13	64,186	1,503	39	4,931	11
1531	POW	40	32	23	25	28	28	26	21	19	26	27	36,709	2,291	19	2,460	2
1601	Farragute Bay	21	21	17	17	18	19	16	13	12	18	18	39,962	1,341	0	0	0
1602	Farragute Bay	6	6	6	6	6	6	6	3	6	6	6	42,233	368	10	1308	2
1603	Thomas Bay	16	16	15	16	16	16	15	12	13	16	15	28,501	715	0	0,	0
1605	Thomas Bay	12	12	9	9	10	10	9	8	8	10	10	45,882	860	27	3,517	5
1706	LeConte Bay	23	23	23	23	23	23	23	23	23	23	23	15,032	550	0	0	3
1707	Stikine River	14	14	14	14	14	14	14	14	14	14	14	38,560	830	9	1,122	0

Glossary

WAA (1, 3)	Vicinity	Density Deer/sq. mile (2) Federal and Private < 1,500 ft. Elevation Alternatives at 2095											Total Area < 1,500' (acres)	1995 Deer Habitat Capability		Total Private Land (acres)	Deer Harvest - % of 1995 Capability
		1995	1	2	3	4	5	6	7	9	10	11		Federal	State-Private (4)		
1708	Stikine River	6	6	6	6	6	6	6	6	6	6	6	90,151	902	0	40	0
1810	Back Channel	15	15	11	12	13	13	11	7	11	12	12	30,507	699	32	4,141	0
1811	Back Channel	18	18	18	18	18	18	18	11	16	18	18	33,301	961	0	0	0
1812	Bradfield	15	15	14	14	14	14	14	10	13	14	14	41,684	979	1	140	0
1813	Bradfield	5	5	5	5	5	5	5	5	5	5	5	45,328	357	0	0	0
1814	Bradfield	15	15	13	14	14	14	13	12	13	14	14	28,999	687	0	0	0
1815	Cleveland	14	14	13	13	14	14	13	14	14	14	14	23,748	511	0	0	0
1816	Cleveland	15	14	11	12	13	13	12	11	10	12	12	28,527	650	0	0	0
1817	Cleveland	19	19	12	17	15	17	16	12	11	17	17	54,828	1611	2	299	1
1901	Etolin Is	23	23	17	19	20	20	17	13	17	20	19	94,307	3,427	4	540	0
1902	Cleveland	25	24	24	24	24	24	24	24	24	24	24	7,575	295	0	0	0
1903	Wrangell	18	17	14	15	16	16	14	11	13	15	15	102,104	2,824	123	15,785	1
1904	Woronkoski	25	25	23	24	24	24	23	11	21	25	24	17,786	696	0	0	9
1905	Zarembo Is.	19	17	14	15	16	15	14	11	14	15	15	102,643	2,993	0	0	3
1906	Shruby Is.	39	31	31	31	31	31	31	31	31	31	31	11,356	697	0	0	3
1910	Etolin Is.	25	25	25	25	25	25	25	24	24	25	25	76,748	3,045	0	0	1
2007	Mitkof Is	17	16	12	13	14	14	13	10	12	14	14	114,754	3,035	167	21,363	6
2008	Woewodski	50	50	46	47	47	48	47	36	47	47	47	10,656	837	0	20	0
2202	Lynn Canal	5	5	5	5	5	5	5	5	4	5	5	18,851	145	9	1,121	5
2305	Lynn Canal	5	5	4	5	5	5	4	5	5	5	5	52,187	383	0	80	1
2306	Cross Sound	5	5	3	4	4	4	3	2	3	4	4	28,682	231	26	3,282	2
2408	Lynn Canal	6	6	6	6	6	6	6	6	6	4	6	11,139	108	6	801	0
2409	Berners Bay	14	14	12	12	13	12	12	12	14	9	13	11,333	241	5	661	0
2514	Juneau	11	11	9	10	10	11	10	8	9	10	10	28,584	498	59	7,531	0
2515	Juneau	4	4	4	4	4	4	4	4	4	4	4	55,027	381	133	16,995	0
2517	Juneau	3	3	3	3	3	2	3	3	3	3	3	37,334	147	199	25,415	9
2621	Shelter Is.	14	14	14	14	14	14	14	13	14	14	14	5,355	118	13	1,604	58
2722	Douglas Is	23	23	23	23	23	23	23	16	23	23	23	30,945	1,104	152	19,468	32
2823	Whiting River	1	1	1	1	1	1	1	1	0	0	1	145,041	288	5	658	1
2824	Tracy Arm	0	0	0	0	0	0	0	0	0	0	0	38,542	0	0	0	0
2825	Endicott	0	0	0	0	0	0	0	0	0	0	0	58,990	0	1	140	0
2926	Hobart Bay	5	5	3	4	4	4	3	3	2	3	4	90,143	688	165	21,134	0
2927	Port Houghton	4	4	3	3	4	4	3	2	2	3	3	81,535	566	24	3,047	0
3001	NW Baranof	32	32	29	31	30	30	30	31	29	30	31	60,137	2,997	0	20	23
3002	Sitka	12	12	11	11	11	11	11	11	11	11	11	45,048	843	108	13,841	66
3003	Sitka	29	28	25	28	26	26	25	24	24	28	27	37,826	1,690	42	5,429	20
3104	Kruzof Is	46	42	37	39	39	38	39	38	37	36	40	52,790	3,755	0	20	7
3105	Kruzof Is	28	28	27	28	28	28	27	26	26	28	28	51,574	2,266	0	0	8
3206	Baranof Is	23	23	23	23	23	23	23	23	23	23	23	34,456	1,258	29	3,739	11
3207	Baranof Is	13	13	13	13	13	13	13	13	13	13	13	66,901	1,328	0	0	11
3308	Chichagof Is	34	32	23	26	27	27	23	19	19	24	28	82,299	4,370	0	80	5
3309	Chichagof Is	24	24	22	22	23	23	22	20	20	22	22	31,111	1,150	0	20	13
3310	Chichagof Is	20	20	20	20	20	20	20	20	20	20	20	65,413	2,015	0	0	12
3311	Chichagof Is	26	26	23	24	24	24	23	22	22	22	24	48,795	2,011	0	20	14
3312	Baranof Is	20	20	18	20	20	19	19	18	19	18	20	16,781	523	0	0	25
3313	Baranof Is	25	26	17	20	21	21	17	16	14	17	20	51,588	2,011	2	220	6
3314	Baranof Is	23	24	18	24	20	20	19	19	20	24	24	32,201	1,180	0	0	12
3315	Catherine Is	32	31	25	30	28	28	25	21	25	29	28	34,595	1,729	0	0	8
3416	Chichagof Is	26	26	26	26	26	26	26	26	26	26	26	52,447	2,130	0	20	9
3417	Chichagof Is	18	18	18	18	18	18	18	18	18	18	18	117,057	3,378	6	825	7
3418	Chichagof Is	29	29	29	29	29	29	29	29	27	29	29	48,320	2,213	10	1,280	5
3419	Chichagof Is	13	13	13	13	13	13	13	13	13	13	13	38,869	785	16	2,062	11
3420	Chichagof Is	17	17	17	17	17	17	17	17	17	17	17	30,927	804	0	20	11
3421	Elfin Cove	21	21	21	21	21	21	21	21	20	21	21	33,575	1,122	2	220	7
3523	NE Chichagof	28	27	19	26	24	24	23	17	22	23	28	42,813	1,902	53	6,844	9
3524	NE Chichagof	6	6	3	5	5	5	4	3	3	4	5	33,451	295	195	24,949	66
3525	NE Chichagof	28	26	18	21	22	23	19	16	20	19	23	64,201	2,791	3	440	7
3526	NE Chichagof	30	30	21	26	26	27	25	19	18	24	27	3,4374	1,632	32	4,120	11
3551	NE Chichagof	26	25	18	21	21	22	20	16	15	19	22	51,378	2,092	3	320	10
3627	Chichagof Is	34	32	23	26	26	27	23	22	20	25	28	21,184	1,121	0	0	6
3628	Chichagof Is	34	34	34	34	34	34	34	34	34	34	34	26,126	1,382	0	120	2
3629	Chichagof Is	24	24	17	20	21	20	18	16	18	18	21	65,168	2,454	0	0	6
3630	Chichagof Is	15	15	12	13	13	14	12	12	13	11	13	38,058	868	0	0	4
3731	Baranof Is	23	23	20	23	22	22	21	18	14	23	22	49,642	1,799	15	1,940	8

WAA (1, 3)	Vicinity	Density Deer/sq. mile [2] Federal and Private < 1,500 ft. Elevation 1995	Alternatives at 2095: 1	2	3	4	5	6	7	9	10	11	Total Area < 1,500' (acres)	1995 Deer Habitat Capability: Federal	State-Private [4]	Total Private Land (acres)	Deer Harvest - % of 1995 Capability
3732	Baranof Is	9	9	9	9	9	9	9	9	9	9	9	36,814	507	0	40	6
3733	Baranof Is	14	14	14	14	14	14	14	14	14	14	14	124,703	2,774	0	0	5
3734	Baranof Is	21	21	21	21	21	21	21	21	21	21	21	87,288	2,843	4	516	4
3835	Admiralty	25	25	25	25	25	25	25	25	23	25	25	31,052	1,195	7	900	25
3836	Admiralty	36	36	36	36	36	36	36	34	35	36	36	38,158	2,142	4	501	15
3837	Admiralty	44	44	44	44	44	44	44	44	44	44	44	25,404	1,744	5	580	4
3938	Admiralty	43	43	43	43	43	43	43	43	43	43	43	68,949	4,613	0	20	5
3939	Admiralty	47	47	47	47	47	47	47	47	47	47	47	57,654	4,190	0	20	7
3940	Admiralty	48	48	48	48	48	48	48	48	48	48	48	52,212	3,925	0	40	6
4041	Admiralty	43	43	43	43	43	43	43	43	43	43	43	45,187	3,007	1	180	2
4042	Admiralty	46	46	46	46	46	46	46	46	46	46	46	54,743	3,920	27	3,458	2
4043	Admiralty	29	29	29	29	29	29	29	29	29	29	29	67,432	3,022	0	40	2
4044	Admiralty	26	26	26	26	26	26	26	26	26	26	26	48,048	1,960	174	22,305	11
4054	Admiralty	46	46	46	46	46	46	46	46	46	46	46	44,777	3,220	0	0	2
4055	Admiralty	47	47	47	47	47	47	47	47	47	47	47	52,486	3,825	6	759	3
4145	Admiralty	34	34	34	34	34	34	34	34	34	34	34	39,813	2,095	1	140	7
4146	Admiralty	21	21	21	21	21	21	21	21	21	21	21	34,207	1,144	0	0	12
4147	Admiralty	28	28	28	28	28	28	28	28	28	28	28	31,597	1,391	5	638	13
4148	Admiralty	46	46	46	46	46	46	46	46	46	46	46	32,838	2,367	0	0	6
4149	Admiralty	43	43	43	43	43	43	43	43	43	43	43	28,906	1,944	0	0	7
4150	Admiralty	35	35	35	35	35	35	35	35	35	35	35	22,446	1,210	8	1037	18
4222	Chichagof	30	30	24	25	27	27	24	24	23	25	28	62,485	2,924	1	160	6
4252	Chichagof	11	11	6	8	8	9	6	6	5	8	8	38,592	657	221	28,257	32
4253	Chichagof	25	24	18	20	20	21	18	17	14	19	21	29,858	1,153	0	60	0
4256	Pleasant Is	38	38	38	38	38	38	38	38	38	38	38	18,797	1,104	0	60	7
5012	Kuiu Is	27	25	16	18	20	20	17	13	12	18	18	129,532	5,382	5	640	0
5013	Kuiu Is	29	29	23	24	26	26	24	16	22	24	25	57,178	2,566	0	40	0
5014	Kuiu Is	36	36	22	24	29	29	22	20	18	25	26	39,094	2,183	0	40	0
5015	Coronation	51	51	51	51	51	51	51	51	51	51	51	18,586	1,473	0	0	0
5016	Kuiu Is	36	36	36	36	36	36	36	36	36	36	36	64,914	3,671	1	140	0
5017	Kuiu Is	31	30	26	27	28	28	27	25	28	27	30	115,357	5,498	0	20	0
5018	Kuiu Is	9	9	6	6	7	7	6	6	5	7	7	47,379	702	0	40	0
5130	Kupreanof	26	26	22	22	24	24	22	19	22	22	23	90,995	3,734	4	540	0
5131	Kupreanof	19	19	16	17	17	18	17	14	16	17	17	69,136	2,070	0	40	1
5132	Kupreanof	7	7	5	6	6	6	6	5	5	6	6	80,800	943	383	48,968	4
5133	Kupreanof	18	18	14	15	16	16	14	13	14	14	15	101,034	2,896	0	0	0
5134	Kupreanof	20	20	17	18	19	19	18	18	17	18	19	100,388	3,158	0	0	1
5135	Kupreanof	12	12	9	10	10	11	10	9	9	10	10	52,431	984	0	0	0
5136	Kupreanof	20	20	14	15	16	16	14	12	13	15	15	42,734	1,349	0	40	0
5137	Kupreanof	19	19	19	19	19	19	19	19	19	19	19	40,450	1,227	11	1460	0
5138	Kupreanof	11	11	6	7	8	8	6	6	6	7	7	57,987	1,014	71	9078	6
													1,018,232	**284,365**	**6,614**	**846,580**	

[1] FORPLAN solutions are specific to VCU's that were split by ADF&G WAA boundaries were assigned to the WAA that contained the majority of the acreage. Examples of split VCU's include Rocky Pass, Wrangell Narrows, and Tuxecan Island. Numbers in this table should be viewed as approximations and are intended for alternative comparison only.

[2] Includes only National Forest Lands. Habitat capability from State and private lands are not included.

[3] Some WAAs with naturally very low deer densities have been omitted (e.g. 4302-4607).

[4] As identified in ADF&G August 26, 1996 letter. These VCU's tend to be associated with planned timber sales and may not necessarily represent all "high use" deer hunting areas where timber sales are not planned (e.g. Angoon and Juneau areas).

[5] This analysis assumes: 1) maximum timber harvest levels over the 100 year period, 2) at 2095 25 percent of the 2nd growth would be <25 years old, and 3) at 2095 60 percent of the 1995 available old-growth would be harvested in alternatives with a 200 year rotation.

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Wildlife Species Viability

Evaluating Viability

The National Forest Management Act (NFMA) requires that the Forest Service provide for the diversity of plants and animals, based upon the suitability and capability of each National Forest, as a part of meeting overall multiple-use objectives (16 USC 1604(g)(3)(B)). The NFMA implementing regulations define diversity as "the distribution and abundance of different plant and animal communities and species within the area covered by a [forest plan]" (219.3). In addition to providing diversity direction (at 219.26), the NFMA regulations include the following provisions for managing habitat to maintain viable populations of wildlife species:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area. (36 CFR 219.3)

Quantitative criteria for viability (or diversity) are not specified by either the Act of the regulations. The Forest Ecosystem Management Assessment Team defined viability as “the likelihood of a species persisting well distributed throughout its range [for] a century or longer” (FEMAT, 1993, p II-99). For the Tongass, the evaluation of viability includes consideration of its unique island archipelago environment as well as current scientific thinking on population viability and conservation biology, as found in the general literature and the recent Tongass-specific assessments. Further discussion follows for two key terms: "well distributed" and "continued existence."

Well Distributed. The phrase "well distributed in the planning area" is used in the regulations. The planning area, for the Tongass Forest Plan and for the purposes of viability analysis, includes all National Forest land within the boundaries of the Tongass. The NFMA Regulations provide that habitat must be “well distributed” so that "individuals can interact with others in the planning area." Interaction is the key operative word, because different individual species often exhibit widely different movement and dispersal capabilities. The continued existence of a population within which interaction between individuals becomes difficult (significantly less frequent) or impossible may no longer be well distributed. The fragmentation of habitats, which isolates and creates small insular populations, contributes to decreased population distribution and increased likelihood of local extirpation (Wilcove et al. 1986). Because of the island archipelago, relatively isolated populations may already exist with naturally higher risks to local extirpation.

In the island archipelago and naturally fragmented landscapes of Southeast Alaska, natural interaction is often problematic, especially for species that cannot move between islands. The insular distribution patterns of over 70 terrestrial mammal species among individual islands illustrates these dispersal limitations. MacDonald and Cook (1994) reported that 27 mammal taxa are endemic to Southeast Alaska. Southeast Alaska most likely supports ecotypes and locally adapted species on individual islands, especially the less mobile species such as small mammals, amphibians, and many invertebrates, but such relationships have not been thoroughly investigated or described. Maintaining populations across the full range of environmental conditions over which they occur retains the genetic variability that is necessary for evolution and adaptation to environmental change (Lande and Barrowclough 1987). At a broad geographic scale, environmental variability (for the Tongass) is classified into Biogeographic provinces that exhibit differences in climate, geology, and species distributions (see Biodiversity section). For wide-ranging species (i.e., northern goshawk, brown bear), well distributed populations are appropriately assessed among, and within, these provinces across the Forest. For many other species, the appropriate scale will be finer, down to small individual islands within a province (i.e., Coronation Island vole).

Continued Existence. Time scale is a critical component for evaluating the potential effects of Forest Plan alternatives on wildlife viability. The short-term, 10-15 year planning period is an inadequate scale for conducting a viability analysis, which must consider long-term, cumulative changes and consequences. There are many reasons for this. The processes of evolution, speciation, and natural extinctions occur over thousands to millions of years; even when accelerated by human activity, extinction or endangerment can require many decades if not centuries (Wilson 1988). One decade is merely a blink in evolutionary time, over which little detectable effect may occur. A species population is not likely to noticeably react in such a short time, but actions taken during a planning period, in combination with past and projected future actions, may be critical in affecting a forest's ability to maintain long-term population viability. And any changes occurring that could measurably affect viability within a 10-15 year period are not likely to be detected with currently available monitoring and evaluation techniques.

Therefore, the viability analysis, including the species panel assessments, used a 100-year time period, or planning horizon, which is probably the minimum period over which viability can be evaluated: the scientific literature suggests 100-1,000 years (Shaffer 1981, Soule and Wilcox 1980, Shaffer 1987, FEMAT 1993). Furthermore, one hundred years is the average rotation age under even-aged management, and thus the time period over which old-growth stand characteristics will be significantly affected. Forests managed under a 100-year rotation will continue to cycle through the stem exclusion phases of stand development, the least favorable phase for old-growth associated species and a permanent change in forest structure (see Biodiversity section for a fuller discussion). Such changes in forest stand structure and wildlife habitat capability require a commensurate period of time over which to assess the cumulative effects to viability.

As discussed in the Biodiversity section earlier, the conservation of biodiversity requires both a “fine” and “coarse” filter approach. This same approach is more explicitly used to address wildlife viability in this section. Individual species, or species groups, representing the “fine” filter approach are discussed later under Species Assessments. All taxa not individually addressed under Species Assessments, and specifically those taxa closely associated with the old-growth forest ecosystem in southeast Alaska, are addressed through a “coarse” filter or ecosystem approach.

Old-growth Forest Conservation Strategy - The “Coarse” Filter Analysis

When considering the viability of old-growth associated species and the possible effects of alternatives and likelihood of maintaining viable well-distributed populations, the assumption is made that if a functional interconnected old-growth ecosystem is maintained then it component parts (composition and structure) and processes (function) are maintained. The likelihoods of these outcomes were discussed in detail under Biodiversity and the Old-growth panel. The framework of the old growth forest strategy relative to wildlife viability is now further described as two basic components.

The first is the reserve system that is represented by all forest-wide allocation of Land Use Designations (LUDs) that effectively maintain the integrity of the old-growth forest ecosystem. These “natural setting” LUDs are represented by Wilderness, Monument, Research Natural Areas, Remote Recreation, Semi-remote Recreation, Old growth Habitat, Wild River, etc.

The second component is the region of the forest where “development” is permitted that will alter the old-growth forest ecosystem. These are often referred to as “matrix” lands that occur among protected reserves. Timber Production, Modified Landscape, and Scenic Viewshed are the three development LUDs where timber harvest is permitted. However, within these development lands there are many factors that restrict timber harvest and maintain components of the old-growth forest ecosystem. First, the tentatively suitable determination process (see Timber section) precludes forest stands that cannot be harvested without impairment to long-term site productivity. Second, Forest-wide Standards and Guidelines that are designed to protect other forest resources that occur in development LUDs prevent timber harvest, many in sensitive locations (Riparian, Beach and Estuary Fringe, Wetlands, Heritage Resources, Soils, Scenery, etc.). Third, timber operability considerations also effectively preclude timber harvest, such as isolated forest stands that are too far from roads or Log Transfer Facilities to economically obtain.

Table 3-113 shows the proportion of productive old growth that is contained within reserves and matrix in each alternative by WAA, an intermediate level of spatial distribution. There are approximately 5,063,000 acres of productive old growth remaining on the Tongass. Alternative 11 provides a combination of land allocations that protects 70 percent of this old growth in natural setting LUD’s, second only to Alternative 1 that schedules no timber harvest. Alternatives 3 and 10 rank next with 65 percent of the old growth in reserves, Alternative 5 and 6 have 59 percent of the old-growth in reserves, Alternatives 2 and 4 have 56 percent and Alternatives allocate the least amount of old-growth in non-development LUDs, respectively.

Within the matrix lands where timber harvest is permitted, Alternatives 4 and 5 maintain 67 percent of the original 1954 productive old-growth due primarily to the 200 year rotation feature of these alternatives; they have generally intermediate riparian habitat protection and the 1,000 foot beach and estuary for landscape connectivity. Alternatives 11 and 3 will retain 57 percent of the 1954 productive old growth in the matrix in 2095. These two alternatives have the strongest riparian protection and have the 1,000 foot beach and estuary fringe protection that contribute to protection and connectivity of old growth stands in the matrix. The remaining alternatives will retain from 55 percent (Alternative 6) to 51 percent (Alternatives 7 and 9) of the old growth forest in the matrix. These alternatives generally have much less riparian and beach and estuary protection and thus less overall matrix old growth protection.

The old growth panel results discussed under Biodiversity were arrayed in the following order in terms likelihood of maintaining functional interconnected old growth ecosystems; Alternatives 1, 5, 4, 6, 3, 2, 9, and 7 (Table 3-9). Based upon alternative design features and the very high correlation of acres of productive old growth planned for harvest in an alternative that the composite panel scores (correlation coefficient 0.94), Alternative 11 is estimated to rank third overall (between 5 and 4) and Alternative 10 is estimated to rank sixth (between 3 and 2).

Species Assessments - The “Fine” Filter Analysis

The viability analysis relies on the six wildlife species panel assessments mentioned previously (wolf, marten, northern goshawk, brown bear, marbled murrelet, and "other mammals"). Each of these panel assessments were conducted by scientists with expert professional knowledge and experience of the species being evaluated. The general process used for these panel assessments is described in the Introduction to this chapter. The five outcomes used for each of the viability panels are described below. Table 3-114 summarizes the definitions.

Outcome I. Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain well distributed, breeding populations across the Tongass National Forest. The concept of well distributed must be based on knowledge of the species distributional range, and life history.

Outcome II. Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain breeding populations distributed across the Tongass National Forest. However, some local populations are more ephemeral because of reduced population levels and increased susceptibility to environmental extremes and stochastic (random) events associated with reduced habitat abundance and distribution. Vacated habitats may become recolonized in the future.

Outcome III. Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain some breeding populations, but with significant gaps in the historic distribution on the forest. These gaps are likely permanent and will result in some limitation of interactions among local populations. The significance of gaps must be judged relative to the species distributional range, and life history.

Outcome IV. Habitat only allows continued species existence in refugia, with strong limitations on interactions among local populations. The significance of extirpations across islands or regional landscapes must be evaluated relative to the species distribution, range, and life history.

Outcome V. Habitat conditions result in species extirpation from federal land.

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Table 3-113 Description of Productive Old-growth (POG) 1954 to 2095 in Reserves and Matrix by WAA and Alternative

WAA	Vicinity	1954 POG	% POG at 1995	Percent of All POG Remaining in 2095 (3) Base Year = 1954, Alternatives: 1	2	3	4	5	6	7	9	10	11	Private Lands (acres) 2)	Total Area (acres) (5)	Percent of POG in Reserves 1), Alternatives: 1	2	3	4	5	6	7	9	10	11	Percent of 1954 Matrix POG Remaining in 2095 (4), Alternatives: 1	2	3	4	5	6	7	9	10	11
101	Gravina Is.	18731	97	97	97	97	97	97	97	45	97	97	83	22890	38952	100	100	100	100	100	100	1	100	100	45	-	-	-	-	-	-	45	-	-	71
303	Duke Is.	7578	97	97	97	97	97	97	97	55	97	97	97	0	46825	100	100	100	100	100	100	16	100	100	100	-	-	-	-	-	-	47	-	-	-
404	Revilla Is	75999	100	100	100	100	100	100	100	100	100	100	100	0	180282	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
405	Revilla Is	26917	88	88	83	67	75	75	61	56	58	66	74	180	53095	100	32	42	32	32	32	13	32	42	41	-	48	50	66	68	48	51	42	49	60
406	Revilla Is	61213	87	87	58	65	75	74	58	52	55	64	70	3417	127166	100	10	31	10	10	10	5	10	31	38	-	54	55	73	72	55	50	52	53	55
407	Revilla Is	18291	95	95	81	66	78	76	60	61	64	67	69	25123	41895	100	20	33	20	20	20	29	15	33	31	-	62	55	74	70	51	46	59	53	67
408	Revilla Is	8715	99	99	98	98	98	98	98	99	99	98	98	18288	16667	100	93	93	93	93	93	100	93	93	93	-	77	78	77	80	78	-	100	78	80
509	Revilla Is	39682	98	98	82	88	92	89	82	69	81	87	91	7540	68817	100	62	79	62	62	62	49	58	79	79	-	57	50	82	75	55	41	80	49	66
510	Revilla Is	90841	84	84	60	64	70	71	60	47	55	62	71	340	154271	100	28	34	26	26	26	1	18	34	44	-	49	50	62	64	49	47	48	47	55
511	Revilla Is	18626	100	100	100	100	100	100	100	100	100	100	100	0	53258	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
612	Cleveland	33384	99	99	81	66	87	89	57	53	47	64	76	180	70653	100	4	23	4	4	4	1	1	23	32	-	59	56	66	89	58	53	47	53	66
613	Cleveland	23836	98	98	72	79	88	88	76	52	70	77	98	740	45492	100	3	37	3	12	12	0	0	37	100	-	71	67	66	87	72	52	70	65	-
614	Cleveland	7852	100	100	81	62	81	79	62	42	54	56	100	7193	13247	100	8	8	8	8	8	1	1	8	100	-	57	59	79	78	59	41	54	52	-
715	Cleveland	41958	100	100	100	100	100	100	100	59	100	100	100	0	101544	100	100	100	100	100	100	0	100	100	100	-	-	-	-	-	-	59	-	-	-
716	Cleveland	77895	100	100	100	100	100	100	100	100	100	100	100	440	335103	100	100	100	100	100	100	95	100	100	100	-	-	-	-	-	-	100	-	-	-
717	Misty Fiords	31000	100	100	100	100	100	100	100	100	100	100	100	80	145861	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
718	Misty Fiords	24256	100	100	100	100	100	100	100	100	100	100	100	0	287089	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
719	Misty Fiords	44637	100	100	100	100	100	100	100	100	100	100	100	0	200236	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
820	Misty Fiords	28478	100	100	100	100	100	100	100	100	100	100	100	180	115657	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
821	Misty Fiords	47328	100	100	100	100	100	100	100	100	100	100	100	0	110949	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
822	Misty Fiords	128574	100	100	100	100	100	100	100	100	100	100	100	480	390568	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
823	Misty Fiords	77569	100	100	100	100	100	100	100	100	100	100	100	20	189136	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
824	Misty Fiords	30996	100	100	100	100	100	100	100	100	100	100	100	0	99894	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
825	Misty Fiords	25791	100	100	100	100	100	100	100	100	100	100	100	140	248758	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
826	Hyder	11082	100	100	94	93	100	100	94	100	94	94	100	2340	61375	100	8	6	6	6	6	100	3	8	56	-	94	93	100	100	94	-	94	94	100
901	Sumez Is	21641	97	97	64	70	74	75	82	45	42	70	74	0	37184	100	25	50	25	25	25	1	1	50	38	-	52	42	85	88	49	44	42	42	59
902	Outer Islands	56262	100	100	100	100	100	100	100	94	92	100	100	1578	106385	100	100	100	100	100	100	86	86	100	95	-	-	-	-	-	-	59	44	-	100
1003	Heceta Is.	33771	83	83	32	51	44	44	40	27	25	49	46	80	44494	100	2	55	2	6	8	2	2	55	44	-	31	30	44	43	38	28	24	27	27
1105	Dall Is	61881	99	99	91	96	96	97	95	55	47	95	97	59828	104251	100	80	87	80	87	87	1	8	87	89	-	57	70	64	83	64	54	44	67	76
1106	Long Is	3633	100	100	100	100	100	100	100	45	45	100	100	23614	8788	100	96	96	96	96	96	4	4	96	100	-	100	100	100	100	100	43	42	100	-
1107	POW	64434	98	98	72	87	64	87	79	52	52	85	80	67949	145775	100	53	71	53	60	80	24	23	71	57	-	42	57	66	68	49	38	38	51	54
1108	POW	31573	100	100	100	100	100	100	100	100	100	100	100	0	85446	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1209	POW	31287	100	100	82	94	89	89	85	45	43	92	95	720	82253	100	69	83	69	69	69	4	9	83	88	-	44	83	64	88	51	43	37	52	62
1210	POW	39270	100	100	60	73	71	72	63	47	56	69	77	3526	85884	100	27	44	27	27	27	2	27	44	47	-	45	52	61	81	49	48	40	44	57
1211	POW	22244	93	93	55	70	87	67	57	53	51	65	71	20999	39877	100	2	38	2	2	2	7	2	36	34	-	55	56	67	87	56	50	51	49	58
1212	POW	10635	99	99	89	79	81	83	71	47	47	74	77	160	37424	100	38	36	36	36	36	3	3	36	48	-	51	67	71	74	55	45	45	60	56
1213	POW	13660	99	99	74	79	88	89	76	60	78	75	91	4743	30003	100	1	1	1	6	6	1	1	1	35	-	74	79	87	89	73	59	78	75	88
1214	POW	36815	85	85	40	59	48	58	53	38	38	54	59	22843	74713	100	11	32	11	32	32	11	1	32	36	-	34	44	41	40	37	31	37	37	43
1315	POW	37739	66	66	41	45	51	51	44	38	42	44	51	37681	59798	86	4	16	4	16	18	3	2	16	38	42	40	39	51	48	39	35	41	38	37
1316	POW	21134	100	100	100	100	100	100	100	100	100	100	100	1199	39688	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1317	POW	32452	67	67	44	51	51	53	49	39	40	49	56	9371	81066	100	18	40	18	40	40	18	0	40	48	-	40	39	49	41	34	34	40	35	42
1318	POW	22236	92	92	41	58	60	63	46	39	37	51	85	68504	58743	100	0	0	0	0	0	1	0	0	19	-	41	57	60	83	46	38	37	51	59
1319	POW	80591	79	79	48	57	62	66	57	40	41	58	67	1220	103242	100	15	33	15	33	33	0	0	33	58	-	41	42	57	54	43	40	41	43	41
1323	POW	14108	98	98	70	77	82	78	72	65	63	75	87	2167	38713	100	28	39	28	39	39	8	6	39	63	-	60	64	78	88	56	63	61	61	67
1332	POW	27425	83	83	38	55	49	59	50	35	32	51	63	19559	65521	100	2	24	2	24	24	2	1	24	41	-	37	45	49	50	39	34	32	40	46
1420	POW	27566	81	81	41	47	48	48	45	39	39	45	51	4279	42738	84	1	28	1	28	28	1	1	28	20	55	41	37	48	39	35	39	39	35	45
1421	POW	89932	78	78	52	61	63	66	66	42	49	61	67	2279	90410	100	18	48	18	59	59	0	0	46	55	-	45	41	57	47	42	42	49	40	48

WAA	Vicinity	1954 POG	% POG at 1995	Percent of All POG Remaining in 2095 (3) Base Year = 1954 Alternatives										Private Lands (acres) 2)	Total Area (acres) (5)	Percent of POG in Reserves 1) Alternatives										Percent of 1954 Matrix POG Remaining in 2095 (4) Alternatives									
				1	2	3	4	5	6	7	9	10	11			1	2	3	4	5	6	7	9	10	11	1	2	3	4	5	6	7	9	10	11
1422	POW	82208	68	66	42	53	50	53	52	37	40	49	54	4810	121272	68	24	38	24	38	38	1	23	38	44	67	31	38	41	39	37	37	29	34	36
1524	Warren	7253	100	100	100	100	100	100	100	100	100	100	100	0	11298	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1525	Kosciusko Is.	33893	54	54	23	41	35	43	43	21	20	38	40	7183	41106	100	1	35	1	37	37	1	1	35	38	-	23	30	35	32	32	21	19	26	28
1526	POW	39545	94	94	87	90	90	91	89	86	85	89	91	381	67166	100	75	80	75	80	80	75	75	80	84	-	63	76	77	81	69	59	57	69	75
1527	POW	25782	75	75	53	63	81	84	60	49	45	60	64	5315	39344	100	22	35	22	47	47	11	11	35	39	-	45	52	55	48	41	45	40	48	51
1528	POW	13438	83	83	70	78	75	79	77	63	71	76	77	40	24548	100	41	68	41	68	68	41	40	68	69	-	57	50	65	59	53	45	59	52	64
1529	POW	50053	73	73	50	60	59	81	58	45	50	57	63	2020	69148	100	12	29	12	34	34	10	10	29	35	-	46	51	55	51	46	41	46	48	53
1530	POW	36043	63	63	48	63	53	55	53	43	43	51	54	4931	59857	100	2	31	2	31	31	1	1	31	42	-	45	43	52	48	43	42	43	40	39
1531	POW	27938	62	62	38	44	47	47	44	31	27	40	48	2460	34289	100	18	16	18	16	18	6	8	18	39	-	31	39	41	41	36	28	25	34	34
1601	Farragut Bay	25265	100	100	69	73	86	81	69	50	47	70	77	0	43484	100	0	9	0	0	0	0	0	9	20	-	69	71	86	81	69	50	47	67	71
1602	Farragut Bay	33795	99	99	99	99	99	99	99	81	99	99	99	1308	136094	100	100	100	100	100	100	0	100	100	100	-	-	-	-	-	-	81	-	-	-
1603	Thomas Bay	16661	97	97	89	98	92	94	89	70	79	95	91	0	78659	100	54	87	54	54	54	0	32	87	57	-	80	82	87	91	80	71	70	79	83
1604	Thomas Bay	280	100	100	100	100	100	100	100	100	100	100	100	0	244633	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1605	Thomas Bay	28051	82	82	55	58	58	58	55	49	46	55	62	3517	149092	100	8	11	8	8	8	8	7	11	30	-	52	54	58	58	52	46	43	52	50
1706	Leconte Bay	12289	100	100	100	100	100	100	100	100	100	100	100	0	99140	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1707	Stikine River	22856	100	100	100	100	100	100	100	100	100	100	100	1122	79583	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1708	Stikine River	37876	100	100	100	100	100	100	100	100	100	100	100	40	240711	100	97	97	97	97	97	97	100	97	97	-	100	100	100	100	100	93	-	100	100
1809	Stikine River	11476	100	100	100	100	100	100	100	100	100	100	100	0	128534	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
1810	Back Channel	23546	100	100	68	72	82	75	89	49	69	69	71	4141	55372	100	8	16	8	8	8	0	0	16	21	-	66	87	81	72	68	49	69	63	63
1811	Back Channel	25580	99	99	96	96	96	96	96	64	84	96	96	0	92705	100	67	81	87	67	67	7	27	81	73	-	89	84	90	90	90	82	79	62	67
1812	Bradfield	29944	100	100	91	93	94	94	92	73	85	93	93	140	99444	100	75	78	75	75	75	0	51	78	75	-	67	70	75	77	68	73	71	70	73
1813	Bradfield	37102	87	87	76	77	78	78	76	74	76	76	78	0	237490	100	27	28	27	27	27	1	27	28	51	-	89	70	72	71	70	74	69	69	61
1814	Bradfield	28238	99	99	89	91	96	96	89	83	87	88	93	0	89407	100	58	59	58	58	58	1	58	59	67	-	74	78	92	90	74	83	69	72	80
1815	Cleveland	19247	100	100	98	96	99	99	98	98	100	99	99	0	43795	100	85	86	85	85	85	85	100	86	87	-	90	78	92	92	90	89	-	91	91
1816	Cleveland	16018	92	92	81	87	78	79	64	60	54	65	67	0	36313	100	4	14	4	4	4	1	1	14	25	-	60	82	77	78	82	60	53	59	56
1817	Cleveland	35026	100	100	49	85	79	86	75	47	40	82	83	299	64140	100	4	72	4	58	58	0	0	72	53	-	47	45	76	68	41	47	40	38	64
1901	Etolin Is	84812	93	93	65	72	76	76	68	47	68	70	78	540	132832	100	3	19	3	3	3	2	2	19	38	-	64	87	75	75	85	45	67	64	63
1902	Cleveland	6757	93	93	93	93	93	93	93	93	93	93	93	0	9554	100	5	5	5	5	5	5	5	6	30	-	93	93	93	93	93	93	93	93	92
1903	Wrangell	63243	90	90	65	71	75	74	68	49	81	68	70	15785	119083	100	3	19	3	3	3	0	9	19	32	-	64	66	76	74	85	49	58	62	58
1904	Woronkofski	15542	78	78	70	71	69	70	69	30	85	63	70	0	23113	100	14	14	14	14	14	1	1	14	27	-	68	66	65	66	85	30	65	59	63
1905	Zarembo Is.	66645	80	80	52	59	58	57	54	36	52	58	82	0	117564	100	1	22	1	1	1	1	1	22	37	-	52	53	58	57	54	36	52	46	48
1906	Shrubby Is.	9223	71	71	71	71	71	71	71	71	71	71	71	0	11378	100	67	67	87	67	87	14	13	67	67	-	44	44	44	44	44	68	68	44	44
1910	Etolin Is.	43116	100	100	95	97	99	99	96	90	88	95	97	0	101727	100	82	82	82	82	82	82	82	82	87	-	78	82	95	97	80	48	38	75	79
2007	Mitkof Is	87911	83	83	65	60	61	63	59	40	53	59	61	21363	113383	100	9	20	9	20	20	1	4	20	32	-	52	54	58	58	52	40	52	53	48
2008	Woewodski	5918	100	100	86	87	88	94	88	50	86	83	88	20	10636	100	1	1	1	1	1	12	1	1	2	-	88	87	68	94	86	44	86	82	86
2202	Lynn Canal	10126	100	100	90	99	95	98	90	86	75	90	95	1121	49374	100	48	48	48	48	48	2	2	48	76	-	81	99	91	92	81	86	74	61	81
2203	Lynn Canal	16485	100	100	100	99	100	100	100	99	99	100	100	0	102477	100	91	96	91	91	91	91	91	96	98	-	97	87	100	100	97	87	84	94	100
2304	Lynn Canal	13888	100	100	99	100	99	99	99	92	99	100	100	4117	56828	100	25	97	25	25	25	1	84	97	28	-	99	100	99	99	99	92	93	97	100
2305	Lynn Canal	26221	100	100	82	100	96	96	86	91	89	98	98	80	102183	100	22	88	22	22	22	1	1	88	63	-	78	97	95	95	82	91	69	84	94
2306	Cross Sound	19241	93	93	47	78	83	84	50	40	43	72	67	3282	58598	100	12	48	12	12	12	1	1	48	40	-	40	81	59	59	44	39	42	53	49
2408	Lynn Canal	4628	100	100	97	100	100	96	97	99	100	95	100	801	19213	100	0	0	0	0	0	0	100	0	26	-	97	100	100	98	97	99	-	95	99
2409	Berners Bay	8810	100	100	88	92	99	98	90	88	100	85	94	661	17579	97	48	48	48	48	48	51	100	48	60	100	77	84	97	95	81	76	-	71	86
2410	Berners Bay	5488	100	100	100	100	100	100	100	94	100	100	100	0	40097	100	100	100	100	100	100	76	100	100	100	-	75	-	97	95	79	74	-	-	-
2411	Berners Bay	8306	100	100	100	100	100	100	100	100	100	100	100	0	229148	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
2413	Berners Bay	4985	100	100	100	100	100	100	100	100	100	100	100	0	223172	100	100	100	100	100	100	85	100	100	100	-	-	-	-	-	-	100	-	-	-
2514	Juneau	17598	100	100	79	91	88	92	81	68	78	90	84	7531	37393	98	14	30	14	14	14	17	14	30	31	100	75	87	84	90	78	61	74	86	77
2515	Juneau	21312	100	100	100	100	100	100	100	83	100	100	100	16995	100458	100	100	100	100	100	100	10	100	100	100	-	-	-	-	-	-	61	-	-	-
2517	Juneau	9265	100	100	99	100	100	100	99	89	99	100	99	25415	76336	100	45	78	45	45	45	6	52	78	85	-	98	100	99	100	98	88	97	99	99
2518	Taku	18755	100	100	100	100	100	100	100	100	100	100	100	2562	159074	100	100	100	100	100	100	62	100	100	100	-	-	-	-	-	-	99	-	-	-
2519	Taku	13783	100	100	99	100	100	100	99	96	98	100	99	0	131558	100	43	77	43	43	43	41	43	77	57	-	98	100	100	100	99	94	97	98	98

WAA	Vicinity	1954 POG	% POG at 1995	Percent of All POG Remaining in 2095 (3) Base Year = 1954 Alternatives										Private Lands (acres) 2)	Total Area (acres) (5)	Percent of POG in Reserves 1) Alternatives										Percent of 1954 Matrix POG Remaining in 2095 (4) Alternatives									
				1	2	3	4	5	6	7	9	10	11			1	2	3	4	5	6	7	9	10	11	1	2	3	4	5	6	7	9	10	11
2521	Sholter Is.	2026	100	100	100	100	100	100	100	91	100	100	100	1604	3750	100	100	100	100	100	100	1	100	100	100	-	-	-	-	-	-	91	-	-	-
2722	Douglas Is	16713	100	100	100	100	100	100	100	64	100	100	100	19468	29529	100	75	99	75	75	75	1	100	99	100	-	100	100	100	100	100	64	-	100	-
2823	Whiting River	89275	100	100	94	99	97	96	95	85	87	96	98	658	410930	100	55	70	55	55	55	9	10	70	71	-	86	96	94	92	89	83	85	87	93
2824	Tracy Arm	9765	100	100	100	100	100	100	100	79	100	100	100	0	295473	100	100	100	100	100	100	51	100	100	100	-	-	-	-	-	-	57	-	-	-
2825	Endicott	32027	100	100	100	100	100	100	100	100	100	100	100	140	304900	100	100	100	100	100	100	99	99	100	99	-	32	3	69	64	37	70	21	-32	99
2926	Hobart Bay	84728	100	100	75	82	91	87	77	70	68	76	87	21134	137918	100	40	40	40	40	40	40	40	40	49	-	59	70	85	79	61	51	47	61	74
2927	Port Houghton	67160	100	100	82	76	75	78	65	64	62	68	80	3047	150046	100	12	30	12	12	12	12	11	30	45	-	57	65	72	75	80	48	57	54	64
3001	NW Baranof	34097	86	86	70	80	75	76	74	83	70	78	81	20	81361	100	22	40	22	22	22	90	1	40	75	-	63	73	70	71	68	47	70	70	58
3002	Sitka	14863	80	80	74	75	77	78	74	70	74	74	78	13841	80263	100	67	67	67	67	67	7	48	67	66	-	47	50	55	56	48	68	60	47	37
3003	Sitka	24755	99	99	62	96	91	89	82	79	81	97	94	5429	60222	100	17	92	17	17	17	1	2	92	66	-	78	92	89	87	79	79	81	82	87
3104	Kruzof Is	29333	61	81	62	69	65	66	87	66	63	66	71	20	55451	100	5	26	5	5	5	56	0	26	40	-	61	62	65	65	66	40	63	58	59
3105	Kruzof Is	15787	99	99	95	99	96	96	95	83	79	99	97	0	53198	100	87	100	87	87	87	0	0	100	87	-	60	100	74	74	80	83	79	100	80
3206	Baranof Is	13344	100	100	100	100	100	100	100	100	100	100	100	3739	44395	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3207	Baranof Is	23392	100	100	100	100	100	100	100	100	100	100	100	0	100161	100	100	100	100	100	100	100	100	100	100	-	-	-	-		-	-	-	-	-
3308	Baranof Is	66572	77	77	50	59	61	60	52	42	43	55	61	80	108946	100	0	12	0	1	1	0	0	12	30	-	50	55	61	60	52	41	43	51	51
3309	Chichagof Is	18822	100	100	86	69	89	89	86	81	78	88	90	20	49424	100	57	57	57	57	57	57	57	57	65	-	68	75	74	75	67	56	48	67	72
3310	Chichagof Is	27371	96	96	96	96	96	98	96	96	96	96	96	0	71588	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3311	Chichagof Is	19412	98	98	75	79	82	83	78	72	68	76	83	20	56224	100	12	12	12	12	12	12	12	12	30	-	71	76	79	81	73	69	64	73	77
3312	Baranof Is	7210	98	98	73	92	95	89	80	74	86	86	94	0	20654	100	1	55	1	1	1	1	1	55	62	-	73	88	95	89	80	74	85	74	91
3313	Baranof Is	37073	79	79	42	55	67	55	43	37	30	45	55	220	74143	53	0	8	0	0	0	0	0	8	16	77	42	52	57	55	42	37	30	41	49
3314	Baranof Is	14601	94	94	58	94	82	82	62	65	70	94	94	0	41827	100	3	96	3	3	3	1	1	96	96	-	67	97	81	82	61	65	70	94	100
3315	Catherine Is	22343	91	91	66	85	76	79	68	53	69	83	79	0	43994	100	23	75	23	23	23	1	23	75	49	-	58	65	70	74	60	53	61	49	61
3416	Chichagof Is	15822	100	100	100	100	100	100	100	100	100	100	100	20	64812	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3417	Chichagof Is	22102	100	100	100	100	100	100	100	100	98	100	100	825	137909	100	100	100	100	100	100	100	97	100	100	-	-	-	-	-	-	-	40	-	-
3418	Chichagof Is	20731	100	100	100	100	100	100	100	100	87	100	100	1280	52518	100	100	100	100	100	100	100	75	100	100	-	-	-	-	-	-	-	47	-	-
3419	Chichagof Is	10748	100	100	100	100	100	100	100	100	96	100	100	2062	64869	100	100	100	100	100	100	100	83	100	100	-	-	-	-	-	-	-	77	-	-
3420	Chichagof Is	13432	100	100	100	100	100	100	100	100	100	100	100	20	54028	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3421	Elfin Cove	15407	100	100	100	100	100	100	100	100	94	100	100	220	43300	100	100	100	100	100	100	100	87	100	100	-	-	-	-	-	-	-	52	-	-
3523	NE Chichagof	24695	87	87	52	79	74	80	72	49	54	72	79	6844	49623	100	1	53	1	53	53	1	1	53	56	-	52	71	74	75	68	48	63	66	63
3524	NE Chichagof	6922	100	100	60	83	89	83	71	59	59	72	86	24949	15524	100	0	0	0	15	15	0	0	0	20	-	60	83	89	80	66	59	69	72	83
3525	NE Chichagof	41080	83	83	50	61	61	65	63	44	54	52	68	440	73679	100	1	8	1	17	17	1	1	8	37	-	50	58	61	60	46	43	54	48	56
3526	NE Chichagof	22734	88	88	54	72	71	73	69	48	47	67	74	4120	41048	100	1	35	1	37	37	1	7	35	50	-	53	63	71	64	58	47	44	56	56
3551	NE Chichagof	33658	87	87	57	68	67	72	63	50	45	64	72	320	58338	100	0	29	0	32	32	0	0	29	48	-	57	59	66	62	50	60	45	53	56
3627	Chichagof Is	18451	83	83	55	68	66	87	56	63	48	61	68	0	27295	100	28	44	28	31	31	28	28	44	40	-	42	48	56	56	41	39	32	41	53
3628	Chichagof Is	20429	99	99	99	99	99	99	99	99	99	99	99	120	34220	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3629	Chichagof Is	41291	95	95	81	73	76	89	62	58	64	65	77	0	98178	100	0	17	0	1	1	0	36	17	28	-	61	66	75	69	62	68	46	59	69
3630	Chichagof Is	14546	99	99	79	88	91	89	80	80	84	79	90	0	70736	100	1	1	1	1	1	1	1	1	29	-	79	86	91	89	80	80	84	79	67
3731	Chichagof Is	24128	96	96	82	96	91	90	85	77	64	96	93	1940	98751	100	41	98	41	41	41	32	18	98	71	-	71	97	65	64	75	67	56	94	85
3732	Chichagof Is	8339	100	100	100	100	100	100	100	100	100	100	100	40	72061	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3733	Baranof	41575	100	100	100	100	100	100	100	100	100	100	100	0	215555	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3734	Baranof	31389	100	100	100	100	100	100	100	100	100	100	100	516	126120	100	100	100	100	100	100	99	100	100	100	-	-	-	-	-	-	100	-	-	-
3835	Admiralty	13569	100	100	100	100	100	100	100	100	87	100	100	900	33033	100	100	100	100	100	100	100	1	100	100	-	-	-	-	-	-	-	87	-	-
3836	Admiralty	32714	100	100	100	100	100	100	100	94	97	100	100	501	54569	100	100	100	100	100	100	59	30	100	100	-	-	-	-	-	-	86	96	-	-
3837	Admiralty	31050	100	100	100	100	100	100	100	100	100	100	100	580	58968	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3938	Admiralty	49541	100	100	100	100	100	100	100	100	100	100	100	20	76664	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3939	Admiralty	39363	100	100	100	100	100	100	100	100	100	100	100	20	66131	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
3940	Admiralty	35782	100	100	100	100	100	100	100	100	100	100	100	40	67845	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4041	Admiralty	31591	100	100	100	100	100	100	100	100	100	100	100	180	54823	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4042	Admiralty	39308	100	100	100	100	100	100	100	100	100	100	100	3458	57223	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4043	Admiralty	62153	100	100	100	100	100	100	100	100	100	100	100	40	111609	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-

WAA	Vicinity	1954 POG	% POG at 1995	Percent of All POG Remaining in 2095 (3) Base Year = 1954 Alternatives										Private Lands (acres) 2)	Total Area (acres) (5)	Percent of POG in Reserves 1) Alternatives										Percent of 1954 Matrix POG Remaining in 2095 (4) Alternatives									
				1	2	3	4	5	6	7	9	10	11			1	2	3	4	5	6	7	9	10	11	1	2	3	4	5	6	7	9	10	11
4044	Admiralty	34728	100	100	100	100	100	100	100	100	100	100	100	22305	69322	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4054	Admiralty	43919	100	100	100	100	100	100	100	100	100	100	100	0	66454	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4055	Admiralty	43712	100	100	100	100	100	100	100	100	100	100	100	759	67997	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4145	Admiralty	35852	100	100	100	100	100	100	100	100	100	100	100	140	65100	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4146	Admiralty	22511	100	100	100	100	100	100	100	100	100	100	100	0	65443	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4147	Admiralty	16846	100	100	100	100	100	100	100	100	100	100	100	638	44194	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4148	Admiralty	24196	100	100	100	100	100	100	100	100	100	100	100	0	36766	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4149	Admiralty	20394	100	100	100	100	100	100	100	100	100	100	100	0	36573	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4150	Admiralty	14178	100	100	100	100	100	100	100	100	100	100	100	1037	22790	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4222	Chichagof	35977	98	98	75	61	84	83	76	74	74	79	93	160	89755	100	54	61	54	55	55	54	54	61	84	-	47	52	65	62	47	48	45	48	60
4252	Chichagof	9213	100	100	59	78	71	72	59	55	52	76	72	28257	21869	100	0	29	0	2	2	13	0	29	24	-	59	66	71	71	58	48	52	66	63
4253	Chichagof	16540	87	87	60	69	68	71	62	56	53	67	73	60	46862	100	2	47	2	4	4	2	2	47	49	-	59	51	68	70	61	55	52	48	58
4256	Pleasent Is	8837	100	100	100	100	100	100	100	100	100	100	100	60	18837	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4302	Chilkoot	2080	100	100	95	100	97	97	97	95	95	100	98	0	17661	100	0	0	0	0	0	0	0	0	0	-	95	100	97	97	97	95	95	100	98
4304	Skagway	20	100	100	100	100	100	100	100	100	100	100	100	499	40	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
4407	Skagway	6562	100	100	100	100	100	100	100	99	100	100	100	0	80103	100	100	100	100	100	100	7	100	100	100	-	-	-	-	-	-	99	-	-	-
4408	Yakuatat	14992	100	100	100	100	100	100	100	100	100	100	100	0	240436	100	99	99	99	99	99	65	100	99	99	-	100	100	100	100	100	100	-	100	100
4503	Yakuatat	18336	100	100	100	100	100	100	100	100	100	100	100	185	467553	100	100	100	100	100	100	93	100	100	100	-	-	-	-	-	-	97	-	-	-
4504	Yakuatat	996	100	100	100	100	100	100	100	100	100	100	100	3069	1255	100	100	100	100	100	100	18	100	100	100	-	-	-	-	-	-	100	-	-	-
4505	Yakuatat	6987	100	100	100	100	100	100	100	100	99	100	100	0	311092	100	97	98	97	97	97	96	96	98	97	-	87	97	98	98	89	88	70	81	95
4506	Yakuatat	8801	100	100	100	100	100	100	100	100	100	100	100	580	56858	100	100	100	100	100	100	96	96	100	100	-	-	-	-	-	-	100	100	-	-
4508	Yakuatat	36735	100	100	90	99	97	97	92	91	76	91	98	29040	282835	100	51	70	51	51	51	28	48	70	67	-	81	95	94	94	83	88	55	70	94
5012	Kulu Is	112932	82	82	44	52	52	54	48	38	33	48	54	640	147840	76	19	21	19	20	20	2	2	21	37	78	34	42	43	45	39	37	32	38	35
5013	Kulu Is	39607	97	97	74	78	82	80	75	44	68	75	80	40	63271	100	58	59	58	58	58	1	57	59	65	-	41	49	60	54	44	43	30	42	47
5014	Kulu Is	28230	97	97	51	58	71	71	52	46	39	52	66	40	40013	100	12	12	12	12	12	11	11	12	28	-	45	53	67	67	46	39	32	46	55
5015	Coronation	11925	100	100	100	100	100	100	100	100	100	100	100	0	19084	100	100	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-
5016	Kulu Is	48191	99	99	99	99	99	99	99	98	99	99	99	140	69258	100	100	100	100	100	100	98	100	100	100	-	-	-	-	-	-	34	-	-	-
5017	Kulu Is	74723	100	100	78	84	89	90	81	77	90	78	100	20	124065	100	51	52	51	51	51	51	51	52	100	-	55	67	79	81	61	54	79	55	20
5018	Kulu Is	22835	94	94	72	75	83	83	73	49	70	74	78	40	49017	100	46	51	48	48	48	2	60	51	58	-	50	52	70	69	50	48	31	50	52
5130	Kupreanof	43731	99	99	69	72	84	66	71	83	70	72	78	540	92497	100	29	34	29	34	34	1	32	34	46	-	57	57	78	78	56	63	58	57	60
5131	Kupreanof	28318	89	89	64	65	69	89	63	48	83	67	68	40	70472	66	41	43	41	43	43	0	42	43	54	83	43	44	50	50	41	46	42	48	39
5132	Kupreanof	16591	75	75	40	44	51	52	42	40	32	40	49	48968	38610	44	3	3	3	3	3	2	2	3	24	77	39	43	50	52	41	40	31	39	38
5133	Kupreanof	46082	99	99	83	68	94	92	66	60	61	67	73	0	107749	100	14	22	14	22	22	1	1	22	30	-	58	60	93	91	57	60	61	59	61
5134	Kupreanof	38816	91	91	69	72	89	90	71	72	63	70	82	0	102411	100	13	13	13	13	13	1	1	13	34	-	66	69	89	90	68	72	63	67	77
5135	Kupreanof	12390	100	100	39	62	66	81	56	38	38	56	62	0	55323	100	0	31	0	31	31	0	0	31	38	-	39	45	66	73	37	38	38	37	40
5136	Kupreanof	32218	90	90	51	58	63	66	55	39	48	63	61	40	59816	59	1	2	1	2	2	2	1	2	18	67	60	58	63	65	54	38	48	52	55
5137	Kupreanof	23873	100	100	99	99	99	100	99	99	100	99	99	1460	49530	100	95	95	95	95	95	95	100	95	95	-	75	80	85	98	75	75	-	75	77
5138	Kupreanof	32330	90	90	50	55	76	78	52	40	47	52	60	9076	60864	100	5	20	5	20	20	1	1	20	30	-	48	45	75	73	41	39	46	42	45
		5441557	93	93	77	83	84	85	80	71	74	81	84	846580	16562003	98	56	65	56	59	59	44	50	65	70	73	53	57	67	67	55	51	51	52	57

1) Reserves are defined as Wilderness, National Monument, and Mostly Natural Setting LUD's.
2) Includes only productive old-growth from National Forest Lands. Old Growth on State and private lands is not included.
3) This analysis assumes: 1) maximum timber harvest levels over the next 100 years.
4)Matrix lands are lands within the Timber Production, Modified Landscape, and Scenic Viewshed LUDs
5)WAA's 2412, 2518, 2620, and 4607 have been omitted because they are primarily icefield (total acres = 382,390)

Table 3-114
Summary of Outcomes for Wildlife Species Viability

Outcome	Species Presence	Distribution	Population Interactions
I	Yes	Similar to historic range	Yes
II	Yes	Low density populations; temporary gaps may occur	Possible limitations
III	Yes	Permanent gaps likely	Some limitations
IV	Yes	Only in refugia	Severely restricted
V	Extirpated	NA	NA

Following are discussions of each of the six panels, including panel assessment results and additional effects considerations. Fuller summaries for each panel, and detailed notes of each panel assessment meeting, are contained in the planning record.

Panel assessments were conducted for the nine alternatives presented in the RSDEIS. The RSDEIS Preferred Alternative (FEIS Alternative 10) and the FEIS Preferred Alternative (Alternative 11) were not subjected to similar panel assessment review and rating. Possible effects of these two alternatives are discussed relative to previous panel assessments using the key alternative design features that were identified by panelists as important factors in their outcome ratings among alternatives, and using the total productive old growth acres planned for harvest over the next 100 years in each alternative (Table 3-115).

Analysis indicated a very high correlation (range 0.92-0.98) between acres of productive old-growth forest planned for harvest in an alternative and the subsequent average weighted outcome scores assigned by panelists (Tables 3-116, 3-118, 3-119, 3-122, 3-123 and 3-124). Thus, alternatives with higher amounts of productive old-growth forest scheduled for harvest also had higher average weighted outcome scores indicating relatively higher relative risk to viability. No attempt is made to assign Panel Outcome Scores to these two alternatives, but rather to make an inference of the relative risks these alternatives may represent compared to all other alternatives using key alternative design features and acres of old growth scheduled for harvest. Alternative 8, presented in the RSDEIS and rated by panelists, has been eliminated from detailed study in the FEIS and all effects estimates of this alternative have also been removed.

Design features as well as acres of old growth planned for harvest in Alternative 10 were generally intermediate between Alternatives 2 and 3. Alternative 10 includes a Forest-wide systems of large and medium old growth habitat reserves as in Alternative 3, with small reserves to be mapped at the project level, but has only a 500-foot beach fringe, option 2/3 riparian protection, a significant reduction in the use of two-aged timber harvest, and no deer standard and guideline to maintain important deer habitats in an old growth condition.

Alternative 11 is similar to Alternative 3 in design components with the following additional features: a Forest-wide system of small old growth habitat reserves has been mapped and allocated to the Old-growth Habitat LUD, in addition to the large and medium reserves, representing an additional allocation of nearly 270,000 acres of productive old growth forest to this LUD; two-aged timber management is not prescribed; four additional very important old growth reserves are added totaling

34,000 acres of productive old-growth forest allocated to the Old-growth Habitat LUD (Rio Roberts on Prince of Wales Island, Sandborn Canal on the central Mainland, the Portage at Port Frederick, and the Chicken Creek watershed, both on northern Chichagof Island); a modified riparian Option 2 that has many Option 1 features is applied forest-wide; and the 1,000 foot beach fringe buffer allows no timber harvest compared to the uneven aged management permitted in the 500 to 1,000 foot beach zone in other alternatives. Finally, there have been several changes from the Timber Production LUD to non-Development LUD's (e.g. South Kuiu Island, and the lower third of Cleveland Peninsula). Because of these additional features, Alternative 11 in general further reduces overall risk and increases the likelihood of maintaining viable and well distributed populations of old growth associated species as compared to Alternative 3. Alternative 11 schedules only 475,000 acres of productive old-growth forest for timber harvest, less than both Alternatives 3 and 4 and very near Alternative 5 at 462,000 acres (Table 3-115).

Table 3-115 shows the estimated cumulative acres of productive old growth scheduled for harvest as presented to the assessment panels and the current planned acres scheduled for harvest in 100 years in all alternatives, for use as a basis of comparison for the alternatives. Alternatives are ranked in terms of acres of productive old-growth scheduled for harvest, from least to most acres.

Table 3-115
Cumulative Old-growth Harvest After 100 Years

Alternative	Panels[1]	Rank	FEIS[2]	Rank
1	0	1	0	1
2	1,106,670	7	853,270	8
3	735,800	4	571,440	5
4	618,060	3	495,160	4
5	572,300	2	462,880	2
6	953,900	5	732,070	7
7	1,556,900	9	1,199,550	10
8	955,460	6	N/A	
9	1,402,800	8	1,042,428	9
10			670,270	6
11			475,000	3

[1] Acres of productive old growth scheduled for harvest in 100 years, preliminary RSDEIS alternatives presented to the panels.
[2] Acres of productive old growth scheduled for harvest in 100 years, alternatives in this FEIS.

Based upon the preceding discussion, Alternatives 10 and 11 have been added to the discussions of the panel assessment results that follow.

Northern Goshawk

Panel Considerations and Assumptions. Panelists noted the apparent low relative density of nesting goshawks in Southeast Alaska. Less than 40 total nest sites have been identified after nearly 5 years of inventory effort across the Forest. Low prey diversity compared to other goshawk populations across North America was considered a principle factor, resulting in a higher sensitivity to habitat modifications which may reduce prey diversity and abundance.

Locally-obtained biological information on goshawk indicates a significant preference for productive old growth forest, the general avoidance of all other habitat types (especially early and mid-seral conifer forests), and a predominant use of lower elevations (less than 1,200') and relatively gentle slopes (less than 35

Glossary

percent). This disproportionate use of productive old growth, at low elevations on gentle slopes, indicated to panelists that not all old-growth forest acres were of equal value to goshawks. Most timber harvest also occurs in these situations, thus causing elevated concern among panelists of a disproportionate effect of planned harvest on goshawk habitat suitability, a feature not revealed in overall statistics of net old growth acres harvested.

Riparian, beach and estuary features were considered important landscape components, and their maintenance or protection incrementally contributed to enhanced confidence that an alternative would maintain suitable habitat to support well-distributed goshawk populations. Information to date suggests that goshawks select these landscapes when productive old-growth stand structure is present. Riparian, beach and estuary habitats generally support greater prey diversity and net prey productivity, features important to goshawk habitat quality.

Discussion revealed that a principal rating component was the net proportion of all old growth on the Tongass that would be harvested under each alternative. This surrogate was used in lieu of detailed evaluations, uncertainty about what specific old growth acres would be harvested, and limited knowledge about goshawks in Southeast Alaska. These general proportions were compared to existing percentage of young growth conifer forest in local areas of the Tongass and related goshawk status. Most notable was north Prince of Wales Island where in excess of 20 percent of the productive old growth had been harvested. Significant concern arose over this and increased proportions of unsuitable early seral forest on the landscape. This concern was generated from the relatively low density of nesting goshawks discovered relative to the inventory effort in those landscapes. In addition, potential signs of ecological stress was indicated by large home ranges, nonbreeding, and differential winter and breeding use areas. Thus, qualitative judgments concluded that alternatives resulting in this or a greater percentage of the net productive old growth harvested could result in negative overall landscape consequences to sustaining resilient, adaptable, and well distributed goshawk populations in Southeast Alaska.

The concept of extended rotations was viewed favorably by panelists. Maintenance of regenerating conifer stands in mid to late seral stand structure from 100 to 200 years was believed to supply adequate stand structure for prey production and goshawk foraging opportunities. However, given the 100-year limit on the panel analysis, the practical benefit from extended rotations was confined to a reduced net harvest of productive old growth forests.

The concept of habitat reserves was seen as a less important landscape design feature, since management of the landscape matrix as a whole was felt to have a greater net influence on goshawk habitat suitability, distribution and persistence. Large (40,000 acre) and medium (10,000 acre) habitat reserves as proposed were generally considered too small to sustain more than one or two pairs of goshawks. Roads were not considered an adverse element, thus roadless features of reserves did not generally contribute to overall habitat suitability. Finally, some relatively low level of forest management was not considered adverse to overall goshawk habitat suitability, and could contribute to stand diversity, but the thresholds of net landscape composition of early seral forests were also considered to be relatively low.

Panel Evaluation of Alternatives. The final average panel ratings for northern goshawk are displayed in Table 3-116. Alternative 1 essentially represents a no-harvest alternative. Nearly 2/3's of all likelihood points were assigned to Outcome I, that well distributed goshawk breeding populations would be maintained across the

Tongass. However, Outcome II received nearly a third of likelihood scores, suggesting that even with no further reduction in old growth forest, goshawk populations will likely experience reductions and local persistence may be more ephemeral or irregular as a result of the local concentration of habitat loss from past timber harvest. Implied in this conclusion is that additional harvest will be additive to an existing effect.

Table 3-116
Average Panel Assessment Ratings: Northern Goshawk

Outcome	Alternative							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**
1	66	0	17	23	23	6	0	0
2	31	24	35	42	51	44	12	23
3	3	40	34	29	25	33	40	42
4	0	32	14	6	1	17	40	32
5	0	4	0	0	0	0	8	3
Average weighted outcomes[1]	**1.4**	**3.2**	**2.4**	**2.2**	**2.1**	**2.6**	**3.5**	**3.2**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.96.

Because of the significant amount of legislatively reserved lands and the net amount of productive old growth that will likely remain under even the most aggressive timber harvest alternatives, panelists believed there was little chance for total extirpation of the goshawk population from Southeast Alaska. The highest rating for Outcome V (extirpation) was only 8 (for Alternative 7).

Moderately-high net scores for Outcomes I and II occurred for Alternatives 4 and 5 (74 and 65, respectively). These alternatives have in common the use of extended 200-year rotations. Panelists generally believed that forest structure resulting from mid-seral mature forest developmental stages (100-200 years old) was more beneficial to goshawks and their prey than a combination of reserves and shorter, 100-year rotations.

Alternatives 3 and 6 had intermediate combined Outcome I and II scores of 52 and 50, respectively. In spite of partial or complete application of habitat reserves, the 100-year rotation perpetuated a less suitable early seral forest stand structure and was a drawback for these alternatives. Conversely, panelists attributed moderate uncertainty that either of these two alternatives would maintain well distributed populations, with a combined score of outcomes III, IV and V of 48 (Alt 3) and 50 (Alt 6). This suggests that there may be nearly an even chance that either permanent gaps in the distribution will occur or goshawks may exist only in refugia under these 2 alternatives in 100 years; and in either case interaction between individuals would likely diminish. The forest-wide system of old growth habitat reserves proposed in Alt 3 alone imbedded in a matrix of early seral forest structure managed on a 100-year rotation were rated by the panelists to be of insufficient size to support goshawk populations without gaps in distribution or refugia populations occurring.

Alternatives 2, 7 and 9 were rated by panelists as having a relatively high likelihood (76, 88, and 78 , respectively) that in 100 years gaps in distribution would be likely to occur or populations would exist only in isolated refugia (Outcomes III or IV).

Both outcomes project limitations or restriction in interaction between individuals within the population.

Alternative 10 is intermediate between Alternatives 2 and 3 in both design features and acres of old growth harvested; thus risks to maintaining viable well distributed goshawk populations are likely intermediate between these two alternatives. In spite of having a system of large and medium reserves and unmapped small reserves that would reduce risks relative to Alternative 2, these were generally judged too small to alone sustain goshawks. Design features removed from Alternative 3 and not found in 10 such as the extended beach and reduced riparian protection would increase risks to goshawks relative to Alternative 3.

Alternative 11 has additional features that further increase the likelihood of maintaining well distributed goshawk populations relative to Alternative 3, such as mapped small reserves, and allocation of four additional medium or small reserves. Substantially fewer old growth acres are scheduled for harvest in Alternative 11 than 3 so overall risks are also reduced and based upon this measure, Alternative 11 may pose less risk to goshawks than Alternative 5.

Further Evaluation of Alternatives. The likelihood that alternatives will sustain habitat to support viable goshawk populations well distributed across the Tongass in 100 years is examined relative to a detailed analysis contained in the interagency Goshawk Conservation Assessment (Iverson et al. 1996). An important conclusion in the conservation assessment was the significant goshawk use of productive old growth forests and little use or avoidance (relative to availability) of all other available habitat types. This relationship formed the foundation of a finding that landscapes managed under a 300 year rotation on all productive old growth would result in a combination of forest age classes providing a high likelihood of sustaining well distributed viable goshawk populations throughout their range on the Tongass.. These age classes were generally 1/3 of the productive old growth forest landscape in 0-100 year old stands (low value to goshawks), 1/3 in 100-200 (moderate value to goshawks and Mature Sawtimber in goshawk assessment) year old stands, and 1/3 in 200-300 or older (old growth) stands (higher values to goshawks). The Conservation Assessment concluded that habitat reserves were necessary in addition to extended rotations in regions where accelerated past timber harvest precluded the opportunity to meet this conceptually acceptable forest age class distribution.

While the conservation assessment examined a full 300 year rotation applied to all productive old growth forests across the landscape, the extended rotation feature of some alternatives (Alternatives 4 and 5) applies a 200 year silvicultural rotation only on the proportion of old growth forest suitable for timber harvest. There is an important difference between a “rotation” applied to all old growth (an ‘ecological’ rotation) as a means to express age class distributions within a forested landscape and a true silvicultural rotation applied only to suitable acres scheduled for timber harvest. Nearly 57 percent of the productive old growth in a typical watershed that is allocated to timber management cannot be harvested and will be permanently retained because a variety of forest plan standards and guidelines prevent timber harvest on these acres (e.g., beach, riparian, high hazard soils, etc., see Table 3-113). Thus a 200-year silvicultural rotation that retains nearly 50 percent of all old growth is very similar or possibly superior to a 300 year “ecological” rotation that retains at least 33 percent of the landscape in stands over 200 years old or older, including old growth.

Iverson et al. (1996) concluded that landscapes that maintained a forest age structure composition consistent with a 300 year rotation would provide a high likelihood of sustaining goshawks. They suggested that maintaining this distribution of habitat within the scale of goshawk use areas (approximately 10,000 acres) across the landscape would be a strategy with a high likelihood of sustaining viable populations of goshawks.

An analysis was conducted at the Value Comparison Unit (VCU) level to examine how well each alternative would satisfy this conceptual landscape design. There are 926 VCU's distributed across the Tongass averaging 17,500 acres each and they approximate the size of adult goshawk use areas. Harvest under a 300 year rotation permits 3.3 percent of the old growth to be harvested per decade, thus in 2095 (14 decades from 1954) those VCUs with over 47 percent of the productive old growth harvested would be harvesting at a rate in excess of a 300 year rotation and possibly providing an excess amount of early (0-100 year old) forest and be at increased risk of not sustaining goshawks. Up to 33 percent of the productive old growth in a watershed (VCU) in early seral forest was considered capable of sustaining goshawks. Those VCUs with between 33 and 47 percent represent only a slightly increased risk to not supporting goshawks.

Of the 926 VCU's on the Tongass, but many are composed of largely unsuitable habitat, including rock, ice, and peatland. To estimate forest-wide risk to goshawks, the number of VCU's at elevated risk was divided by the number landscapes (VCU's) across the Tongass that might have sufficient habitat to minimally support goshawks. Thus, the analysis only included 678 VCU's that have at least 2,300 acres of productive old growth forest. This approximate threshold value was used because the median adult goshawk home range size was 10,000 acres and the least amount of productive old growth in any goshawk use area was 23 percent (Iverson et al. 1996). Under these assumptions, this analysis must be considered conservative because up to 248 VCU's containing a total of over 280,000 acres of productive old growth, but less than 2,300 acres a VCU) have been removed forest-wide and there is some likelihood that collectively these areas support some goshawks

Results of this analysis indicated that a total of 40 VCU's across the forest currently exceed 33 percent of the productive old growth harvested, or approximately 6 percent of the range of the goshawk on the Tongass is at elevated risk. Most are located in high risk provinces (see Biodiversity) generally Prince of Wales Island. Alternative 1 does not schedule any harvest and is not included in the analysis.

Alternative 11 has the highest likelihood of all alternatives of sustaining goshawk habitat across the forest in 100 years with only 58 VCU's at elevated risk or approximately 9 percent of the forest (Table 3-117). Alternative 11 also has the largest number of VCUs completely reserves at 340. Alternatives 4 and 5 have similar estimated risk in 2095 at 9 percent but fully protect fewer VCU's. Alternative 3, 10 and 6 are intermediate risk with 12 to 18 percent of all VCU's at somewhat elevated risk. Alternatives 2, 7 and 9 have the highest percent of VCU's that exceed a 300 year rotation in 2095. All alternatives have between 50 (Alternative 9) and 85 (Alternative 3) VCU's with from 33 to 47 percent of the productive old growth harvested with no apparent pattern among alternative design feature or total acres planned for harvest. The total number of VCU's that retain 100 percent of the 1954 productive old growth are shown and indicate the number of VCU's totally reserved in that alternative.

The higher risk VCU's are generally clumped in a few regions of the Tongass, for example the North Prince of Wales Province. Iverson et al. (1996) also suggested that large reserves would be a needed complementary component of a landscape conservation strategy when past timber harvest had precluded the opportunity to meet the 300 year rotation. The number and size of reserves varies by alternative. Alternative 11 provides the largest reserves and protected acres of productive old growth forest to complement the higher risk VCU's identified above.

Table 3-117
Comparison of the number of VCUs that will exceed 47 percent of the total 1954 productive old growth in 2095 by Alternative. Also shown are the number of VCUs that fully protect all of the original 1954 productive old growth

Alternative	100% Protected	Over 47% Old-growth Cut	Forest-wide %
2	310	159	23
3	334	82	12
4	323	65	9
5	326	63	9
6	314	125	18
7	258	237	35
9	291	215	32
10	330	112	17
11	**340**	**58**	**9**

Apart from Alternative 1, Alternative 11 and 5 have the highest likelihood of sustaining viable goshawk populations within 100 years. Alternative 11 would harvest the least amount old growth forest except Alternative 1. Alternative 11 is the only alternative that provides a forest-wide system of mapped large, medium and small old growth reserves well distributed across the forest; it protects four additional important medium and small old growth reserves (three of which are in high risk provinces, thus reducing net forest-wide long-term risk), provides substantially increased riparian habitat protection, and protects the 1,000 foot beach fringe. These are particularly important conservation features relative to goshawk ecology since riparian habitats were a selected habitat feature by goshawks and representing about 25 percent of all goshawk habitat use. Beach was a landscape position where an average of 15 percent of goshawk habitat use occurred.

Alternative 5 has a 200 year extended rotation in combination with reserves in some provinces to compensate for past harvest. This was the ideal conceptual conservation strategy identified in the Goshawk Conservation Assessment. Alternative 4 applies a 200 year rotation forest-wide and would theoretically provide the necessary distribution of forest age classes to sustain goshawks. However, it does not apply any reserves in provinces with concentrations of younger forests and cannot achieve the desired distribution of forest age classes across those landscapes. Alternatives 4 and 5 apply the 1,000 foot beach fringe with uneven-aged management. These two alternatives also provide Option 2 and 3 riparian protection to the riparian habitat zone (less protection that Alternative 11).

Alternative 3 has less likelihood of sustaining viable goshawk populations in 100 years than Alternatives 1, 11, 4 or 5 because it relies entirely on habitat reserves that may be too small and applies a 100 year rotation in the intervening lands between reserves. Alternative 3 does protect the 1,000 foot beach fringe and applies riparian options 1 and 2, thus protecting very important habitat components in the matrix lands where timber harvest will occur. In areas with large amounts of legislated withdrawals or plan imposed Land Use Designations that do not permit timber harvest, goshawk habitat should be maintained. Alternative 10 has a somewhat lower likelihood than Alternative 3 of sustaining goshawks, having the same reserve system but less protection of the very important beach and riparian landscape components.

All other alternatives have a low (Alternatives 6 and 10) or very low (Alternatives 2, 7 and 9) relative likelihood of providing habitat to sustain viable goshawk populations well distributed across the Tongass in 100 years, because of the absence of an extended rotation or forest-wide system of habitat reserves, or less or no protection of the important beach fringe and much less riparian protection.

A short term (10-15 year) concern for sustaining well distributed goshawk populations also exists on the Tongass. Because of a concentration of past timber harvest in some provinces and an abundance of young forest structure, four biogeographic provinces may not meet the extended rotation landscape composition design identified in the Conservation Assessment. To protect management options, reserves are applied in these four provinces in Alternatives 5 and 6 and forest-wide in Alternatives 11, 3 and 10. Some indirect indications of populations currently at risk on one of these provinces on north Prince of Wales Island was also debated by the Goshawk Panel (USDA Forest Service -Goshawk Panel Notes 1995).

Because the goshawk is a wide ranging species that uses landscape mosaics, there are few specific goshawk standard and guideline options available to mitigate otherwise adverse broad landscape management strategies. Approaches considered in the Goshawk Assessment were specific goshawk nest site management prescriptions such as those historically attempted on the Tongass (U.S. Forest Service 1992). This approach was considered unsatisfactory because its success as a conservation strategy is dependent upon locating goshawk nests which has proven difficult in the temperate rainforest. Less than 40 goshawk nesting areas have been located in Southeast Alaska despite 5 years of inventory and search effort. Thus, an approach was suggested in the Assessment that described a dynamic landscape composition of forest age classes using a 300-year rotation that was likely to sustain goshawks across the landscape. A Forest-wide Standard and Guideline protects an area of 100 acres around identified goshawks nests. This does not represent a comprehensive conservation strategy, but rather serves to conserve identified goshawk nesting habitat which may have specific characteristics of stand structure and landscape position and is complementary to a broader landscape strategy.

Based upon this analysis, Alternatives 1, 11 and 5 would have a moderately high likelihood of sustaining well-distributed viable goshawk populations and would not result in a loss of viability and a declining trend that would require additional protection and federal listing under the ESA.

Marten

Panel Considerations and Assumptions. Forest structure at the stand scale and integrated across the landscape was the most important factor in panel ratings and discussion. Panelists agreed, based on personal experience, the scientific literature, and local Southeast Alaska data, that marten are clearly associated with late seral and old growth forests and that marten function ecologically at broad landscape scales.

The panel found that the strong association of marten with the high volume old growth forest strata, combined with past timber harvest that was concentrated in these highly productive stands, was cause for significant concern. The added interaction of elevation heightened concern; that is, significantly greater marten habitat use occurred below 1,500 feet in elevation where there is also a greater relative proportion of the high volume strata and past timber harvest. Future timber harvest is estimated to be generally proportional to its present occurrence (50 percent harvest from the high, 40 percent from the mid, and 10 percent from the low volume strata).

Marten is a mid-level predator, thus habitat to support adequate prey populations of small mammals was considered important. Based upon forest succession in Southeast Alaska and small mammal habitat relationships, panelists concluded that 100-year timber harvest rotations were adverse to providing a continuing prey base for marten. The stem exclusion stage of forest succession persists for at least 70 percent of the rotation with a greatly simplified overall forest structure generally devoid of understory vegetation. In addition, large trees, snags and downed logs, features that contribute to enhanced forest structural diversity, and prey habitat, are not present during these short rotations. Conversely, 200-year rotations increase the structural complexity of seral forests to support prey and were viewed as a superior landscape management approach. The concept of two-aged silvicultural management was also believed to significantly contribute to forest stand structural diversity in managed forest stands. Thus, panelists felt that a 100-year timber harvest rotation applied across a large portion of the landscape would not provide the habitat necessary to support sustainable and well distributed marten populations across the Tongass.

Maintaining the old growth forest within the beach and riparian habitat zones was considered important, particularly for landscape connectivity and prey habitat diversity. Corridors that are wide enough to also serve as functional habitat to facilitate long-term landscape connectivity were preferable to narrower corridors that only facilitate movement between forest patches. The 1,000 foot beach zone was specifically considered important because of the dissected nature of Southeast Alaska islands, and generally more important that altitudinal riparian corridors. Much of the panel discussion was devoted to the interpretation of gaps in distribution, areas within which habitat capability was reduced to the point that reproductively successful marten populations may no longer exist or would exist in such low densities as to significantly increase the probability of local extirpation.

Panel Evaluation of Alternatives. The final average panel ratings for marten are displayed in Table 3-118. Alternative 1 provided the greatest likelihood of maintaining well distributed marten populations across their current range on the Tongass. It had a mean likelihood rating of 54 for Outcome I. However, panelists indicated that even with no further timber harvest and road construction, there is still a reasonable likelihood that local populations would be reduced or gaps that limit population would be created with little interaction within the species range, as indicated by a combined score of 46 for Outcomes II and III. Concentration of past timber harvest in specific provinces and past harvest primarily in the high volume classes which were concentrated at lower elevations contributed to this conclusion.

Table 3-118
Average Panel Assessment Ratings: Marten

Outcome	Alternative							
	1	2	3	4	5	6	7	9
1	54	3	4	15	17	3	3	3
2	25	5	40	45	53	25	6	6
3	21	56	41	37	24	42	27	46
4	0	21	15	3	6	30	39	24
5	0	15	0	0	0	0	25	21
Average weighted outcome[1]	**1.7**	**3.4**	**2.7**	**2.3**	**2.2**	**3.0**	**3.8**	**3.6**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.97

Panelists concluded that there was little or no likelihood of extirpation of marten from the entire Tongass National Forest under alternatives 1, 3, 4, 5 or 6. Alternatives 2, 9 and 7, however, were considered to have some chance of extirpation (likelihood scores of 15-25 for Outcome V). Anticipated timber harvest, especially in the remaining high volume class stands at lower elevation, and road construction, contributed to this conclusion.

The likelihood that in 100 years an alternative would result in either significant gaps in distribution, populations existing in relatively isolated refugia, or local extirpations, may be an indication that marten populations would not remain well distributed across the forest. This cumulative likelihood is the sum of Outcomes III, IV, and V. From this perspective, Alternatives 2, 7 and 9 were rated identical by panelists with a cumulative rating of 91 for each alternative. Alternative 6 had a relatively high cumulative likelihood outcomes of 72. Extensive planned roading, continued fragmentation of habitat, and most importantly, a significant reduction in the important high volume old growth forest component were factors cited by panelists that contributed to these conclusions. Even Alternative 3 with its significant reserve component had a combined Outcome III, VI, and V rating of 56, suggesting a better-than-even chance that well distributed populations may not be maintained across the Tongass in 100 years. All of these alternatives have in common a 100-year timber harvest rotation.

Alternatives 4 and 5 were rated intermediate by the panelists in their likelihood of maintaining persistent and well distributed marten breeding populations, with combined scores for Outcome I and II of 60 and 70, respectively. Extended 200-year timber harvest rotations was the most important design feature for sustainable approaches to providing marten habitat.

Alternative 10 is intermediate between Alternatives 2 and 3 in both design features and acres of old growth harvested; thus risks to maintaining viable marten populations are likely intermediate between these two alternatives. In spite of having a system of large, medium and unmapped small reserves that would reduce risks relative to Alternative 2, the 100 year rotation, only a 500 foot beach fringe, and smaller riparian buffers in Alternative 10 may present substantial long-term risks to marten.

Alternative 11 has additional features that further increase the likelihood of maintaining viable goshawk populations relative to Alternative 3, such as mapped small reserves in all watersheds, and allocation of four additional medium and small reserves. The 1,000 foot beach and riparian protection are similar among Alternatives 11 and 3, but 11 has substantially fewer old growth acres scheduled for harvest (475,000) and thus lower risk than Alternative 3 (571,440). Total acres harvested in Alternative 11 is even fewer than Alternative 4 (495,000) in spite of the 200 year rotation. Alternative 11 does not have a two-aged silvicultural prescription that maintains forest structure considered important by panelists but the net acres old growth disturbed might offset either the potential advantage of two-aged management in Alternative 3 or two-aged management and a 200 year rotation in Alternative 4.

Further Evaluation of Alternatives. As concluded by the Marten Assessment Panel (Iverson 1996b) and review by Flynn (1994), marten are an old growth associated species that require a landscape approach to long-term conservation (Bissonette et al. 1989). As such, viability concerns are primarily focused on cumulative long-term effects of conversion of complex and diverse old growth forests to structurally simple young growth regenerated conifer forests. In general, there is not an immediate viability concern evident within the short term planning period (10-15 years). Management strategies adopted in the short term, however, may have very important implications regarding opportunities for long term conservation and maintenance of viable populations. Well distributed marten populations have been generally defined by some as occurring in every third order watershed (more generally a 10,000 landscape nearly equivalent to a Value Comparison Unit), an assumption adopted by Flynn (1994) and reviewed by Capp et al (1991) (referencing the Flathead Land Management Plan Appeal decision relative to well-distributed populations).

Alternative 3 should have a moderate to high relative likelihood for supporting viable well distributed marten populations within their range on the Tongass in 100 years based upon the recommendations and analysis by Flynn (1994) which is a revised version of his original marten strategy contained in the Viable population (V-POP) Committee Conservation Strategy (Suring et al. 1993). The marten was one of five species that contributed to the overall V-POP landscape conservation strategy design. The V-POP strategy was endorsed through peer review (Kiester and Eckhardt 1994) as a sound initial approach to maintain well-distributed viable wildlife populations. For marten, Alternative 3 should be an improvement over the original V-POP design by providing a wider 1,000’ beach fringe corridor and option 1 and 2 riparian habitat management buffers, often significantly wider than the 100’ minimum riparian buffers identified in the original V-POP strategy. Both of these landscape habitat features were important elements in marten habitat use (Flynn 1994). Further, the two-aged silvicultural management regime should provide enhanced structural diversity in managed stands, particularly later in the stand development. This will improve both marten prey species habitat as well as provide more complex and beneficial structure for marten cover and denning.

Alternative 11 has a relatively high likelihood of sustaining viable marten populations because it incorporates essentially all features of Alternative 3. A nearly equal riparian management system is provided forest-wide and not only in FHIP 1 watersheds. Small reserves are explicitly mapped and the four additional medium and small reserves reduce risks in already high risk landscapes. While two-aged management has been essentially eliminated and may adversely effect within stand structural diversity considered important by panelists, it also indirectly resulted in reducing the total harvest of productive old growth over the entire 100-year rotation by 100,000 acres (Table 3-115). This substantially reduces risk relative to Alternative 3. Finally, within the matrix of Development LUD’s an average of 57 percent of the productive old growth will be retained nearly equivalent to alternative 3 and superior to all other alternatives except 4 and 5 (67 percent each) (Table 3-113)

Alternatives 4 and 5 should have nearly equal likelihoods of sustaining viable marten populations and both at levels higher than for Alternative 3. Alternatives 4 and 5 have 200 year rotations and harvest less old growth forest, and include similar beach, riparian and two-aged management regimes, and overall retain 67 percent of the productive old growth in the matrix, but less land is in protected reserves (Table 3-113). The 200 year rotation and associated thresholds should sustain a more even distribution of old growth across all landscapes. Alternative 1 poses the least risk to marten populations by allowing for essentially no additional harvest of old growth.

Alternative 6 and 10 may be considered intermediate in approximate relative risk to long-term marten viability. Alternative 6 only applies reserves in high risk landscapes but fails to conserve unfragmented blocks of landscape for future habitat needs. The enhanced beach and riparian features of Alternative 6 may serve to mitigate the intensity of matrix timber management on the 100 year rotation. Alternative 10 may have a slightly lower risk with the full complement of large and medium reserves but the application of a 100 year timber rotation throughout the matrix increases risk.

Alternatives 2, 7 and 9 all have substantially higher risks to maintenance of long-term marten viability. They have neither a reserve system nor an extended rotation concept. Riparian and beach habitats generally receive the least protection of all alternatives.

Alexander Archipelago Wolf

Panel Considerations and Assumptions. Perhaps the most significant factor affecting evaluators' ratings in Game Management Unit 2 and 3 was the estimates of deer habitat capability resulting from the Deer Panel habitat model (see previous discussion of deer model and effects). Deer are the primary prey of wolves in Southeast Alaska, and the significance of predator/prey interactions on wolf populations led to the conclusion that wolf persistence was directly linked to deer habitat capability. Therefore, to the extent the individual alternative design features effected deer habitat capability the feature was important to the alternative likelihood rating. There were no overall identified positive or negative contributions of major alternative design features such as reserves versus extended rotations, presence of an extended beach zone, or any specific riparian option.

Genetic differentiation was considered but was not a major factor in outcome ratings. The key factor revealed from the genetic data was the indication that interchange among wolves was occurring between major island groups in Southeast Alaska. On the other hand, direct ecological evidence suggests the existence of dispersal barriers or at least severe limitations. The panel considered hypothetical dispersal corridors between the Stikine River and Prince of Wales Island. However, the absence of wolves on Admiralty, Baranof and Chichagof Islands and lack of dispersal of radio-marked wolves away from Prince of Wales Island suggests the potential inability of wolves to successfully disperse across major water barriers. Thus insular populations of wolves may indeed exist in Southeast Alaska, and this has profound implications for conservation strategies and maintaining well distributed populations.

Roads as a management issue affecting wolf mortality were considered. There was general agreement that mortality related to roads is a human education and management issue and not specifically a road issue. Thus likelihood outcome rating were not generally affected by existing or planned miles of road construction, although some discussion focused on the extended rotation alternatives and general requirement for relative increase in roading in those alternatives. Conversely, some discussion indicated a preference for a reserve based landscape strategy to provide roadless refugia for wolves.

The concept of well distributed populations received considerable discussion, specifically what constituted a “gap” in wolf distribution that would trigger an Outcome III rating. Wolf dispersal capabilities were an important element in this dialogue as wolves are capable of dispersing several hundred miles. Some panelists considered a gap in distribution to be complete extirpation from major islands such as Prince of Wales and that a single wolf pack there might represent a well-distributed population. There was no agreement on this issue, especially from local experts.

Panel discussion generally concluded that a gap could be created in wolf distribution through the effects of forest management that reduced deer habitat capability to the extent that a pack no longer occupied a former territory. Ephemeral, dispersing individuals may occasionally occur in that formerly occupied range, but habitat was insufficient to continue to sustain a reproductively successful pack, and there would be limited interaction between individuals and packs resulting from these gaps.

Panel Evaluation of Alternatives. The final average panel ratings for Alexander Archipelago wolf are displayed in Table 3-119. For all alternatives, there is virtually no chance of extirpation of the wolf from the Tongass National Forest (Outcome V). All alternatives had only one of a possible 100 points assigned to this outcome. This likely represents a chance catastrophic event that, in combination with normal Forest Service activity, would result in the complete extirpation of wolves.

Table 3-119
Average Panel Assessment Ratings: Alexander Archipelago Wolf

	Alternative							
Outcome	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**
1	80	35	59	34	48	26	3	3
2	14	25	25	39	34	38	26	31
3	3	30	14	24	16	31	51	48
4	2	9	1	3	1	4	19	18
5	1	1	1	1	1	1	1	1
Average weighted outcome[1]	**1.3**	**2.2**	**1.6**	**2.0**	**1.8**	**2.2**	**2.9**	**2.9**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.92

Alternative 1 provided the greatest relative likelihood of maintaining stable well distributed wolf populations across their current range on the Tongass. However, panelists indicated that even with essentially no action, past management activity that reduced deer habitat capability on some portions of the forest (north and central Prince of Wales Island were specifically identified) would result in some likelihood (14) of locally reduced population levels. Outcome II for Alternative 1 was explained as the likely result of natural fluctuations in wolf populations in response to prey availability and other environmental factors.

Because of the intensity of proposed harvest activity and anticipated significant regional reductions in deer habitat capability, Alternatives 2, 7 and 9 were rated with some likelihood (range 9-19) of creating populations that would exist in refugia with severely restricted interaction between them (Outcome IV).

The likelihood of an alternative resulting in a situation in 100 years where either gaps in distribution occur, populations exist in refugia, or total extirpation may be a general indication that wolf populations would not remain well distributed across the Tongass compared to historical distributions. This cumulative likelihood is considered the sum of Outcomes III, IV, and V. Alternatives 7 and 9 both have a relatively high cumulative likelihood outcome, 71 and 67 respectively. Moderate likelihoods exist for Alternatives 2 (40) and 6 (36). These cumulative outcomes are generally directly related to the total harvest levels and associated reductions in deer habitat capability and all have in common a 100-year timber harvest rotation timber management regime.

Further Evaluation of Alternatives. Results of the Wolf Panel are synthesizes in a broader context, incorporating additional available information including the interagency Wolf Conservation Assessment (Person et al. 1996). Maintaining well distributed and viable wolf populations in southeast Alaska involves two principal management concerns. Current mortality rates in localized areas such as north Prince of Wales Island (POW) may result in local declines in the wolf population. Secondly, long-term reductions in deer habitat capability from timber harvest in some alternatives may negatively affect wolf populations. Wolf/deer population interactions in conjunction with human deer harvest and environmental variability is a complex relationship. There is relative certainty, however, that reductions in long-term deer habitat capability can eventually adversely affect all three of these interrelated components wherever wolves occur.

Wolf mortality concerns are primarily focused on POW and Kosciusko Island (most of ADF&G GMU 2) due to the relatively high existing road densities that provide greater trapping/hunting access. Wolf mortality results from natural events, legal hunting and trapping, as well as illegal kills. Human access to significant portions of the wolf range on POW increases wolf vulnerability to legal and illegal mortality. Person et al. (1996) reported a positive relationship between total roads and total reported wolf mortality in WAA's.

GMU 2 deer and wolf populations have been increasing since the severe winters in the late 1960's. Legal wolf harvests from hunting and trapping have also increased dramatically in GMU 2 over the last 19 years. The average annual legal wolf harvest from 1977/78-81/82 was 19 and increased nearly five fold to an annual average harvest of 96 wolves from 1991/92-95/96. Similar increases occurred in GMU 3 where an average of 13 wolves were harvested from 1977/78-81/82 and increased to an average of 43 wolves during 1991/92-1995/96 (Table 3-120).

Table 3-120
Annual legal wolf harvest from hunting and trapping in Region 1 (Southeast Alaska) during the past 19 years.

Year	GMU 2[(1)]	GMU 3[(1)]	GMU 1a, b, & c	Total Region 1
1977/78	23	10	42	75
1978/79	10	16	60	86
1979/80	11	16	45	72
1980/81	34	10	44	88
1981/82	19	14	35	68
1982/83	15	17	48	80
1983/84	27	17	59	103
1984/85	43	7	54	104
1985/86	18	9	52	79
1986/87	39	10	63	112
1987/88	55	9	58	122
1988/89	45	10	42	97
1989/90	32	22	82	136
1990/91	66	18	44	128
1991/92	86	51	59	196
1992/93	105	26	62	193
1993/94	103	48	74	225
1994/95	85	54	80	219
1995/96	99	36	67	202

[1] Game Management Unit (GMU) 2 is Prince of Wales and surrounding Islands and GMU 3 is Kuiu, Kupreanof, Mitkof Wrangell, Zarembo and Etolin Islands. GMU 1 is the entire mainland. Data provided by ADF&G.

In the remainder of the wolf range from Skagway to Dixon Entrance on the mainland, short-term viability concerns in response to management activities are lower despite lower apparent wolf densities. This difference is due to the generally unroaded nature of the mainland, difficulty of hunter access, minimal past timber harvest, relatively minor anticipated reductions in deer habitat capability and a more diverse prey base upon which wolves depend. Further, wolf harvest has been relatively stable over past 19 years (Table 3-120) in GMU 1a, b, and c, at least indirectly suggesting a temporary equilibrium between harvest mortality and net habitat capability. Wolf harvest rates in GMU 3 were low but stable, but have increased during the last five years, probably in response to recovering deer populations.

Within this planning period, wolf mortality will be addressed through coordinated management between the Forest Service and the ADF&G. Forest-wide standards and guidelines for wolves (Wildlife Section) that are applicable to all alternatives include such direction to address wolf mortality. Using this approach was also a principal recommendation of the Wolf Panel. The Wolf Panel suggested against use of a specific road density threshold "rule of thumb." This was contrary to Kirchhoff (1993) and Pletscher (1994) who recommended a road density threshold of no more than 1 mile of open roads/square mile. However, Person et al. (1996) revealed an increased legal wolf harvest in areas where open road densities exceeded 0.7 mile per square mile of land. Site specific, project level analyses will identify solutions to manage high mortality levels since local, prescriptive solutions are beyond the level of specificity available in the programmatic forest plan. Establishing a rigid road density threshold provides no assurance that objectives to manage wolf mortality will be achieved; if roads are determined to a causal factor in

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excessive mortality. Open road densities above or indeed below these referenced densities may be necessary to effectively manage road-access related wolf mortality that exceeds sustainable levels. In addition, seasons, harvest methods and bag limits must be used as a population management tool by the ADF&G as a complimentary approach to manage wolf mortality.

Person et al. (1996) suggested that roadless and unfragmented reserves should be established in biogeographic provinces where extensive timber harvesting is planned to reduce long-term risks to wolf viability. Reserves of approximately 50,000 acres per each 192,000 acres of landscape were considered necessary to support relatively secure core wolf populations. Spacing among reserves was not a critical criteria due to extensive movement capability of wolves. On POW/Kosciusko Island they recommended 9 such reserve areas totaling 437,000 acres (Table 3-121). Using the same design criteria, an estimated 7 reserves totaling 350,000 acres would be needed on Mitkof, Kupreanof and Kuiu Islands (representing most of GMU 3).

Table 3-121
Comparison of at least 50,000 acre contiguous reserves of natural setting LUDs on Prince of Wales and Kosciusko Islands (principally GMU 2) and Kuiu/Kupreanof/Mitkof Islands (principally GMU 3) by alternative.

Alternative.	POW/Kosciusko Reserves[1]	Total Acres	Kuiu, Mitkof Kupreanof Reserves[1]	Total Acres
2, 4	3	289,723	2	224,618
3, 10	4	431,181	3	282,189
5, 6	4	425,415	3	282,189
7	3	201,204	2	176,386
9	3	141,443	3	253,628
11	3	457,000	3	377,000
Recommended	9	**437,000**	7	**350,000**

[1] Reserves refers to the number of individual reserves over 50,000 acres allocated in the alternative.

Reserves of this size in these areas are displayed in Table 3-121 by alternative. Only Alternatives 1 and 11 meet the reserve criteria identified by Person et al. (1996) to sustain core wolf populations to reduce risks to long-term viability in the two principal areas of concern in Southeast Alaska (GMU 2 and 3). A few of these reserves represent new Old growth LUD allocations and may have some roads from previous management activity (e.g. Central POW reserve). Continued use of these roads would be examined consistent with the Old growth LUD and Forest-wide Standards and Guidelines for Wolves.

With the possible exception of the mainland, deer are the principal prey of wolves and wolf long-term viability is directly related to deer habitat capability, a point of common agreement between members of the Wolf Panel and Person et al. (1996). Timber harvest of important deer winter range reduces modeled deer habitat capability. Fragmentation of deer habitats may also increase deer vulnerability to predators, especially in winters of heavy snowfall (McCullough 1994). However, the deer panel and subsequent deer workshops (DeGayner 1996) removed the effect of "patch size" in the deer model. Immediate concerns in all alternatives focus on the cumulative effects of past timber harvest on the reduction in deer habitat capability on POW/Kosciusko Islands. Deer habitat capability has declined over 20 percent since 1954 in 12 of 24 WAA's on POW/Kosciusko Islands. In 3 WAAs capability has declined over 40 percent. A 25 year lag time is modeled between the time of timber harvest and the most dramatic drop in deer habitat capability. (See previous Sitka black-tailed deer discussion.)

Alternatives 1, 11, 4 and 5 will result in the least reduction in deer habitat capability on POW/Kosciusko Islands (Table 3-110) and thus have a higher relative likelihood of maintaining wolf populations. Long-term reductions in deer habitat capability in Alternative 3 and 10 may place wolf populations at greater risk on POW/Kosciusko Islands and possibly Kuiu/Kupreanof/Mitkof Islands because the even-aged short rotation management reduces deer habitat capability and the proposed habitat reserves (V-POP Large and Medium HCA's) are considered too small (McCullough 1994) to support wolf populations. Projected declines in deer habitat capability on POW/Kosciusko Islands in are somewhat greater in alternatives 2, 7, and 9 on POW (Table 3-110). Risks elsewhere within the range (GMUs 1a, b, c or 3) are slightly lower because of lower levels of planned timber harvest. Continued reductions in deer winter range coupled with the likelihood of another periodic severe winter (see discussion below) could increase the risk of deer population declines equal to or greater than those experienced in Kuiu/Kupreanof/Mitkof Islands in 1968-1971. Consequences of such an event to wolves as well as human uses of deer may be significant.

Further analysis of deer habitat capability relative to recommended deer densities suggests relatively low risk to wolves in many alternatives. Kirchhoff (1993) recommended that a deer density of 5 deer/mile^2 was necessary to sustain a deer/wolf equilibrium in GMU 2. Person et al. (1996) suggested that 13 deer/mile^2 would reduce the risk to long-term wolf viability. This deer density is likely to support wolves and sustain the current level of harvest by humans. Of the 25 WAA's on POW/Kosciusko Islands, the deer habitat capability model reveals the following number of WAA's in each alternative that would not support 13 deer/mile^2 in 2095: Alternative 1 - 2 WAA's; Alternatives 4, 5, 10 and 11 - 5 WAA's; Alternatives 3 and 6 - 6 WAA's; Alternative 2 has - WAA's; Alternative 7 - 11 WAAs; and Alternative 9 - 12 WAA's. Of the 18 WAA's on Kuiu/Kupreanof/Mitkof Islands, 4 WAA's would support less than 13 deer/mi^2 in Alternatives 1, 3, 4, 5, 6, 10 and 11 in 100 years. Alternative 2 would have 5 WAA's and Alternative 7 and 9 would have 6 WAAs below this modeled threshold after 100 years of forest plan implementation. (See Table 3-112.)

Three of the WAA's currently below the modeled threshold occur on Kupreanof Island, which theoretically supports a viable wolf population and human deer harvest. Furthermore wolves survived in this region through the consecutive hard winters from 1969-1972. Thus, the numerical threshold from Person et al. (1996) may only be applicable to POW/Kosciusko Islands where the data originated to conduct the analysis.

The above analysis relative to the ability of an alternative to provide habitat to sustain the current wolf population of 250-300 wolves on POW/Kosciusko Islands is conservative for three reasons:

1. Estimated deer densities (Table 3-112) reflect a 36 percent reduction where wolves occur to account for the portion of the deer habitat capability (component of the deer population) consumed by wolves. These reduced deer densities are then used to assess areas that support at least 13 deer per square mile - a density estimated necessary to support both wolves and human deer harvest. Using this approach, wolf deer prey needs have been

provided for twice; once in the 36 percent reduction in density and once in the 13 deer per square mile threshold.

2. The deer model estimates long-term deer habitat carrying capacity and assumes that winter range is considered the limiting factor to deer populations in Southeast Alaska. Thus, deer habitat capability is essentially the population that could be sustained through the most restricted period, generally mid-late winter. The model does not consider demographics and does not include the "annual increment" of annual spring fawn production that may represent 20-40 percent increase in population size throughout the year (until mid-late winter). This deer biomass is available to wolves essentially throughout the year that is not represented in the above analysis.

3. Habitat capability from non-federal land is not included in the density estimates, thereby understating actual habitat capability available to wolves. Table 3-112 displays the abundance of non-federal lands and the estimated deer habitat capability in each WAA.

This analysis indicates that alternatives that result in WAA's having insufficient deer habitat capability to support a modeled threshold of 13 deer/mi^2 are at risk of either not sustaining current wolf populations (estimated 250-300 wolves), or current annual levels of human deer harvest, or both. Maintaining habitat to support current relatively high wolf populations and current human deer harvest is unlikely a viability issue for wolves.

A Forest-wide Standard and Guideline in the Forest Plan (Alternative 11) maintains sufficient deer habitat capability to sustain wolf populations, generally 13 deer/mi2 where deer are the principal prey of wolves. This standard should preclude further declines in deer habitat capability that would adversely effect the equilibrium. This equilibrium between habitat capability, wolf populations, and human deer harvest could be disrupted with likely increases in human deer harvest, or alternatively, increased deer harvest demand may not be satisfied. Because deer model outputs have not been validated and the threshold equilibrium level of 13 deer/mi^2 is a working hypothesis, this analysis indicates areas of potential concerns relative to the current situation rather than an absolute management threshold.

Deer populations declined significantly in parts of GMU 3 (especially Kuiu, Kupreanof, and Mitkof Islands) from 1969 to 1972 as a result of heavy and long-lasting snowfall; deer hunting was closed for 18 years. Extremely severe winters are apparently periodic and may occur every 15-20 years in Southeast Alaska (Juday 1984). Wolf populations persisted, at least in low densities, in spite of significant deer population declines and wolves (and perhaps black bears) apparently factored heavily in limiting deer population recovery that took nearly 20 years in some areas such as Mitkof Island. Other regions of GMU 3 still maintain low deer densities, well below carrying capacity (e.g. Kuiu Island) that the vegetation could support.

The periodic nature of these severe winter events suggests that during the next 10-15 years there is a high likelihood of such an event occurring again in Southeast Alaska. Within the longer 100 year period, perhaps 3-5 such events could be expected. As deer habitat capability is reduced from timber harvest, the magnitude of deer population declines resulting from these events will presumably increase. Population recovery times will likely increase and thus directly affect wolf populations where deer are the primary prey on the islands of GMU 2 and 3. As

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such, maintenance of long-term deer habitat capability would reduce the frequency and magnitude of periodic lows in deer populations.

Short-term management concern may, however, be heightened because evidence suggests that wolves on POW may represent a relatively isolated population. First, there is little apparent dispersal between wolves on POW and the adjacent mainland or major islands. Person and Ingle (1995) did not detect any movement of radio-marked wolves from POW across Clarence Strait to the mainland or GMU 2 over three years, suggesting some degree of isolation, despite speculation to the contrary by the Wolf Panel. But, current relatively high deer populations (abundance of food) and high wolf mortality rates (estimated 50 percent in some regions - Person et al. 1996) creating ‘vacant’ wolf habitat suggests at least a temporary situation that might reduce the necessity and likelihood of long-distance dispersal. That major bodies of water may serve as dispersal barriers is supported by the absence of wolves on Admiralty, Baranof and Chichagof Islands. Further, the proportion of dark pelage wolves in the overall harvest in Southeast Alaska may exceed 50 percent, whereas on POW dark phases only represent 14.5 percent of the harvest; body size of both males and females harvested on POW were smaller than the overall harvest (Person and Ingle 1995), suggesting at least some degree of variation in allele frequencies.

The recent study by Shields (1995) did not detect any genetic differences, among wolves in Southeast Alaska. This may be due to small sample sizes and the use of less definitive laboratory techniques. However, total genetic isolation is not necessary to consider a population relatively isolated. A chance immigration of just one breeding individual per generation (10 years, or other similar ecological time frame) may be sufficient to maintain some degree of genetic heterozygosity (Lacy 1987). The demographic consequences of isolation are, however, much more severe since the chance interaction of just one individual per generation would likely be insufficient to rescue a declining population, thus possibly resulting in local extirpation.

Based upon the above analyses, only Alternatives 1 and 11 have a high likelihood of sustaining viable and well distributed wolf populations in GMU 2 and 3 as well as the remainder of their historic range on the Tongass. Only these two alternatives will sustain sufficient reserves on POW/Kosciusko Islands and Kuiu/Kupreanof/Miktof Islands to provide secure core refugia for wolf persistent wolf packs and provide sufficient deer habitat capability to sustain the current deer, wolf, human harvest equilibrium.

Both short-term and long-term viability concerns should be considered in light of a recent review by Fritts and Carbyn (1995) that examined wolf viability and conservation relative to nature reserves. They reviewed information on many wolf populations throughout North America and Europe and concluded that data on survival of actual wolf populations might suggest that wolves are more resilient than is indicated by classic population viability analysis theory. In fact, many populations they examined were smaller than the estimated populations on POW/Kosciusko Islands. They remained concerned however, about fringe populations and rare subspecies, especially those located in the southern part of the species’ range.

Marbled Murrelet

Considerations and Assumptions. The panel noted the lack of distributional and ecological information about marbled murrelets, especially in Southeast Alaska. They appeared to make the following general assumptions about harvest practices and other components of the alternatives relative to marbled murrelets and in particular to nesting habitat.

1. The best or most important habitat is found within large contiguous blocks of high-volume, low-elevation old-growth forest. In Yakutat and Glacier Bay this may include stands of large mature Sitka spruce.

2. The main concern with fragmenting or reducing such habitat (1.) is an increase in predation rates (more edge and less interior).

3. Canopy cover above the nest (highest in the high-volume stands) is another critical factor in keeping predation rates lower.

4. The maintenance of old-growth forest reserves, and extended rotations, are both seen as ways to retain suitable nesting habitat. Large reserves, and rotations greater than 200 years, are favored; an alternative that would provide both Forest-wide would be ideal (assuming timber harvesting is to continue). Rotations averaging 100 years are not long enough to provide suitable habitat.

5. Riparian and beach fringe old growth, due to its linear nature (more edge, less interior), is considered less suitable nesting habitat than interior old growth. Alternatives with higher amounts of riparian and beach fringe protection may work against murrelets by pushing harvest into critical nesting habitat. Conversely, higher riparian protection could lead to improved habitats overall through a synergistic effect resulting from more interconnectivity.

6. The retention of spatially-explicit small old-growth reserves (as in the one/watershed in Alternatives 3) is favored over the "33 percent residual" concept of Alternatives 5 and 6.

Evaluation of Alternatives. Average panel ratings are shown in Table 3-122. Based on these ratings, the alternatives fall roughly into four groups. Alternative 1 is by itself with all of its outcome points assigned to Outcomes I or II. The very low level of timber harvest, all of it under a 200-year rotation, resulted in a rating considerably higher (in terms of ensuring viability) than the other alternatives. The assignment of points to Outcome II was primarily a result of the amount of low-elevation, high-volume old growth already harvested.

Alternatives 3, 4 and 5 all rated fairly high, with at least 74 percent of the points in Outcomes I or II. Alternative 5, offering extended rotations and reserves in critical areas, had the highest viability scores of this group, although the panel would have preferred spatially-identified small reserves rather than the 33 percent residual old growth concept. The full reserve system and greater riparian protection, combined with two-aged management, of Alternative 3 was favored somewhat over the Forest-wide uneven-aged management, but no reserves, of Alternative 4.

Table 3-122
Average Panel Assessment Ratings: Marbled Murrelet

	Alternative							
Outcome	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**
1	85	18	41	36	45	26	10	16
2	15	34	40	38	46	33	20	29
3	0	40	19	24	6	36	45	38
4	0	9	0	3	3	5	23	18
5	0	0	0	0	0	0	3	0
Average weighted outcome[1]	**1.2**	**2.4**	**1.8**	**1.9**	**1.7**	**2.2**	**2.9**	**2.6**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.98

Alternatives 2, 6, and 9 each have most of their points (67-74 percent) assigned to Outcomes II or III, and except for Alternative 9 have over 90 percent in Outcomes I-III, providing moderate to high viability ratings (although not all panelists felt Outcome III would meet viability requirements). The rationale for these scores varied by alternative. Alternatives 6 rated highest of this group due largely to their reserve systems, two-aged rather than even-aged timber harvesting, and watershed-specific residual old growth requirements. The 100-year rotations in each were a drawback. Alternatives 2 and 9 rated somewhat lower than Alternatives 6, neither of the former having a reserve system and both using even-aged harvest with 100-year rotations.

Finally, Alternative 7, similar to Alternatives 2 and 9 and with a higher timber harvest level, had the lowest viability rating, assigning 2/3 of its points to Outcomes III or IV.

Marbled murrelet likelihood outcome ratings were also highly correlated (0.98) with acres of productive old growth planned for harvest over a 100 year rotation. Alternative 10 is very similar in design to Alternative 3, but does not have the extended beach nor option 1 and 2 riparian buffers, both features considered important by panelists, thus presents greater relative risks than Alternative 3. The system of large and medium and unmapped small old growth habitat reserves in Alternative 10 was also an important feature, thus superior in design with lower relative risk that Alternative 2.

Alternative 11 harvests nearly the least amount of old growth (Table 3-115) has the most extensive forest-wide reserve system (Table 3-113) with very large reserves in heavily harvested provinces, and has an extended beach and significant riparian protection. The only possible drawback of Alternative 11 is the 100 year timber harvest rotation in the matrix, viewed as unfavorable by panelists. However, an average of nearly 57 percent of the original 1954 productive old growth will remain in all watersheds under timber management (Table 3-113) contributing to a diversity of stands and habitat mosaics, clearly superior to extensive even-aged stands. Thus, Alternatives 1 and 11 offer the highest likelihood of maintaining well distributed viable murrelet populations

Commentary on the Panel Ratings. The marbled murrelet is second only to the Other Terrestrial Mammals panel with respect to the lack of local information available to assess long-term viability. Viability concerns for the marbled murrelet in southeast Alaska intensified due to listing of this species as threatened under

ESA in California, Oregon, and Washington and the very close habitat affinity with coastal old growth forests (Ralph et al. 1995). Information to substantiate this concern in southeast Alaska is only indirect relative to the loss of nearly one million acres of productive old growth coastal temperate rainforests throughout southeast Alaska (including all ownerships). These are generally the more productive sites at low elevation, presumably some of the best murrelet nesting habitat (DeGange 1996). However the strength of the association between murrelet nesting habitat and highly productive old growth forest has not been established; indeed two of the six nests located in Southeast Alaska to date have been on the ground.

Short term (10-15 years) risks to murrelet viability are difficult to assess but are likely minor especially given the magnitude of recent conservative population estimates of over 365,000 marbled murrelets in southeast Alaska (DeGange 1996). Further, murrelets appear to be highly mobile traveling up to 50-60 miles per day on foraging flights (DeGange 1996) suggesting at least the possibility of relatively high population interaction throughout southeast Alaska. Short term risks are likely proportional to the amount of additional old growth planned for harvest among alternatives (1, 11, 5, 4, 3, 10, 6, 2, 9 and 7 in order of increasing risk) within the planning period covered by the TLMP Revision. While large block reserves in general may be a preferable conservation strategy, the small (1,600 acre) block reserves (Alternatives 3, 10, 11 and parts of 5 and 6) in each watershed may significantly contribute to maintenance of nesting habitat and well distributed populations in the absence of additional information on nesting habitat relationships. Forest-wide Standards and Guidelines protect nesting habitat around any identified murrelet nests. However, only six murrelet nests have been found so this standard is not considered as a viable conservation strategy in itself. Rather it serves to protect habitat surrounding the few nests that may be located for long term monitoring and studies to understand murrelet habitat relationships .

Under the assumption that productive old growth habitat is the preferred murrelet nesting habitat, then the loss of an additional 1.5 million acres in some alternatives, in addition to the million acres already lost, could contribute to a long-term viability concern. This concern may become greater if future research reveals a significant murrelet selection for high volume low elevation forests that are sought for timber production, similar to the situation documented in the Pacific Northwest (Ralph et al. 1995). DeGange (1996) suggested that long rotations may be beneficial components to a murrelet conservation strategy, he concluded that a reserve system was more likely to present a viable conservation strategy for murrelets given significant unknowns about this elusive specie; protecting intact landscapes/ecosystems is a better hedge against uncertainty.

The significant reserve system in Alternative 11, especially in at-risk landscapes with significant past timber harvest (reserves partially discussed under Wolf) may make this alternative superior to all others (except Alternative 1). The reserve system in additional to significant matrix protection should provide a reasonably high likelihood of sustaining well-distributed viable murrelet populations throughout southeast Alaska.

Even over long time periods, there is less relative concern for the marbled murrelet compared to other old growth associated vertebrates assessed by panels. Average murrelet scores for Outcome I and II rated higher than all other species in all alternatives except for the wolf in Alternatives 2 and 3.

Other Terrestrial Mammals

Considerations and Assumptions. The panel identified two groups of mammals for evaluation: (1) widely distributed taxa associated with productive old-growth (*widely distributed group*), and (2) endemic taxa associated with productive old-growth (endemic group). The widely distributed group was comprised of the following:

black bear (*Ursus americanus pugnax* Swarth)
Canada lynx (*Lynx canadensis canadensis* Kerr)
wolverine (*Gulo gulo* luscus Linnaeus)
fisher (*Martes pennanti* [Rhoads] Miller)
northern flying squirrel *(Glaucomys sabrinus zaphaeus* [Osgood] A.H. Howell)
river otter (*Lutra canadensis mira* Goldman)
mountain goat (*Oreamnos americanus columbiae* Hollister)
silver-haired bat (*Lasionycteris noctivagans* [LeConte] Peters)
California Myotis (*Myotis californicus caurinus* Miller)
Keen's Myotis (*Myotis keenii keenii* [Merriam] Miller and G.M. Allen)
little brown Myotis (*Myotis lucifugus alascensis* Miller)
long-legged Myotis (*Myotis volans longicrus* [True] Miller and G.M. Allen).

The *endemic group* was comprised of the following:

Prince of Wales Island flying squirrel (*Glaucomys sabrinus griseifrons* A.H. Howell)
beaver (*Castor canadensis phaeus* Heller)
Keen's mouse (*Peromyscus keeni sitkensis* Hogan et al. 1993)
red-backed vole (*Clethrionomys gapperi stikinensis* Hall and Cockrum)
red-backed vole (*Clethrionomys gapperi solus* Hall and Cockrum)
red-backed vole (*Clethrionomys gapperi wrangeli* [V.Bailey] Hall and Cockrum)
red-backed vole (*Clethrionomys gapperi phaeus* Swarth)
Admiralty Island meadow vole *(Microtus pennsylvanicus admiraltiae* Heller)
Sitka meadow vole (*Microtus oeconomus sitkensis* Merriam)
ermine (*Mustela erminea alascensis* Hall)
ermine (*Mustela erminea initis* Hall))
ermine (*Mustela erminea celenda* Hall)
Admiralty Island ermine (*Mustela erminea salva* Hall)
Suemez Island ermine (*Mustela erminea seclusa* Hall).

The panel used the approach of assigning the likelihood scores given to the most vulnerable or sensitive taxa within a group to the entire group. For example, if a panelist reasoned that habitat conditions created by Alternative 6 represented a 30 percent likelihood that Outcome V (extirpation) would occur for Keen's Myotis, then the panelist would assign a 30 percent likelihood score for Outcome V to the *widely distributed group*.

The panel predicted that all of the proposed alternatives had some likelihood of causing extirpation within the endemic group. This prediction was attributed to both historical and proposed timber related activities. These likelihoods increased with higher levels of timber harvest proposed. Conversely, the panel also predicted that mountain goat, one ermine (*Mustela erminea salva*), beaver (*Castor canadensis phaeus*), and Admiralty Island meadow vole would largely experience no adverse effects under all alternatives.

The panel also predicted that most of the alternatives have a relatively high likelihood of creating conditions where wildlife populations of at least one of the species in the group may be no longer well distributed and viability could be compromised. According to the panel, a serious problem (viability) could exist once a taxon or group reaches Outcome II or III (depending on the circumstances). Most of the alternatives (except Alternative 1) had some indicated likelihood of causing extirpation of some taxa in the *widely distributed group*.

Significant concerns identified by panelists for at least one species in these groups led to significant design feature changes in some alternatives, especially Alternative 11. To specifically address restricted range endemics that may occur only on one or a few isolated islands, all islands less than 1,000 acres were removed from the timber base to eliminate risks to habitat loss or alternation from timber harvest. The extended beach fringe and riparian corridors would were also features that provide functional habitat for species with relatively small home ranges.

Evaluation of Alternatives. Average panel ratings are shown in Table 3-123. Alternative 1 was generally considered by the panel as the alternative least likely to negatively impact taxa under consideration. The panel predicted a higher likelihood that the *widely distributed group* would experience ephemeral range distribution gaps (Outcome II); the *endemic group* would occur more frequently in refugia (Outcome IV). Panelists assigned these outcomes based upon historical levels of timber related activities. The panel suggested that Alternative 1 could be improved by restoring old-growth in extensively harvested areas (northern Prince of Wales Island for example).

Table 3-123
Average Panel Assessment Ratings: Other Terrestrial Mammals

	Alternative							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**9**
Endemic Group								
I	13	0	8	4	5	8	0	0
II	20	5	15	14	18	18	3	3
III	18	11	21	19	16	18	8	9
IV	43	30	36	50	51	28	26	29
V	8	54	20	14	10	30	65	60
Average weighted outcome[1]	**3.1**	**4.4**	**3.7**	**3.6**	**3.5**	**3.8**	**4.5**	**4.5**
Widely-Distributed Group								
I	23	0	5	1	3	5	0	0
II	44	9	31	34	38	19	3	3
III	25	18	34	41	49	25	8	9
IV	9	29	19	21	9	36	31	35
V	0	45	11	3	3	15	59	54
Average weighted outcome[1]	**2.2**	**4.2**	**3.0**	**3.0**	**2.8**	**3.4**	**4.5**	**4.5**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.96

Alternative 5 was regarded by panelists as the second least likely alternative to negatively impact taxa under consideration. The panel offered higher likelihoods that the *widely distributed group* would experience both ephemeral and permanent range distribution gaps (Outcomes II and III) that could affect viable populations well-distributed across the planning area. Little brown Myotis was cited as one animal whose local populations would be more ephemeral under this alternative; it was predicted that fisher could experience significant gaps in its historic range. The *endemic group* would more likely be restricted to refugia under Alternative 5 (Outcome IV). These circumstances would increase the risk of extirpation as a result of isolation. Prince of Wales Island flying squirrel was noted as one animal that would likely only exist in refugia. A relatively longer rotation, uneven- and two-aged management systems, and old-growth retention were features the panel liked about this alternative. Panelists stressed that reserves proposed under this alternative should be carefully located within the ranges of vulnerable wildlife and that corridors be truly functional.

Panelists ranked Alternatives 3, 4 and 6 as intermediate among the alternatives in terms of likelihood of negatively impacting taxa under consideration. For both the *widely distributed* and *endemic groups*, likelihood scores were fairly evenly distributed among Outcomes II, III, and IV; scores for outcome extremes (I and V) were consistently lower for these alternatives. For most of these alternatives, local populations of Sitka mouse could become more ephemeral (Outcome II); northern flying squirrel could experience permanent gaps in its historic range or exist only in refugia (Outcome III or IV); fisher could exist only in refugia (Outcome IV). The panel suggested that Alternatives 3 and 6 could be improved by lengthening rotation ages and reducing harvest levels. The greater protection afforded riparian habitat proposed under Alternative 3 was identified by the panel as a positive feature for maintaining viable river otter populations.

The panel considered Alternatives 2, 7 and 9 to be most likely among alternatives to create wildlife viability problems. The panel predicted that implementation of these alternatives would result in high likelihoods that both the *widely distributed and endemic groups* would exist only in refugia (northern flying squirrel for example) or would become extirpated (Keen's Myotis for example). It was suggested that these alternatives could be improved by incorporating several features of Alternative 5--longer rotations, uneven-aged management, and higher levels of riparian habitat protection.

Alternative 10 is intermediate between Alternatives 2 and 3 in both design features and acres of old growth harvested; thus risks to maintaining viable populations other mammals is likely intermediate between these two alternatives. Design features removed from Alternative 3 and not found in Alternative 10 such as the extended beach and reduced riparian protection generally increased risks to these mammals relative to Alternative 3.

Alternative 11 has additional features that further increase the likelihood of maintaining well distributed mammal populations compared to Alternative 3, such as mapped small reserves, and allocation of four additional medium or small reserves. Substantially fewer old growth acres are scheduled for harvest in Alternative 11 than 3 so overall risks are also reduced and based upon this measure of acres of old growth harvested, Alternative 11 may pose less risk than Alternative 5.

Commentary on the Panel Ratings. The Other Terrestrial Mammals Panel was asked to conduct their assessment with little information. Their assessment of alternatives produced scores that were the most conservative among all wildlife panels. There are at least two factors that probably influenced the distribution of points among alternatives. When scientists are faced with uncertainty, the tendency is to err conservatively; the paucity of information available to this panel probably increased uncertainty among the evaluators. Secondly, the total number of species represented by both groups increased the possibility of encountering species that were especially sensitive to selected alternatives and thus influenced likelihood point distribution in outcomes reflecting greater risk to maintaining viable and well distributed populations across the Tongass National Forest.

Further examination of available information can serve to focus viability concerns among these mammal taxa. Assuming that loss of productive old growth conifer forest habitat is the greatest risk facing old growth associated species, then those species most closely associated with old growth are assumed to be at greatest risk. Thus among the 14 species or subspecies included in the "endemic group", the Prince of Wales flying squirrel may be assumed to have the greatest viability concern. MacDonald and Cook (1994) concluded that Keen's mouse (*Peromyscus*) and red-backed voles (*Clethrionomys*) were ubiquitous with generalized habitat requirements and that voles (*Microtus*) were restricted to herbaceous and shrub dominated habitats. The Panel concluded (Julin 1995) that beaver are more closely associated with deciduous habitats rather than conifer old growth and mentioned little about ermine. However, Suring et al. (1993) rated the vulnerability of ermine habitat as a low level of concern suggesting a limited association with old growth forest; conversely they concluded that the northern flying squirrel was closely associated with old growth forest and rated the habitat concerns as high.

A similar analysis of the Widely Distributed Group revealed that the northern flying squirrel may be the most vulnerable species in that group as well. The wolverine was not identified as an old growth associate (Suring et al. 1993) and was not rated. The lynx is a casual visitor to southeast Alaska (MacDonald and Cook 1994) and was rated as a low level of concern for loss of old growth habitat (Suring et al. 1993). The occurrence of fisher in southeast Alaska was first confirmed in 1994 along the Taku River (MacDonald and Cook 1994) and is considered a visitor in the major transboundary river drainages and most of these lands have land allocations precluding old growth harvest. The mountain goat was not mentioned in Panel discussions but is considered an old growth associate that is generally associated with steep slopes and cliff habitat (Suring et al. 1993), areas generally inoperable for timber harvest.

The black bear was rated as only moderate concern for loss of old growth habitat (Suring et al. 1993). Suring et al. (1988) concluded that food was the limiting factor for black bear habitat capability and a variety of habitats including salmon streams, estuarine grassflats, avalanche chutes, early seral conifer stands as well as old growth provided food resources suggesting a moderate association with old growth. Since salmon are a principal food source in July - September, alternatives that minimize risk to riparian habitat and fish production will benefit bears (Alternatives 1, 11, 4, 5, 3, 6 and 10 in increasing order of risk). However black bears are unlikely the most limiting species with a viability concern within the widely distributed group.

River otters are considered old growth associates but habitat relationships indicate that terrestrial habitat use is limited to the narrow beach fringe habitat and riparian corridors (Suring et al. 1988). Thus alternatives that provide a 500' beach fringe (all but 9) and minimize risk to riparian habitats and fish habitat capability (Alternatives 1, 11, 3, 4, 5, 6 and 10 in increasing order of risk) will likely sustain river otter populations and minimize viability concerns.

Five species of bats were included in the group but information is extremely limited. Specimen records range from two to five individuals for three species, no records for the big brown bat exist for Southeast Alaska and the little brown myotis is considered widely distributed but habitat relationships are virtually unknown (MacDonald and Cook 1994). Riparian habitats were discussed by the panel (Julin 1995) and karst systems have been mentioned as habitats associated with bat use (MacDonald and Cook 1994) on Prince of Wales Island. Thus by inference bats, may benefit from greater cave and riparian habitat protection afforded in Alternatives 1, 11, 3, 4, 5, 10 and 6 but whether these measures will assure maintenance of viable and well distributed populations is unknown. The Keen's Myotis was repeatedly discussed by the panel as extremely rare and is currently on the Red List of rare species in British Columbia (Julin 1995).

The two subspecies of the northern flying squirrel appear to be the most sensitive among all species assessed by the panel. This is not surprising since this was the only species specifically mentioned as an old growth associate by MacDonald and Cook (1994). More importantly, the northern flying squirrel was rated with the highest viability concern among all mammals assessed by Suring et al. (1993). Also, recent laboratory work indicates that the Prince of Wales flying squirrel may be genetically distinguished from all other flying squirrel populations that have been analyzed from interior Alaska to British Columbia (Cook 1996). This preliminary information supports the subspecific taxonomy (*Glaucomys sabrinus griseifrons*) and provides more evidence of insular populations that exist on Prince of Wales Island among a variety of terrestrial taxa that have limited dispersal capabilities across major bodies of water. Thus, lacking better information about any species in either group, the above analysis suggests that the flying squirrel may be considered a management indicator for these other mammals from a conservation planning perspective, despite the acknowledged limitations in the management indicator concept discussed earlier.

Habitat needs of flying squirrels contributed to the development of a multiscale, large, medium and small habitat reserve landscape conservation strategy for all old growth associated species (Suring et al. 1993). Conservation needs of flying squirrels specifically included a 1,600 acre small habitat reserve in each 10,000 acre watershed to sustain habitat to support well distributed populations capable of interaction across the landscape.

The complete set of habitat large and medium reserves and unmapped small reserves are applied in Alternatives 3 and 10 provide a moderate relative likelihood of sustaining flying squirrel populations. However, because of limited mobility of squirrels, population interaction may require forested landscape linkages not otherwise provided by significant beach or riparian corridors in these two alternatives which allow a 100 year timber harvest rotation in the intervening matrix. Alternatives 4 or 5 with 200 year rotations and a greater diversity of forest age classes from 0-200 years old, and riparian corridors and a beach fringe buffer, would presumably have a higher likelihood of sustaining flying squirrel populations. However, if one assumes the panel ratings were applied to just the flying squirrel then Alternatives 4 and 5 would have a combined Outcome I and II (well distributed populations) of 18 and 23. Moreover, even Alternative 1 only has an Outcome I and II rating of 33 suggesting that past management activity, especially on Prince of Wales Island has already placed this species at risk. Alternative 6 applies reserves on Prince of Wales Island, but the 100 year rotation in the matrix would likely isolate populations that exist in reserves. Alternatives 2, 7 and 9 have the least relative likelihood of sustaining well distributed flying squirrel populations because they have neither reserves or extended rotations. While all of these alternatives would provide some old growth unsuitable for timber production, the amount, quality, and distribution of these acres remains unknown (see Table 3-113).

Alternative 11, among all alternatives except 1, presents the highest likelihood of sustaining habitat to support viable populations of endemic and wide ranging mammals. This conclusion is predicated upon the fact that Alternative 11 proposes to harvest nearly the least amount of productive old growth, similar to Alternative 5, (Table 3-115) that in general should reduce overall risk. The manner in which the alternative is designed should further prove superior than Alternative 5, primarily due to the extensive reserve system built into Alternative 11. Alternative 5 has an extended rotation but fails to provide multiscale reserve system across the forest. The very large reserves in Alternative 11, especially in heavily harvested provinces, and the forest-wide system of mapped large, medium and especially small reserves is a multiscale ecosystem hedge against significant uncertainty. Thus the optimum strategy for these species and associated unknowns is a significant reserve system that preserves entire landscapes and ecosystems well distributed across the forest at multiple scales from small old growth blocks in every watershed to large and medium reserves on up to the 1-2 very large reserves in each province.

Finally, the Panel recommended special management consideration be applied to small islands (Julin 1995). This is largely due to high levels of endemism already documented (MacDonald and Cook 1994) as well as the likelihood of additional endemism that may occur within the island archipelago on the Tongass. Lidicker (1994) shared similar concerns for small islands and the maintenance of biodiversity and recommended that no timber harvest occur on islands less than 1,000 acres in size and islands greater than 1,000 acres should have at least one habitat reserve. He also recommended islands with known endemics, or islands that were extremely isolated should be completely protected from commercial timber harvesting.

In response to this recommendation, an analysis was conducted of all islands on the Tongass (Iverson 1996). This analysis revealed a total of over 22,730 islands forest-wide, and 21,271 of these were less than 1,000 acres. Of these, 179 had old growth forest that was tentatively available for timber harvest. To minimize risk to possible small island endemics and related biodiversity, all islands less than 1,000 acres in size were removed from the timber base and given complete protection in Alternative 11, a design feature not found in any other alternative except 1. These islands include Whitney, East Level, Mosman, and Greys Island on the Stikine Area and White Cliff, Eagle, Gedney, and Peratovich Islands on the Ketchikan Area. All of these islands are in timber development LUDs in all other alternatives. Thus in addition to the overall superior design of Alternative 11, this measure of removing small islands from the timber base should contribute to maintenance of unknown features of biodiversity on the Tongass related especially to small island endemic mammals.

Brown Bear

Considerations and Assumptions. Riparian habitat emerged as one of the more important elements of brown bear ecology addressed by panelists. The relationship between riparian habitat management and the maintenance of habitat capability in sustaining anadromous fish production (see Fish section) is one aspect. Salmon obtained from mid-summer to early fall represent a very important food source for accumulation of energy reserves to sustain overwinter denning for a substantial proportion of the brown bear population in most years. Panelists agreed that any factor that diminished net fish production and long-term habitat capability related to variations in riparian habitat management standards was directly related to the assessment of long-term brown bear persistence, and thus favored features that reduced management risk to the fishery resource.

A second aspect of riparian habitat management is vegetative cover provided by riparian habitats. Cover for visual obscurity is important for minimizing interactions among bears and between humans and bears. In addition, unpublished data from local studies revealed that bears also use daybed loafing sites within the riparian zone where salmon are taken to avoid interaction with other bears. These sites are generally within 500 feet from the stream. A brown bear standard and guideline that establishes an objective to provide visual cover along streams important for brown bear foraging, without providing specific distances, was considered inadequate, and even the largest buffers (over 250 feet) provided in Riparian Option 1 on some channel types were considered insufficient to meet riparian cover objectives for brown bears. Panelists strongly recommended that a minimum 500' no-harvest riparian buffer be maintained along streams considered important for brown bear foraging.

Roads and human access and the effect on brown bear populations was considered equally important. The panel specifically clarified that the issue was the human access and use of roads and not necessarily the physical nature of the road itself. However, to the extent that road construction and presence also contributed to reduced habitat capability for anadromous fish populations, a major concern revealed by the fish panel, the panelists' overall concern over roads was heightened. Data was presented that revealed a correlation between miles of road that facilitated human access and bear mortality on northeast Chichagof Island.

The likely abandonment of brown bears from once inhabited landscapes along the Juneau road system was cited as evidence of effects of human access and presence at a more intensive level, a clear example where a gap in brown bear distribution had developed. Thus absence of bears from one or more adjacent major watersheds constituted a gap in distribution. Design features of alternatives relative to harvest techniques, harvest thresholds, rotation lengths, uneven-aged management and other factors affecting upland old growth forest structure were of secondary importance in panel deliberations. However, factors that increased road construction and repeated human entries into a watershed were viewed as adverse to brown bear populations, especially the concept of dispersed, extended rotation timber harvests.

Panelists favored the reserve concept in alternative design, not necessarily as a large block of unfragmented old growth, but rather as landscapes providing roadless refugia from human disturbance. Most panelists considered the large 40,000 acre reserves as generally adequate in relation to the smaller home ranges of brown bears in Southeast Alaska. Medium reserves were considered too small to independently sustain brown bear and rather functioned as landscape linkages between large reserves. Twenty miles between large reserves was considered beyond the average dispersal movement from telemetry data presented. However, several examples of large movements documented on Admiralty Island demonstrated a capability of bears to move significant distances.

The panel considered current population trends and concluded that there is no evidence of short- or long-term brown bear population declines anywhere in Southeast Alaska. Current mortality rates are estimated at four percent from all sources. The population is apparently reproducing at a rate matching current mortality and thus maintaining current populations. Anticipated cumulative effects of planned management may result in reduced brown bear habitat capability, reductions in population size with the resulting creation of more gaps in distribution, or some populations existing in isolated refugia. Implicit in this conclusion is that even if all regulated and permitted harvest would cease, mortality rates would exceed four percent from other sources due to anticipated increases in roading and human population, resulting in at least locally declining populations.

Evaluation of Alternatives. Average panel ratings are shown in Table 3-124. Panelists unanimously agreed that brown bears are not likely be extirpated in 100 years from the Tongass National Forest under any alternative. All panelists rated Outcome V as 0 for all alternatives. Wilderness and LUD II (legislated) areas essentially assure brown bear persistence somewhere in Southeast Alaska in 100 years. Alternative 1 was rated highest in total likelihood of maintaining brown bears in their current distribution, with combined scores of Outcomes I and II of 93, although certain populations would experience some reduction in overall density (a 53 score for Outcome II). The likelihood rating of 7 for Outcome III is due to the extent of past roading and an anticipated future growth in human use of existing roads, in spite of little or no additional timber harvest.

Table 3-124
Average Panel Assessment Ratings: Brown Bear

	Alternative							
Outcome	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**
I	40	4	10	8	7	6	0	0
II	53	35	50	47	59	45	16	14
III	7	37	36	37	34	38	44	45
IV	0	24	4	8	0	11	40	41
V	0	0	0	0	0	0	0	0
Average weighted outcome[1]	**1.7**	**2.8**	**2.4**	**2.5**	**2.3**	**2.6**	**3.3**	**3.3**

[1] The correlation coefficient between acres of old growth planned for harvest (Table 3-115) and average weighted outcome is 0.97.

Due to the planned extensive timber harvest and associated road construction, Alternatives 7 and 9 had the highest likelihoods of limiting distribution of brown bears such that they might exist only in isolated refugia, with Outcome IV scores of 40 and 41, respectively.

Panelists generally agreed that either Outcomes III, IV or V would not represent well distributed populations based upon the assessment criteria they were provided. Alternatives 2, 7 and 9 all had combined scores of over 50 for Outcomes III, IV, and V combined. All of these alternatives have in common relatively extensive planned timber harvest and all are managed with a 100-year rotation. These four alternatives present the greatest relative long-term risk to the maintenance of well distributed brown bear populations in 100 years.

Alternative 3 ratings did not appear to reflect the panelists' conclusion that riparian habitat protection was a significant feature in brown bear management. Alternative 3 has the widest riparian buffers on most channel types, yet was rated similarly to Alternatives 4, 5 and 6, with combined Outcome I and II scores of 60, 55, 66, and 51, respectively. The extended rotations in Alternatives 4 and 5 inferred greater dispersion of future timber harvest into roadless watersheds and were rated similar to Alternatives 3 and 6 in spite of much less total planned harvest of old growth. Nonetheless, these four alternatives had a moderate relative likelihood of maintaining brown bear populations at least in their current distribution in spite of the potential for development of temporary gaps in distribution.

Alternatives 10 and 11 were not rated by panelists but based upon the high correlation between acres of old growth proposed for harvest (Table 3-115) and average weighted likelihood outcome scores, Alternative 10 would be intermediate between Alternatives 6 and 3. The reserve system would make it superior to Alternative 6; but has less limited riparian protection compared to Alternative 3. Alternative 11 likely presents the highest likelihood of maintaining viable long-term brown bear populations due the extensive reserve system that should significantly address the road issue that is adverse to bears. It also has strong riparian protection.

Based upon work conducted by Dr. Shields at the University of Alaska, genetically distinct and relatively isolated subpopulations of brown bears exist in Southeast Alaska. Bears on Chichagof and Baranof are different from Admiralty and these bears are distinct from the mainland bears that are more similar to interior British Columbia bears. In addition, brown bears in Southeast Alaska are more closely related to polar bears than brown bears in other regions of Alaska.

These subpopulations were rated separately. Panelists generally had greater concerns for the mainland bear populations than the other two. The mainland population was rated consistently lower than Chichagof/Baranof for all alternatives in combined Outcomes I and II. In fact only Alternative 1 provided better than an even average likelihood rating of maintaining a well distributed population in 100 years on the mainland. These ratings support discussion that focused significant concern on the low density population that may already exist in relatively isolated regions. Anticipated future roading and human access development would exacerbate this natural situation and place these populations at additional risk.

Four Alternatives (1, 3, 4 and 5) had combined Outcome I and II scores over 50 for the Chichagof/Baranof population, suggesting a better-than-average likelihood that persistent and well distributed populations would exist in that area in 100 years. Alternatives 2, 7, and 9 could result in at least the development of permanent gaps in brown bear distribution. Panelists believed brown bears had a very high likelihood of maintaining persistent and well distributed populations on Admiralty Island due to its Wilderness designation that would preclude development considered adverse to brown bears. Ratings for all alternatives were above 97 for Outcomes I and II.

Commentary on the Panel Ratings. Brown Bear Panel findings were generally consistent with available literature (e. g. Schoen et al. 1992, Titus and Schoen 1993) and additional local information discussed by panelists (see Iverson 1996d) especially with respect to the potential adverse effects of roads and the importance of riparian habitats. This analysis further examines finer spatial scales and shorter time frames and associated viability risks to brown bears and complements the longer time frame (100 years) and broader geographic ranges considered by the Bear Panel.

While the Brown Bear Panel generally concluded that most long term concern was related principally to the low density mainland bear populations, a shorter term management concern may exist of brown bears on northeast (NE) Chichagof Island base upon past timber harvest, roading activity as well as direct positive relationships between roads and bear mortality (Titus and Schoen 1993). Despite the apparent absence of brown bear population declines or apparent low densities, risks and management concerns exist. Brown bears are long-lived species, have a delayed age of first breeding to 5-10 years, and very low reproductive rates; all factors that may delay population response to environmental stresses. Sufficient time may not have elapsed since significant forest management activity has occurred on NE Chichagof Island for cumulative impacts to the brown bear population to be evident. However, restrictions in brown bear harvest regulations instituted in 1988 (Schoen et al. 1992) due to high harvest rates indicated heightened management concern.

The likely presence of brown bear subpopulations in southeast Alaska is supported by genetic analysis (Talbot and Shields 1996) and local information regarding brown bear movements, habitat use, and differentiation in morphological characteristics. Brown bears on NE Chichagof may also be effectively demographically isolated

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from brown bears on the remainder of Chichagof Island (Titus, K. in Iverson 1996 d).

Lande (1994) expressed concern about the recommended habitat conservation reserve strategy (Titus and Schoen 1993) because of the low actual and effective population sizes of five female brown bears that would be supported in 40,000 acre habitat reserves on Baranof and Chichagof Islands may be insufficient. In addition, a few reserves fall short of meeting reserve design criteria and their integrity and function may have been compromised (e.g. Game Creek large HCA on NE Chichagof Island, Iverson 1996d). This may reduce the effectiveness of the landscape strategy and may increase localized but long term risk to the brown bear population there. However, reserves may be more important to brown bears as sources of roadless refugia rather than as unfragmented blocks of old growth forest. Roaded human access is directly related to brown bear mortality, except where special management precautions have been applied, such as Greens Creek Mine (panel discussion, see Iverson 1996d).

Alternative 11 should rank highest along with Alternative 1 in landscape design features that minimize risk to brown bear viability. The extensive reserve system at multiple scales and significant riparian protection reduces risk relative to other alternatives. The additional reserves added on Northeast Chichagof (Chicken Creek and Port Frederick) should compensate for an otherwise high risk landscape identified by panelists.

Forest-wide Standards and Guidelines applied to all alternatives directs the development of a management program in cooperation with the ADF&G to address brown bear mortality. Management tools will include both access (road) management as well as harvest regulations. Thus, in combination with a brown bear mortality management plan, the reserve strategy in Alternatives 3, 10 and 11 and portions of 5 and 6, particularly since they are applied to NE Chichagof, may reduce local short term risks to brown bears and represents lower risks than other approaches of extended rotations (Alternative 4) or alternatives lacking either reserves or extended rotations (Alternatives 2, 7 or 9). The addition of two very significant reserves in Alternative 11 should further reduce risk to brown bears within this region. The Chicken Creek large reserve and the reserve added at the Portage at Port Frederick connecting two medium reserves to create a larger reserve serve as very important additions to an overall reserve strategy to address brown bear concerns.

Riparian habitats are clearly very important to brown bears and riparian management significantly contributes to long-term brown bear persistence. Riparian management Forest-wide Standards and Guidelines for Options 1 and 2 provide old growth forest riparian buffers of at least 150’ and up to the entire width of riparian floodplains on streams most likely to be used by brown bears. Alternative 11 applies a modified version of Option 2 that has some protection features of Option 1. Thus Alternative 11, with the overall system of reserves including those specifically added to northern Chichagof Island, would likely have the least long-term risk to important brown bear habitats among all other alternatives except for Alternative 1. Alternative 3 applies riparian Options 1 and 2 and in combination with habitat reserves should mitigate most near term concerns on NE Chichagof Island and likely provides a relative level of risk nearly equivalent to, or slightly higher than, Alternative 11. Alternatives 5 and 6 apply Options 2 and 3 and present intermediate risks by having reserves on NE Chichagof but less riparian protection. Alternative 4 also applies Options 2 and 3 and does not have reserves, but the 200 year rotation should provide overall intermediate risks among all alternatives.

Alternatives that do not have reserves (2, 4, 7 and 9) or only apply higher - risk Option 3 riparian buffers everywhere (Alternatives 2 and 9) present greater short and long term risks to brown bears and important riparian habitats. Even Option 1 and 2 riparian buffers may not fully meet the 500' riparian buffer recommended by the Brown Bear Panel. Removal of productive old growth forests from these important habitats are decisions with effects that persist for decades or even centuries.

In recognition of the importance of riparian habitats to brown bears based upon panel recommendations, recommendations from Titus and Schoen (1993) and recent brown bear telemetry relocation data from NE Chichagof Island provided by ADF&G, a Forest-wide standard and guideline has been added to more explicitly address the issue of riparian brown bear habitat protection. Where site specific analysis indicates that the Riparian Forest-wide Standards and Guidelines do not effectively protect riparian habitat cover for brown bears, an unharvested buffer of up to 500 feet on each side of important brown bear foraging streams may be necessary. These streams are generally the Floodplain and Moderate Gradient/Mixed Control process groups. Important foraging sites will also be identified on a site specific bases and in consultation with the ADF&G.

Brown bear management concerns with respect to short-term risks are apparently less significant for the remainder of the brown bear range in southeast Alaska.

Combined Panel Outcomes

Based on the definitions for the five outcomes, Outcomes I or II assume that "habitat ... of sufficient quality, distribution, and abundance" will be maintained so that breeding populations are distributed ("well distributed" in Outcome I) across the Tongass National Forest. Under Outcomes III or IV, on the other hand, significant gaps in distribution, or existence only in refugia (isolated populations), are anticipated. Outcome V represents extirpation. Therefore the scores for Outcomes I and II may be combined to provide some indication of the likelihood that viable populations will remain distributed across the Forest. Most panels also came to this same conclusion. These combined scores, for each of the panels just discussed in detail, are displayed by alternative in Table 3-125.

Table 3-125
Panel Likelihood Scores for Outcomes I and II Combined

	Alternative							
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**
Northern Goshawk	97	24	52	65	74	50	12	23
Marten	79	9	44	60	70	28	9	9
Alex. Arch. Wolf	94	60	84	72	82	64	29	34
Marbled Murrelet	100	51	81	73	91	59	30	45
Other Mammals:								
Endemics	33	5	23	18	23	26	3	3
Widely-Distr.	67	9	36	35	41	24	3	3
Brown Bear	93	39	60	55	66	51	16	14

Even for Alternative 1, which will maintain current conditions essentially unchanged over time, the outcome scores from the "other mammals" panel appear anomalous in comparison to the scores from the other panel assessments. As noted in the previous discussion, the other mammals panel dealt with aggregates of terrestrial species about which on the whole very little is known: the knowledge base for these species is much poorer than for the species treated individually by panels. This in turn suggests that the uncertainty inherent in assessing current status and estimating future effects was higher for this panel.

When faced with high levels of uncertainty, panelists tended to score alternatives lower, choosing to err on the conservative side by assuming a greater risk than might be the case (the so-called "Type II" error) rather than assuming less risk than might be the case (a "Type I" error). Risk assessments typically favor making a Type II error - over-estimating an actual negative effect - than making a Type I error - under-estimating a negative effect. In natural resource management, if effects are over-estimated, projects or activities may be fewer or smaller than they might otherwise have been, but the potentially affected resource is maintained; if effects are under-estimated, however, there may be more or larger projects, but the affected resource may suffer accordingly. While the outcome scores for all the panels include some amount of compensation for uncertainty, this appears to be much more the case for the other mammals panel scores.

Another feature of the other mammals scores that makes comparisons difficult is that panelists used the individual species with the worst estimated outcome to represent the aggregate of species for each of the two subgroups of other mammals. Depending on the actual reasons for rating the one species "worst," this naturally tends to overstate the risk for all the other species in each group. These high individual risks are important to point out, and knowing them can help us provide specific measures to maintain the necessary habitats for these species, and decide where to place an emphasis on additional research. But for overall alternative evaluation these ratings may be misleading, and tend to make broad comparisons difficult.

One way to address this anomaly in making comparisons between alternatives will be presented here. Since Alternative 1, which has essentially no timber harvesting, maintains most current conditions over time (there will of course be changes as previously-harvested areas move through the stages of forest succession), it can be used to represent existing habitat conditions, and serve as a baseline against which to measure and compare the other alternatives. In comparison to Alternative 1, changes in outcome scores can be seen as indicating the additional relative risks

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inherent in an alternative over and above whatever level of risk is present today. A simple way to do this is to let Alternative 1 mean "no additional risk" to viability, setting all its outcomes equal to 100 or "no risk," and then convert all other outcome scores (from Table 3-125, the combined Outcome I and II scores) to percentages of Alternative 1. These percentages then represent the relative likelihood of maintaining the *existing* habitats and conditions contributing to viable populations over time. These adjusted scores are shown in Table 3-126.

Table 3-126
A Baseline Comparison: Combined Likelihood Scores for Outcomes I and II, as a percent of Alternative 1 scores

Species	Alternative 1	2	3	4	5	6	7	9
Northern Goshawk	100	25	54	67	76	52	12	24
Marten	100	11	56	76	89	35	11	11
Alex. Arch. Wolf	100	64	89	77	87	68	31	36
Marbled Murrelet	100	51	81	73	91	59	30	45
Other Mammals:								
Endemics	100	15	70	55	70	79	9	9
Widely-Distr.	100	13	54	52	61	36	4	4
Brown Bear	100	42	65	59	71	55	17	15

It should be immediately pointed out that these adjusted "scores" are *not* viability ratings per se, as are the original panel scores, and are useful only as a comparative measure for evaluating alternatives for additional risks to viability in the future. By setting all Alternative 1 scores to 100, we have evened-out or normalized the disparity between the scores for different panels (as previously discussed), but this is not intended to imply that under Alternative 1 there will be no viability concerns, only that there will likely be no additional concerns from planned actions. At any rate, it is now possible to compare the other Alternatives across the range of panel scores and more easily see their estimated risks to future wildlife viability.

Alternative 5 has the most consistently-high comparison scores, and is greater than 60 percent of Alternative 1 for all categories. This is no doubt due to the combination of extended timber harvest rotations, reserves in key areas, and the full compliment of wildlife-oriented standards and guidelines. By inference relative to alternative design features and planned harvest of old growth, Alternative 11 may be considered very close to Alternative 5 relative to this analysis. Alternatives 3 and 4 are higher than 50 percent of Alternative 1 in all categories, but in most cases have scores lower than Alternative 5. The extended rotation management of Alternative 4 is favored over the Forest-wide reserve system of Alternative 3 for some species (goshawk and marten), but the reverse is true for most other species. These alternatives generally have the same set of wildlife-oriented standards and guidelines as Alternative 5. Alternative 10, by inference relative to acres of old growth planned for harvest and design components, is likely the highest risk alternative among this group.

There is a distinct break in comparison scores between Alternatives 11, 5, 3, 4 and 10 and the remaining alternatives, each of which have several or all categories at less than 30 relative to Alternative 1. Alternative 6 has most scores above 50, but is below 40 for two species (marten, and widely-distributed other mammals). This is likely due to its use of shorter rotations with only a limited reserve system.

Alternatives 7 and 9 are very close in most categories, with Alternative 2 slightly better in several. All these alternatives rely on even-aged management with short rotations, have no reserve system applied, and generally have fewer (or less protective) wildlife-oriented standards and guidelines. Ranking the alternatives using this comparative approach, from most likely to maintain suitable distributed habitats to ensure species viability to least likely, the following order emerges: Alternatives 1, 11, 5, 3 or 4, 10, 6, 8, 2, 7 or 9.

Most of the previous viability analysis has been based on the species, or "fine filter," approach discussed in the introduction to Wildlife environmental consequences, and in the Biodiversity section. The biodiversity analysis took the ecosystem, or "coarse filter," approach. Without repeating the discussions of the old-growth ecosystem panel assessment used for biodiversity, it is nevertheless interesting to compare the ranking of alternatives arrived at here with the ranking resulting from the composite ratings for old-growth ecosystems (discussed in the Biodiversity section, and shown in Table 3-9). For the likelihood of maintaining old-growth ecosystems Forest-wide, the order is: Alternatives 1, 11, 5, 4, 6, 3, 10, 8, 2, 9 and 7. This is essentially the same likelihood order as the one based on species viability, with the only distinct difference being the reversal of Alternatives 3 and 6. It appears that Alternative 3 was favored for wildlife due to its enhanced riparian standards and Forest-wide reserve system, whereas the watershed-specific old-growth requirements of Alternative 6 favored it in terms of maintaining old-growth ecosystems. Otherwise, the fine-filter and coarse-filter analyses tended to comparatively score the alternatives identically.

Short-term Effects Related to Viability

The introduction to the analysis of wildlife viability pointed out the need to take a longer-term perspective in evaluating potential effects to species viability. In part this relates to our inability to realistically take into account, let alone measure, how short-term, incremental actions (habitat changes) may affect a particular species' ability to perpetuate itself over time. Although Forest Plans are focused on the 10-15 year planning period, the potential effects or results of planning must be put in a longer-term context, with the assumption made that the same level of forest management (i.e., amounts of timber harvest, recreation use, etc.) will occur over each decade of this extended period as are planned for the first decade. This longer period is called the "planning horizon" in the NFMA Regulations, defined as: "[t]he overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions" (36 CFR 219.3). As noted, the analysis of wildlife viability done by the assessment panels used 100 years as the planning horizon.

If Forest-wide viability per se cannot be adequately evaluated in a short-term context, such as the initial decade of implementation of the Revised Forest Plan, what aspects of wildlife management are reasonable to evaluate? Short-term, localized concerns have previously been discussed for several species, such as brown bear and wolf. The huntable wildlife resource is another aspect, discussed for Sitka black-tailed deer above. A third aspect is focusing on particular portions of the Forest where past and present actions have already altered habitats to a substantial degree, so that any additional (and therefore short-term) changes could potentially reduce the suitable habitats of some species within that area to the point that viability becomes a short-term, localized concern. (A similar approach is used above for Forest-wide effects where Alternative 1 is used as the indicator of the current habitat condition. Here we will focus on indicators other than the assessment panel results.) Changes within landscape-level ecosystem units, based on the biogeographic provinces discussed in the Biodiversity section, can be used for this purpose, as can identifying possible barriers to wildlife travel between provinces or other large landscape units.

The Biodiversity section evaluated the 21 biogeographic provinces for their current condition, primarily in relation to the amount of productive old-growth forest still present. As discussed in that section, the "productive" component of the old-growth forest resource is considered one of the most "at risk" habitat types Forest-wide, both for maintaining natural diversity, and for its association with many of the wildlife species of the Tongass. The amount of productive old-growth forest remaining - as a percent of that existing prior to large-scale, human-caused habitat changes within the Tongass - is a good general indicator not only of habitat loss in itself, but also of how fragmented that habitat is likely to be. An evaluation of how much high volume strata old growth remains (also considered by many to be an important habitat component for some species). At the biogeographic province level, using these indicators, several areas of the Tongass can be identified that have undergone noteworthy changes largely resulting from forest management practices over the last 40 years. Table 3-127 displays these areas.

Table 3-127
Some indicators of habitat change for selected biogeographic provinces (does not include State and private lands).

Biogeographic Province	Percent of Productive Old-growth (POG) Component Remaining[1]	
	Total POG	High-Volume POG
N. Prince of Wales	76	57
Etolin Island/Vicinity	88	73
East Baranof	90	74
East Chichagof	91	78
Kupreanof/Mitkof	92	78
Kuiu	93	88

Source: Based on information in the section on Biodiversity.
[1] Compared to 1954 estimated productive old-growth forest amounts.

Most other biogeographic provinces have 90 percent or more of their productive old-growth forests remaining, and have more than 85 percent of the high-volume component remaining.

For the areas in the table, however, habitat changes are such that there may be potential for reaching a local viability concern for old-growth-associated species with additional planned habitat alterations. These changes could in turn mean that there is a higher likelihood that suitable, well distributed habitat to ensure viable wildlife populations may not be maintained Forest-wide (such local changes creating significant gaps in habitat). Alternatives that minimize significant habitat alterations in general, or in these specific areas, will have a greater relative likelihood of maintaining habitats in the short-term so that a Forest-wide viability strategy remains feasible. Alternative 1, which has essentially no additional habitat changes, has the highest likelihood in this respect. Next are those alternatives that use uneven-aged management with extended rotations as the principle harvest method (Alternatives 4 and 5); nearly equivalent is Alternative 11 with the most extensive system of forest-wide reserves, and then alternatives that, while using 100-year rotations (either even-aged or two-aged systems), incorporate a Forest-wide reserve system, or reserves in key areas. Alternatives 3 and 10 include a Forest-wide reserve system; Alternative 6 (along with Alternative 5) includes reserves in three of the six provinces listed in the table. Alternatives 2, 7 and 9 include neither extended rotations, nor any system of habitat reserves.

Another aspect of identifying potential adverse short-term effects on maintaining well distributed, viable populations is determining if management activities are likely to create barriers that could affect species distribution on terrestrial landscapes within provinces. Such barriers, or "pinch-points," (Kiester and Eckhardt 1994) can result when habitat changes such as timber harvesting or road construction reduce or eliminate natural migration or dispersal corridors. Four areas have been identified where past and continued future timber harvesting might result in pinch-points. These are all relatively narrow areas between larger land units where future alterations in habitat could significantly reduce natural connectivity, thereby affecting the ability of land-based species to disperse or migrate. A general description of these four areas follows:

1. The portage between Tenakee Inlet and West Port Frederick on Chichagof Island, a narrow neck of land connecting northeast Chichagof Island to the main body of the rest of the island. This is in the East Chichagof biogeographic province.

2. The area between Port Camden, Bay of Pillars, and 3-Mile Arm on Kuiu Island (Kuiu Island biogeographic province), a narrow neck of land connecting the northern and eastern part of the island to the rest of Kuiu Island.

3. The Neck Lake area between Whale Passage and El Capitan Passage on Prince of Wales Island (North Central Prince of Wales biogeographic province) has had significant past and on-going forest management activities. It also is a relatively narrow piece of land connecting the extreme northern end of Prince of Wales Island to the remainder of the island.

4. Sulzer Portage, between the West Arm Cholmondeley Sound and Portage Bay at the head of Hetta Inlet, on Prince of Wales Island. This area has had considerable timber harvesting on both National Forest and adjacent private lands, and due to a recent transfer of land ownership the pinch-point itself is now all private land. This relatively narrow neck of land joins the southeast part of Prince of Wales Island to the remainder of the island, connecting North Central and South Prince of Wales biogeographic provinces.

Potential pinch-point #1 is in the middle of the East Chichagof biogeographic province, one of the more heavily logged provinces (see previous province discussion). Only Alternatives 1 and 11 include the portage itself and adjacent lands in LUD's not allowing timber harvest, and thus maintains the current forested landscape linkage at this pinchpoint. Alternatives offering estuary fringe and beach fringe protection (Alternatives 1, 3, 4, 5 and 6 provide an extended beach fringe; Alternative 2 and 10 (less of a beach fringe) are likely to maintain much of the critical connecting habitat of the narrow portage itself; Alternatives 7 and 9 do not have such measures. Alternatives utilizing extended rotations (1, 4 and 5) are more likely to maintain connectivity in adjacent areas. The reserve system Alternatives 5 and 6 apply only to the lands east of the portage and does not provide full protection for this landscape linkage.

All alternatives except Alternatives 7 apply Natural Setting (non-timber-harvest) LUD's to all or most of the Port Camden-Bay of Pillars connection (with a narrow strip adjacent to Port Camden in timber harvest LUD's in some alternatives) and are likely to maintain sufficient connectivity. Alternative 7 could result in significant barriers in this area. Only alternatives 1 and 11 protect the portage between Port Camden and 3-Mile Arm, a major linkage connecting north Kuiu with the eastern side of Kuiu and further east to Rocky Pass.

Potential pinch-point #3 is in the northern portion of North Central Prince of Wales biogeographic province, the most heavily logged province (see previous province discussion). All alternatives except Alternative 1 include the portage itself and adjacent lands in LUD's allowing timber harvest, and thus offer the potential for additional habitat alterations that could contribute barriers to movement. In contrast to pinch-point #1, alternatives offering estuary fringe and extended beach fringe protection (Alternatives 1, 2, 3, 4, 5 and 6) are not likely to maintain much of the critical connecting habitat of this area, which is primarily inland (both shorelines are private land), and already considerably in a second-growth condition. Alternatives emphasizing extended rotations (1, 4 and 5) are more likely to maintain connectivity than the 100-year rotation alternatives. The mapped reserve system of Alternatives 3, 5, 6 and 10 do not offer substantial connectivity in this region. Alternative 11 that has mapped small reserves provides some measure of connectivity for the existing very large reserve at Neck Lake to the northern portion of the island.

Pinch-point #4 is now all private land, dividing the northcentral and south portions of Prince of Wales Island with a non-National Forest strip 1-2 miles wide. Continued timber harvesting is anticipated on these private lands, with the creation of a significant migration and dispersal barrier likely.

Conclusions. We have examined short-term wildlife effects in several ways: deer habitat capability and its relation to hunter demand; biogeographic provinces that may have a near-term potential of negatively affecting viability, or creating gaps in a Forest-wide viability network; and potential barriers to land movement by terrestrial species between areas of suitable habitats. In general, specific aspects of alternatives have been seen to contribute to lowering the potential that any of these short-term factors could in fact lead to an actual concern for wildlife species viability (by reaching the point where habitat alterations exceed our management capability to maintain suitable, well distributed habitats that will ensure viable populations).

Alternative 1, which has essentially no additional habitat changes, is the least risk in this respect. Next is Alternative 11 that has a forest-wide reserve system including mapped small reserves, allocation of additional reserves at critical areas, estuary and extended beach protection, and an integration of Riparian Options 2 and 1. Next are those alternatives that incorporate the deer hunting standards and guidelines (discussed under the section on deer modeling and effects), apply the estuary fringe and extended beach fringe standards and guidelines, and use two-aged management with extended rotations as the principal harvest method. These are Alternatives 4 and 5. Alternatives that use 100-year rotations (either even-aged or two-aged systems), but incorporate a Forest-wide reserve system, or reserves in key areas, along with the standards and guidelines mentioned, represent a third group also generally contributing to reduced potentials for creating viability problems. These are Alternatives 3, 6 and 10. The remaining alternatives - Alternatives 2, 7 and 9 - offer few if any of these features. Under these three alternatives, there is a relatively high short-term potential of reaching a point beyond which maintaining suitable, well distributed habitats to ensure wildlife viability Forest-wide is not possible.

Conclusion: Wildlife Viability Analysis

The issue of maintaining habitat to support, at least a minimum, viable wildlife populations presents a difficult planning challenge, especially over long time frames and in the face of uncertainty and often limited amounts of information. The panel assessments need to be placed in context with other professional scientific analyses that have been conducted to address wildlife viability on the Tongass. Overall conclusions about wildlife population viability pertaining to the alternatives represent the synthesis of inferences from empirical data with ecological theory and professional scientific judgment.

V-POP Conservation Strategy. The wildlife viability challenge to planning was first addressed in 1990 when the Interagency Viable population Committee (V-POP) systematically crafted a landscape conservation strategy based upon habitat conservation areas to maintain viable well-distributed populations of old growth associated species on the Tongass National Forest (Suring et al. 1993).

Steering Committee Review. At the request of the Forest Plan Revision Team, the V-POP Strategy was reviewed by the Steering Committee for Viable Population Review (Capp et al. 1991). They concluded, “we support the overall theory and design of the Conservation Strategy developed by V-POP and recommend this strategy be incorporated into the TLMP Revision to assure a high probability of maintaining long-term population viability on the Tongass National Forest.”

PNW Peer Review. At the request of the Alaska Regional Forester the Forest Services’ Pacific Northwest Research Station, with the assistance of 18 nationally recognized scientists versed in conservation biology, conducted a scientific peer review of the V-POP Strategy. They concluded that the V-POP Strategy “represents a solid attempt to integrate species viability concerns with the Habitat conservation area approach. It demonstrates a good awareness of modern concepts of wildlife management and conservation biology. However, it ...will not ensure viability of all species.” (Kiester and Eckhardt 1994). Their assessment was conducted independent of the context of the entire forest plan and did not specifically identify which species would not be satisfactorily accounted for in the V-POP strategy. They did however, provide several sound conceptual recommendations for landscape viability planning.

V-POP Response. In response to limitations in the V-POP Strategy identified in the PNW peer review, Suring et al. (1994) provided and “initial response” with immediate recommendations to strengthen the V-POP Strategy prior to finalizing their strategy based upon the PNW review comments. Collectively, their recommendations generally equate to Alternative 5 (and by inference Alternative 11) in terms of acres of old growth harvested (Iverson 1996e), an indirect measure of relative risk to viability of old-growth associated species.

Wildlife Assessments/Viability Synthesis Workshop. The Forest Plan Revision Team and PNW scientists jointly conducted a Viability Synthesis Workshop of wildlife experts to evaluate species conservation assessment findings and previous planning strategies (Rene 1995). They fully considered and integrated findings from the above referenced reports as well as other wildlife assessments (Wolf, Goshawk, Marbled Murrelet), and workshops to systematically develop conservation-oriented building blocks (e.g. V-POP reserves and others) from which alternatives could be crafted. They generally concluded that the existing V-POP Strategy was intermediate in overall risk of not maintaining viable populations and other conceptual approaches with more and less risk were identified.

Panel Assessments. The Wildlife Viability Panel Assessments were the latest stage in the process of developing and integrating the best available information into planning for wildlife viability on the Tongass. The V-POP Strategy was well supported by earlier reviews but was considered to need improvement as a comprehensive conservation strategy. Alternative 3 incorporates the original V-POP Strategy with improvements, but was generally rated by the panels as intermediate in relative risk to wildlife viability, with likelihood Outcomes I and II ranging around 50. Alternative 10 incorporated the V-POP reserves but has fewer of the additional components compared to Alternative 3 that would reduce risk (e.g. no extended beach, no deer standard and guideline, and no two-aged management).

There is now an emerging body of scientific judgment supporting the need for a landscape conservation strategy that relies on something like the original V-POP Strategy or other ecological approaches for maintaining well distributed viable populations. Meeting this planning challenge compliments emerging federal policy for preventing the need to list taxa under the Endangered Species Act (Capp, 1996)

Endangered Species Act Listing Petitions. Further indication of the relative risk among alternatives specific to goshawk viability may be gleaned in the FWS analysis and conclusion regarding their decision not to list the goshawk as endangered. FWS stated, “it is clear that without significant changes to the existing Tongass National Forest Land and Resource Management Plan, the long-term viability of the Queen Charlotte Goshawk may be seriously imperiled” (USDI FWS 1995). Thus, current Tongass timber management practices and intensity (and by inference any similar alternatives), if continued into the long-term, are considered by the FWS to present serious potential risk to goshawks. Both the Goshawk Conservation Assessment and the Goshawk Assessment Panel did conclude that an approach like Alternative 4, with a 200-year timber harvest rotation, has a relatively high likelihood of sustaining viable goshawk populations.

Synthesis. Based upon the preceding analysis, Alternatives 1, 11, and 5 have the greatest overall likelihoods of sustaining viable well distributed wildlife populations across the Tongass. Except for Alternative 1, Alternative 11 is considered to have the least overall risk. Alternatives 4, 3 and 10 have intermediate relative risk. All other Alternatives (6, 2, 7 and 9) represent management approaches that, relative to the V-POP Strategy as a basis for comparison, are not supported by any of the viability analyses previously referenced, and which had viability panel assessment results that suggest that all had a low to very low relative likelihood of maintaining well distributed viable populations of old growth associated species across the Tongass National Forest.

Alternative 11

Alternative 11 deserves specific discussion because it, more than any other alternative, represents an explicit attempt to address general as well as specific issues related to wildlife viability conservation planning (see also Iverson 1997).

- It builds upon a foundation of the V-POP conservation strategy of large and medium reserves and in combination with other alternative-specific natural setting LUDs provides substantial reserve strategy protection for old growth associated species well-distributed across the forest at multiple spatial scales (watersheds to biogeographic provinces).
- Small reserves recommended by V-POP have been explicitly mapped to provide for enhanced landscape connectivity and a finer-scale, watershed-

specific component of a multi-scale landscape conservation strategy of blocks of old growth habitat for less mobile species.

- Collectively, 70 percent of the productive old growth (3,551,482 acres) is in a reserve LUD, protecting entire landscapes at a variety of scales.
- Every biogeographic province protects at least one very large reserve as identified in the PNW Peer Review.
- An average of 44 percent of the productive old growth in reserves is high volume, compared to a current forest-wide average of 43 percent high volume old growth.
- Also for landscape connectivity, the 1,000 foot beach and estuary fringe and enhanced riparian habitat management standards are applied forest-wide.
- An average of 57 percent of the productive old growth occurring in development LUDs where timber harvest will occur will remain in 100 years. Areas such as beach fringe, riparian, steep slopes, karst terrain, and others prohibit timber harvest and protect sensitive areas.
- Beach and riparian habitats are among the most highly productive sites in the forest and contribute to protection of a substantial portion of the high volume strata in the matrix; 36 percent of the remaining high strata will be retained in 100 years. The current proportion of high strata in the matrix is 39 percent.
- Ecological "pinchpoints" are specifically provided significant reserve protection on Chichagof Island and central Kuiu Island, and to a lesser extent the pinchpoint at Neck Lake on North Prince of Wales Island.
- This alternative meets conservation planning measures considered important to sustain viable populations of the Alexander Archipelago Wolf and Queen Charlotte Goshawk as identified in interagency conservation assessments. Timber harvest is generally consistent with a 300 year rotation in over 90 percent of the VCUs that provide goshawk habitat.

Finally, Alternative 11 proposes a harvest of 474,000 acres of old growth forest over the entire 100 year planning period. This maximum harvest level is among the lowest of all alternatives, and represents over a 70 percent reduction in acres of old growth available for harvest from those of the current Tongass Plan (1,700,000 acres; USDA Forest Service 1979). Certainly, a 70 percent reduction in acres planned for harvest is highly responsive to the FWS warning that a "significant change" in current Tongass management was necessary relative to ESA listing deliberations on the Tongass.

Overall, Alternative 11 is projected to have a moderately high likelihood of maintaining viable well-distributed populations of old-growth associated species across the Tongass National Forest.

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Economic and Social Environment

Introduction

The earliest inhabitants of Southeast Alaska relied extensively upon the lands and waters of the region for their livelihood. More recently, the natural resources of Southeast Alaska have provided a base for economic development, supporting employment for the cash economy and subsistence resources to support traditional cultural pursuits. Given that the Tongass National Forest comprises the vast majority of land in the region, a revised Forest Plan could have substantial and disparate effects upon the peoples of Southeast Alaska. Moreover, the Tongass National Forest contains large areas of essentially undisturbed forest lands. These lands represent increasingly scarce (and thereby increasingly valuable) ecosystems and are the object of considerable interest both locally and nationally. The purpose of this section of Chapter 3 of the Environmental Impact Statement is to describe, in economic and socio-cultural terms, the relationships between the Tongass National Forest and its various beneficiaries and how these relationships might change under the alternatives presented.

The health and vitality of human socio-cultural and economic systems must be evaluated side-by-side with the health of other biological and physical systems. We also need to work toward a better understanding of how human and non-human ecosystem components interact and affect each other. One of the most important assumptions made under ecosystem management is that natural and biological systems must be healthy in order to achieve and maintain healthy social and economic systems—and vice versa.

The following analysis is divided into four main parts. In the first, an economic and social description of the affected environment of the region as a whole is provided, including measures of current economic activity associated with the Tongass National Forest. These provide a baseline description and consist primarily of employment, income, and gross revenue figures for those industries directly dependent upon the Tongass National Forest, i.e. timber and wood products, fishing, mining, and recreation and tourism activities (including sport fishing and hunting). National Forest receipts and payments to the state of Alaska are also treated in this section. In the second part, forest plan alternatives are analyzed in terms of their potential effects on these region-wide baseline statistics.

The regional analysis includes an estimation of the benefits produced by forest-resource activities. The estimated value in no way comprise the total value society derives from the Tongass National Forest. In addition to incomes and revenues, there are values which are equally important but far more difficult to quantify. Consumer surplus and cultural importance are among these kinds of values. Consumer surplus can be described as the amount of benefit a person derives from a certain good over and above the dollar cost of that good in the market place. Cultural importance is at least as difficult to quantify, and adequate measures of these kinds of values are quite elusive (especially in the case of the sort of non-market goods which constitute an important part of the Tongass National Forest's benefits to society) but, to the extent possible, these values have been incorporated in the analysis found in the second section of this report.

The third part of this socioeconomic section is a "subregional" overview of Southeast Alaska. This provides information about the economic and social environments at a scale between the region as a whole, and the level of each individual community. This subregional overview serves in part as a transition to the fourth part of the socioeconomic analysis, which is an examination of the characteristics of, and potential effects to, each of Southeast Alaska's 32 communities.

Methodologies

A complete measure of economic benefits would also include the value obtained by people who may never visit Southeast Alaska, but benefit from knowing it is there. Often referred to as non-use, existence or preservation values (Duffield et al. 1994), these indirect benefits can range from 3-20 times as great as benefits flowing from direct use of a resource for recreation or resource production. The methodologies for measuring the size of preservation values have always been controversial, even though federal policy includes approval of such techniques (United States Water Resources Council 1983). Because non-use values are not bought or sold, their economic value must be estimated through survey research. As a consequence, the precise dollar range of non-use values is subject to debate (Allen 1985), even though few question the validity of the concept. Alaska, in fact, is often used as an example of a place grand enough to generate substantial value to the American public. However, no adequate survey data was available and, given the controversial nature of estimation techniques, no attempt was made to quantify existence or preservation values in this document.

The employment, income and revenue statistics are also not altogether straightforward in their derivation. In each industry numerous techniques have been used to estimate these figures, each embodying underlying assumptions and subject to varying degrees of error. Where possible, these assumptions are stated and the nature of associated problems discussed. In general, the timber industry receives the most extensive consideration in the first three portions of this section. This is due to two factors. First, the number and quality of relevant economic statistics are highest within this sector. To the extent possible, comparable statistics for the other industries have been developed, but, in many cases, these measures were not available. The absence of detailed statistics is not an indication of a lack of importance for a given economic activity.

Second, the timber industry stands to be most directly affected by forest plan alternatives, and estimates of economic impacts within the sector can be made with relatively greater certainty. Once again, however, this does not necessarily imply that timber is the most important of the Tongass National Forest's outputs. Recreation and tourism, for example, are estimated to have the highest net present value of all activities, even though much of this value is not captured in market transactions. Considerable attention is also given to recreation. However, due to the difficulties of measuring recreation-related statistics and their relation to land management practices, the numbers presented here are less certain than those associated with the timber industry. The value of subsistence activities and other cultural activities are likewise difficult to evaluate.

The specific methodologies used for the various resources and economic indicators are discussed throughout this section where they are used.

Regional Economy

Affected Environment

Area of Influence

Because of the strong linkage of local residents to both commodity and cultural and lifestyle uses of the Forest's resources, the primary area of influence for the Tongass National Forest is defined as Southeast Alaska. The major resources of the Forest are used, processed or consumed by different, although overlapping, segments of the local population. Residents of Southeast Alaska depend on the Forest's wildlife and fish resources for subsistence purposes and on the natural resources and values necessary for cultural survival. Southeast Alaska residents account for a majority of the recreation activity on the Forest, although tourism from nonresidents is becoming more important. Timber from the National Forest is the primary fiber supply for the region's wood products industry. Similarly, the Tongass National Forest holds over 70 percent of Southeast Alaska's salmon streams and, therefore, provides for the major component of the region's considerable salmon fishery. The largest silver mine in North America is located on Admiralty Island, and other locations appear promising in terms of mineral development.

The secondary influence area for the Tongass National Forest stretches outward to include the entire state of Alaska; other Pacific Northwest states, especially Washington, Oregon and California; British Columbia; and other Pacific Rim countries, especially Japan. Discussion in this document focuses on the primary area of influence and only briefly addresses the secondary area. As mentioned above, the Tongass is also viewed as a international resource – the largest National Forest in the United States.

Historical Development

Southeast Alaska's contemporary society is influenced by a variety of cultures, from its earliest peoples to its most recent inhabitants. The abundant resources of the forest and waters have provided for the physical and cultural livelihood of local peoples for thousands of years. The earliest known people to inhabit the area, the Tlingit and Haida, adapted well to the coastal environment and developed a rich culture within their long-term relationship with the land and waters, a culture that still thrives through the changes brought by European peoples.

In the 1700s, the Russians began exploration in Alaska. The fur trade, primarily sea otter pelts, was the main force driving colonization. When most of the sea otter populations were depleted the fur industry declined, Russia lost interest in her North American colony, selling Alaska to the United States in 1867. As American colonization continued, new industries developed. In the late 1800s commercial fish canning became an important part of the economy of Southeast. During that same period, the discovery of gold brought thousands of miners to the area, many of whom were then followed by their families. The most important of the early discoveries occurred in Juneau. In the 1920s and 1930s, the Depression brought a decline in fish prices and mining employment. The last remaining mines were closed during World War II.

The region's timber resources were used by the earliest inhabitants for shelter, heat, utility, and cultural purposes. The Russians also harvested timber for building ships and structures, but commercial timber harvest did not develop until the 1900s. In the earlier part of the century, small timber mills were operated in a few communities. However, it was not until the mid-twentieth century that, with the development of two large pulp mills in Ketchikan and Sitka, the timber industry became a major social and economic factor in Southeast Alaska. More recently the

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closure of the Sitka pulp mill and the Wrangell sawmill, the announcement of March 1997 closure of the Ketchikan pulp mill, and a decrease in timber harvest on private, state and federal lands reflect a downturn in the region's timber economy.

In the 1950s Alaska focused its attention on statehood. On January 3, 1959, President Eisenhower signed the proclamation establishing Alaska as our 49th state. The concurrent economic shift towards more government employment and an expanding timber industry had implications beyond population levels and distribution. It was a shift towards a diversified economy, with less dependence on extractive and nonrenewable resources, and away from a seasonal economy.

Current Environment

Presently, approximately 72,800 people live in the towns, communities and villages of Alaska's southeastern panhandle, most of which are located on islands or along the narrow coastal strip. As of 1996, only five of Southeast Alaska's 32 communities were considered urban by United States Census Bureau Definition (population 2,500 or greater). Three of these cities, Juneau, Ketchikan and Sitka, rank within the top five urban areas in the state; only Anchorage and Fairbanks are larger. Together, these cities account for close to 70 percent of the region's total population. At 29,700, Juneau alone accounts for 40 percent of Southeast Alaska's total population.

Southeast Alaska contains approximately 12 percent of Alaska's population and six percent of its land base. Unlike the rest of the United States which is entirely organized into counties, Alaska remains largely unorganized. Within Southeast Alaska there are five boroughs which correspond to the county governments found in the rest of the United States. These include Juneau, Sitka and Yakutat, which are city/boroughs, and Ketchikan Gateway and Haines, which have independent, incorporated communities within their boundaries. The remaining unorganized area is divided into three census areas (CA) for enumeration by the United States Census Bureau: 1) Skagway/Hoonah/Angoon CA, 2) Wrangell/Petersburg CA, and 3) Prince of Wales/Outer Ketchikan CA. While these are only statistical units, they are widely recognized by all federal agencies and most state agencies as county equivalents for Alaska.

The remote aspect of the region is reflected in a population density of around two persons per square mile, compared to the United States average of over 70 persons per square mile. Many locations are accessible only by boat or plane, and landing strips or seaplane facilities are located in virtually all communities. The State ferry system also transports people and vehicles between several ports in Southeast Alaska, and Prince Rupert, B.C. and Bellingham, Washington. Haines and Skagway, at the northern end of the inter-island waterway, and Hyder at the southern end, offer access to the interior and Southcentral Alaska via the Alaska Highway, and Canada via the Cassiar Highway.

Southeast Alaska is a unique and special place to the people who live there. Insight into the values and challenges shared by residents was gained in a recent series of informal meetings held in five communities by representatives of the Henry P. Kendall Foundation. Their findings, published in a report called "Listening to Communities in Southeast Alaska," were laced with references to "human dignity, fairness, community/place/home, the economy, inclusiveness/participation, long-term vision, and land and water." Excerpts from their report demonstrate the range of values held by Southeast residents:

- Southeast Alaskans cherish their place, their closeness to the land, water, mountains, and wildlife--their lifestyles. Personal use of forest and marine resources is considered by many to be a vital component of local culture,

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lifestyle, and family provisioning.

- Southeast Alaskan communities seem to prefer a diverse local economy, one that is not dominated by a single corporate employer, native or non-native. Nearly every community is experiencing changes in its leading economic sectors: fishing, timber, and tourism.

- Many residents want to protect the forest lands, wildlife, and fisheries in the areas surrounding their own city or village. This (apparently growing) sense of economic and life-style territoriality is expressed in comments about logging, hunting, fishing, and tourism.

- Commercial fishermen express concern over habitat destruction in the Tongass, but they seem more interested in issues like access, market prices, and restrictions imposed to protect Columbia River salmon runs.

- Several communities are facing the same issues—on their own. Examples include tourism planning and passenger (user) levies, solid waste disposal, municipal water, and all of the challenges and problems associated with investments in new woods products facilities (such as drying kilns, MDF plants, sawmills).

- There is growing frustration in rural communities/villages among residents who believe they cannot influence decisions in corporations and governmental agencies which control the use of surrounding forests. Some people think that communities need to find a way to develop a vision of their future and then deliver that message to institutions that dominate their local economies. There is presently said to be no institution capable of bringing people together to search for an acceptable medium to long-term strategy for Tongass management.

Summary of Southeast Alaska Regional Economy

When assessing the impact of forest planning alternatives on the economy of Southeast Alaska, it is important to realize that potential impacts occur within a dynamic economy which may be subject to relatively rapid change. The purpose of this section of the document is to outline some of the general characteristics of Southeast Alaska's regional economy in order to provide a wider context within which to analyze expected economic impacts of the forest plan.

Table 3-128 displays several key economic statistics depicting the current state of the regional economy and its development since 1985. Certain of these measures display a healthy and dynamic economy. For example, at 2.1 percent annual growth, job creation in Southeast Alaska exceeded the national average by approximately 40 percent. This growth was matched by strong growth in the region's total population. When taken together, these statistics indicate a vigorous and resilient economy which is likely positioned to weather the negative impacts and take advantage of the positive impacts arising from forest policy decisions.

Table 3-128
Southeast Alaska Vital Economic Statistics

	1985	1994	Percent Change	Growth Rate	U.S. Growth Rate
Total Personal Income (Million 1995$)	$1,745	$1,911	9%	1.2%	2.0%
Population	62,800	72,800	16%	1.6%	1.0%
Average Annual Employment(1)	39,113	47,352	21%	2.1%	1.5%
Per Capita Personal Income (1995$)	$27,788	$26,245	-6%	-0.3%	0.9%
As % of U.S. Average	138%	118%	--	--	--
S-W Diversity Index(2)					
SE AK Borough Average	46%	55%(3)	--	--	--
U.S. County Average	54%	60%(3)	--	--	--
Average Earnings per Job (1995$/Year)	$36,975	$31,674	-14%	-1.5%	0.4%
Per Capita Unearned Income (1995$)	$6,741	$7,482	11%	1.1%	1.2%
As % of Total Per Capita Income	24%	29%	18%	--	--
SE Alaska Unemployment Rate	10.2%	8.2%	--	--	--
U.S. Unemployment Rate	7.2%	6.2%	--	--	--

Source: U.S. Bureau of Economic Affairs 1994
[1] Full and part-time employment, includes self-employed.
[2] Created from Bureau of Economic Affairs RES Data. This measure is not equivalent to those presented in subsequent portions of this analysis.
[3] Estimate for 1990

The other statistics shown in Table 3-128, however, indicate a more complex situation. The regional unemployment rate, for example, is well above the national average and has remained so since at least 1975. This indicates that higher unemployment is a structural feature of the region's economy, or, in other words, that the "natural" rate of unemployment for Southeast Alaska is higher than the national average. Given the relative youth of the region's population and the transitory or piecemeal nature of substantial portions of the region's job market, it is not surprising that Southeast Alaska residents might find themselves between jobs more often or for longer periods of time than the national average. It appears that the unemployment rate has begun to track the national average more closely in recent years, and this may be the result of increased economic diversification in region. In any case, it is extremely doubtful that the long-term discrepancy between regional and national unemployment rates will be impacted by policy decisions such as those made by forest planing. Developments in this area will depend on more profound changes in the region's demographic and macro-economic characteristics. It is also clear that many Southeast residents are willing to remain because of the unique lifestyle here, with relationships to the land and water that may no longer be possible in most other places. People may choose a lifestyle that relies less on money and more on what the land and water provide, including cultural, recreational, and other related values.

The Shannon-Weaver (S-W) diversity index is included in Table 3-128 to provide a measure of the diversity of the regional economy. The S-W looks at how evenly a measure is distributed across the categories in which it is reported. For example, in this analysis we measured the percent of employment within an industry sector relative to the total. If employment is evenly distributed across all industry sectors, the S-W will yield a maximum score. In economies with substantial concentration in a single sector, the S-W score will be relatively low. Of course no economy, even an extremely diverse one, will have a perfectly even distribution of employment. As a result, the S-W must be viewed as a relative measure.

The S-W diversity index for Southeast Alaska boroughs and census areas indicates that, on average, the region's boroughs are well below the national average in terms of economic diversification. Over 90 percent of all United States counties reported a higher diversity index than the Southeast Alaska average in 1985 (calculated using a standard deviation of 0.0621 for all United States counties in 1985). In 1990, 83 percent of United States counties scored higher than the Southeast Alaska average (standard deviation of 0.0555 for all United States counties), indicating that the region's economy has been becoming increasingly diverse but is still significantly less so than the national average.

Total personal income in Southeast Alaska presents an ambiguous picture. While it has increased at an annual rate of 1.2 percent, this rate of growth is 38 percent below the national average. When combined with a growing population, this has resulted in an actual decline in per capita personal income for the region. Residents of Southeast Alaska still earn more, on average, than the general United States population, but the difference has fallen from 138 percent of the national average in 1985 to just 118 percent in 1994; when the higher prices faced by consumers in Southeast Alaska are taken into account, it is hard to argue that residents of the region are economically better off than the national average. A decline in average real wages is the primary cause of decreasing per capita income (transfer payments, interest income, and other unearned income being the other sources of total personal income). Real average earnings per job have declined at an annual rate of 1.5 percent since 1985, falling from $36,975 per year to $31,674 per year over that period (Table 3-128). Median income is related to the level of subsistence use with lower incomes tending to be associated with higher use of subsistence resources.

As shown in Table 3-129, services and retail trade have garnered a growing share of the region's total employment, increasing from 29 percent of total employment in 1985 to 36 percent in 1995. Nonetheless, as shown in the last column of Table 3-129, the share of retail employment is currently quite close to the national average and services are still largely under-represented in the local economy. Moreover, jobs in these sectors have by no means been replacing jobs in the manufacturing sector where a robust 2.1 percent annual growth rate is evident and the share of Southeast Alaska total employment has remained stable at approximately 11 percent. No categories, in fact, display absolute declines in job numbers, and relative declines in share are concentrated in the government sector where growth in employment has been limited.

Table 3-129 also displays industrial sector employment shares relative to the United States average, and this gives an indication of how similar or dissimilar Southeast Alaska's economy is to the whole of the United States. Wholesale trade, F.I.R.E. (finance, insurance and real estate), and services are largely under-represented, reflecting the lack of economies of scale in the regional economy and the propensity to import these goods and services from the lower 48 states. Manufacturing is also under-represented, but to a much lesser extent. This is the result of certain basic industries (wood products and commercial fishing being chief among them) partially off-setting a lack of a more developed local manufacturing base. Government and transportation, on the other hand, far exceed their representation in the United States economy at large. In the first instance, the location of the state capital in Juneau is a primary determinant, but the relatively

Table 3-129
Southeast Alaska Employment By Sector.

Sector	Employment 1985	Employment 1995	Share of Total 1985	Share of Total 1995	Percent Change	1995 Share Relative to US
Agricultural Production	0	0	0%	0%	--	-100%
Mining	44	188	1%	1%	331%	-16%
Construction	1,665	1,609	6%	5%	-3%	-10%
Total Mfg.	3,234	4,017	11%	11%	24%	-14%
Retail Trade	4,182	6,061	14%	17%	45%	2%
Wholesale Trade	370	492	1%	1%	33%	-70%
F.I.R.E.	1,112	1,303	4%	4%	17%	-50%
Services	4,389	6,459	15%	18%	47%	-38%
Transportation & Pub. Utilities	2,032	2,767	7%	8%	36%	64%
Ag. For. & Fish Services	162	270	1%	1%	67%	-35%
Federal Government	2,075	1,939	7%	6%	-7%	46%
Other Government	9,898	10,182	34%	29%	3%	157%
Total[(1)]	**29,162**	**35,287**	**--**	**--**	**21%**	**--**

Source: State of Alaska and U.S. Bureau of Economic Affairs.
[1] Full and part-time average annual employment. Self-employed not included.

higher proportion of government employment in the other communities of Southeast Alaska also plays a part. The high share of transportation arises, for the most part, from the importance of air and water traffic in a region where no developed road system exists. The figures displayed in Table 3-129 exclude self-employed persons, and thus commercial fishermen are generally not included in any of the categories.

With the exception of the employment levels shown in Table 3-128, the EIS relies primarily upon non-agricultural wage and salary employment (NAWS) as reported by the Alaska Department of Labor (ADOL) and other relevant agencies. NAWS employment excludes self-employed individuals and thus omits a substantial proportion of regional total employment. The omission is unavoidable as sufficiently detailed statistics on total employment are generally unavailable. Given the importance of commercial salmon harvesting to the region and to the forest plan in particular, we have added our own estimates of employment in salmon harvesting to the NAWS totals used in subsequent portions of this report.

In 1994, the difference between total and NAWS employment (with salmon harvesting included) is estimated at 10,289 jobs with NAWS employment accounting for 78 percent of total regional employment. This percentage is substantially lower than the United States average of 85 percent, indicating that Southeast Alaska residents are more apt to be self-employed. Since a large proportion of self-employment occurs within the retail and service categories, it is reasonable to assume that 22 percent of Southeast Alaska not recorded in the NAWS employment is concentrated within these categories and that, in general, regional self-employment levels will be relatively more sensitive to activity in the recreation and tourist industries.

Taken altogether, the statistics presented in this section of the EIS indicate an economy which exhibits both strengths and weaknesses relative to the whole of the United States. Growth in employment opportunities is significantly higher than much of the rest of the country, but so is growth in the local population. When

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combined with the fact that much of new job creation has occurred in the lower paid retail and service sectors, the result is a steady erosion in average wages and per capita income. Nonetheless, current per capita income is still significantly higher than the national average, and much of the new job creation in the region is occurring in industries which are locally under-represented. If the regional economy continues to grow at its current rapid pace, it is likely that it will more closely resemble that of the United States at large. This could mean a further diminution of per capita income, but also increased economic diversification and resiliency and a decline in unemployment rates to levels more closely matching the rest of the country. Later sections of the analysis will discuss economic growth on the regional scale, the changes associated with that growth, and the changes occurring independent of planning decisions made in the Forest Plan. While it is important not to under emphasize the individual hardships caused by job losses and other negative expected impacts, these impacts will occur within the context of a growing and rapidly changing economy.

Overview of Tongass National Forest-Related Economy

In the following section, employment and income statistics are reported for Southeast Alaska in total and for the region's resource-dependent industries. Resource-dependent industries are those industries which stand to be directly impacted by policy decisions related to the Tongass National Forest. They include wood products, mining, salmon harvesting, fish processing, and recreation and tourism (including sport fishing and hunting). The primary statistical source is the employment and earnings data published by the Alaska Department of Labor. This agency publishes employment figures based on unemployment insurance contribution reports filed by state employers. Self-employed individuals are not included. Consequently, commercial fish harvesting (a major component of Southeast Alaska's resource-dependent sector) is not covered. In this report, statistics related to salmon harvesting are derived using a methodology developed by the McDowell group, a private consulting firm based in Juneau (McDowell Group 1989). Alaska Department of Labor totals for Southeast Alaska are then adjusted to include employment in commercial fishing.

Recreation and tourism is also not reported as a separate industry. Employment within this sector is distributed across various industry categories, particularly the service sector. In this report, recreation and tourism jobs are derived using the IMPLAN model, a regional input-output model developed by the Forest Service. Where appropriate, employment estimates for this category are then subtracted from the Southeast Alaska totals to avoid double counting. For the recreation and tourism industry, as well as for commercial fishing, the methodologies used are further described along with their inherent shortcomings in the industry specific subsections below.

In deriving estimates of current and expected future employment multipliers have been used extensively. Multipliers are designed to measure the total impact of a certain economic activity on the local economy. Economic activity within one industry will in turn generate activity in others as firms purchase services and materials as inputs (termed "indirect" effects) and employees spend their earnings within the local economy ("induced" effects). Consequently, in what is known as the multiplier effect, each industry will possess a unique multiplier representing its impact on the regional economy given its particular distribution of local purchases and payments. Reported employment and earnings within an industry (termed "direct") times their respective multipliers yield total employment generated by that industry.

The employment and income IMPLAN-generated multipliers used to derive total employment levels are shown in Table 3-130. Employment and income multipliers for the resource-dependent industries average around 1.5, with a low of 1.32 for recreation and a high of 1.92 for fish processing. The high figure for fish processing no doubt reflects the dependence of the industry upon local fish harvesting as a major input. Relative to multipliers estimated for other states, these figures are quite low, but this is not surprising given that a higher percentage of goods and services purchased by local firms and individuals must be imported from Seattle and elsewhere. (The multipliers used here are consistent with the Institute of Social and Economic Research (ISER) estimation of the Alaska statewide multiplier at 1.55.)

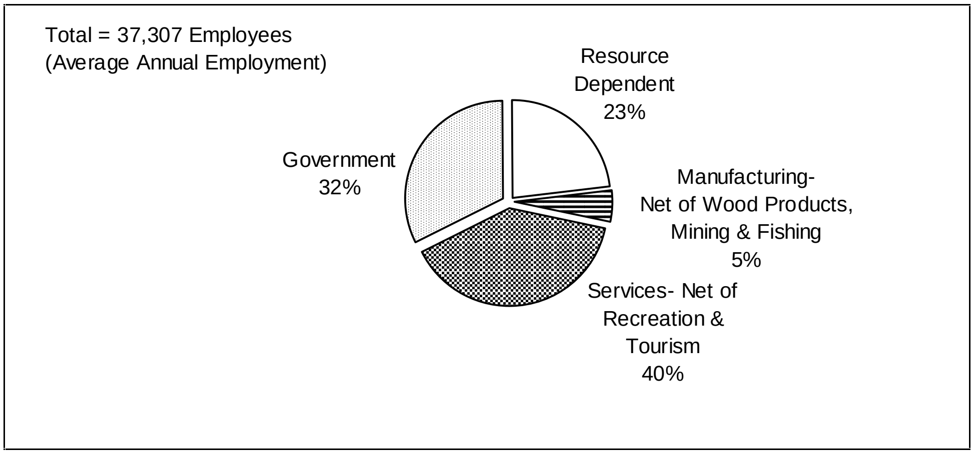
Table 3-130
Employment and Income Multipliers

Industry	Employment and Income Multipliers
Wood Products	1.73
Mining	1.74
Salmon Harvesting	1.42
Fish Processing	1.92
Recreation/Tourism	1.32
Hunting	1.40
Sport Fishing	1.44

Source: U.S. Forest Service.

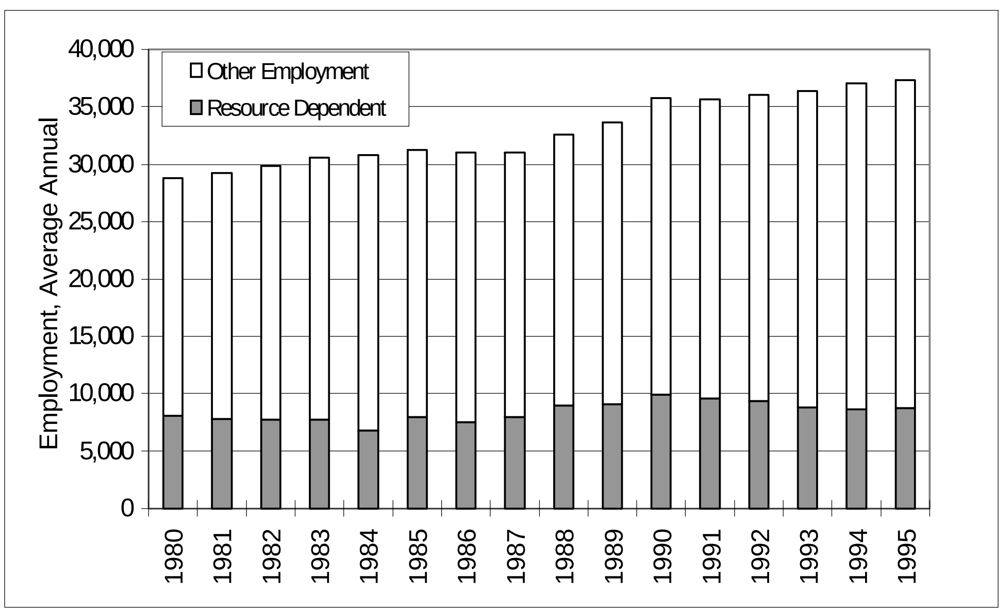
Figure 3-13 shows the distribution of direct employment in Southeast Alaska by major economic sector. Note that these numbers, and all subsequent employment figures, are expressed in average annual employment (equivalent to one year of full-time or part-time employment). The figure shows that out of 37,000 jobs in 1994, 23 percent were comprised by the direct employment contribution of resource-dependent industries. Estimates of total (i.e., direct, indirect and induced) employment from the resource-dependent sector were not available because of double counting, but it is certain that the share of total employment attributable to the resource-dependent industries is significantly higher. Due to a rapid increase in recreation and tourism-related employment, direct employment in the resource-dependent industries has risen approximately nine percent since 1985. Total Southeast Alaska employment, on the other hand, increased by about 21 percent during the same period. As shown in Figure 3-14, the resource-dependent industry share of total Southeast Alaska employment has been relatively constant.

Figure 3-13
Distribution of 1995 Southeast Alaska Direct Employment by Major Sector.



Source: AK Dept. of Labor and others (see industry subsections for details)
'Resource-dependent' industries include Paper and Wood Products, Mining, Fish Harvesting and Processing, and Recreation and Tourism.

Figure 3-14
Total Southeast Alaska Employment and Resource-Dependent Industry, 1980-1994.



Source: AK Dept. of Labor and various (see industry subsections for details).
Resource Dependent Industries Share is share of direct employment in Southeast Alaska total employment.
Note: All employment figures are standardized to average annual employment.

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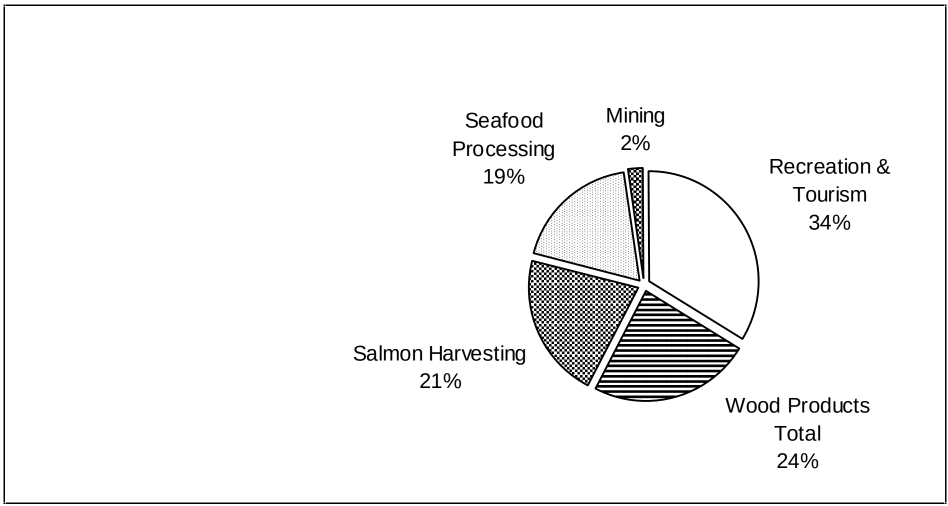
Direct employment shares of the various resource-dependent industries within the resource sector total are displayed in Figure 3-15. Salmon harvesting and fish processing together account for 40 percent of the total, followed by recreation and tourism including hunting and sportfishing (34 percent), wood products (24 percent), and, lastly, mining (2 percent). It should be noted that the distribution of total employment (using the multipliers mentioned above) will differ somewhat due to the different multipliers attached to each industry. While the share of recreation and tourism would decline due to its relatively small multiplier, that for wood products would increase. Relative changes in share for the salmon harvesting and processing sector total employment are ambiguous due to the complimentary nature of the sector's two constituent industries (i.e. indirect effects from each cannot be directly summed to yield a total). Income shares will likewise be different due to the relatively higher wages paid in the mining and wood products industries.

Figure 3-15
Distribution of 1995 Southeast Alaska Direct Employment within the Resource Dependent Industries.



Source: AK Dept. of Labor and various (see industry subsections for details).
Note: All employment figures are standardized to Average Annual Employment.

Alongside the number of jobs generated within a sector, various measures may be used to help describe the quality of the jobs created. Average annual earnings are shown in Table 3-131 and roughly correspond to the wage rate pertaining to a given industry (note, once again, that these are expressed in terms of average annual employment, i.e., they are the amount a person would earn by working in the given industry for a full year). Mining, followed by wood products, occupies the top of the spectrum. These two industries are, respectively, 100 percent and 48 percent higher than the average for the region. Estimates for tourism and recreation are also slightly higher than the regional average. At $26,074, seafood processing provides the lowest wage of all the industries here included. Profits to fishing permit holders are not included in the fish harvesting earnings. The earning figures presented here do not reflect total income of fishing industry participants.

Two other characteristics of employment are of specific relevance to Southeast Alaska. These are the nonresident share and the seasonal variation in industry employment, and they are highly correlated. Nonresident shares for Southeast Alaska total employment and direct employment in the resource-dependent

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industries are shown in Figure 3-16. At 44 percent, the share of nonresidents in the resource sector is approximately twice that for all industries within the region. This is mostly the result of the high proportion of nonresidents working in the seafood processing sector and recreation and tourism sector. Other sectors, particularly mining, are substantially lower, but, with the exception of hunting-related employment, all industries post figures higher than the regional average. It must be noted, however, that just because an employee is a nonresident, does not mean that the job is somehow less valuable. Nonresident shares merely help to indicate how much of the benefits generated by an industry stay in the region.

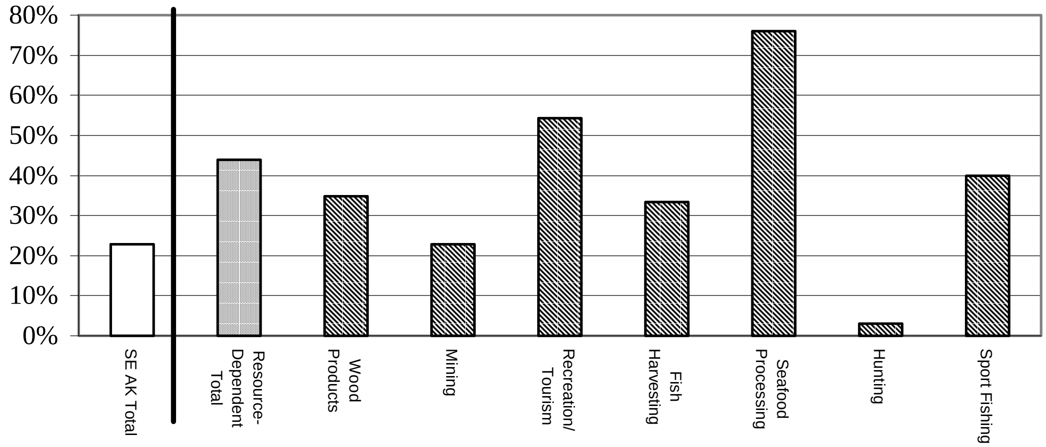
Table 3-131
1995 Employment & Earnings; Resource-Dependent Industries & Southeast Alaska Total

	Individuals Employed (Average Annual Employment)				Employee Earnings			
Industry	1995 Direct Employ-ment	Change 1985-95	% of SeAK Total	1995 Total Employ-ment	1995 Direct Earnings (mill. $)	% of SeAK Total	1995 Average Annual Earnings	1995 Total Earnings (mill. $)
Wood Products	2,070	2%	6%	3,584	$92	8%	$44,542	$160
Mining	189	-10%	1%	329	$12	1%	$60,971	$20
Recreation	2,941	22%	8%	3,888	$93	8%	$31,773	$124
Salmon Harvesting	1,855	-4%	5%	2,634	$49	4%	$26,418	$70
Seafood Processing	1,648	14%	4%	3,164	$43	4%	$26,074	$83
Resource Dependent Total	**8,702**	**9%**	**23%**	**--**	**$289**	**25%**	**$33,224**	**--**
SE Alaska Total	**37,307**	**21%**	**100%**	**37,307**	**$1,153**	**100%**	**$30,914**	**$1,153**

Source: AK Dept. of Labor and others (see industry subsections. for details).
Note: Recreation and tourism employment and income estimated from 1990 levels (derived from regional input/output model) using recreational use on the Tongass as an index. Total resource-dependent employment and income is omitted because of inability to sum resident and nonresident measures.

The seasonality of employment is another factor for Southeast Alaska, a region where the difference between peak levels of employment in the summer and dips in the winter are quite pronounced. Figure 3-17 shows one measure which is designed to capture seasonal variation. Unfortunately, monthly statistics were not available for many of the resource-dependent industries discussed here. Nevertheless, a pattern similar to that in nonresident share is apparent, with seafood processing showing an extremely high degree of seasonal variation (salmon harvesting can be assumed to display comparable but somewhat smaller figures due to increased preparation time). Though it is not reported here, it is safe to assume that tourism and recreation likewise show a high degree of seasonal variability. With the noted exception of pulp mills, the mining and wood products industries show a higher variation than the regional non-agricultural wage and salary average, but significantly less than in the case of seafood processing.

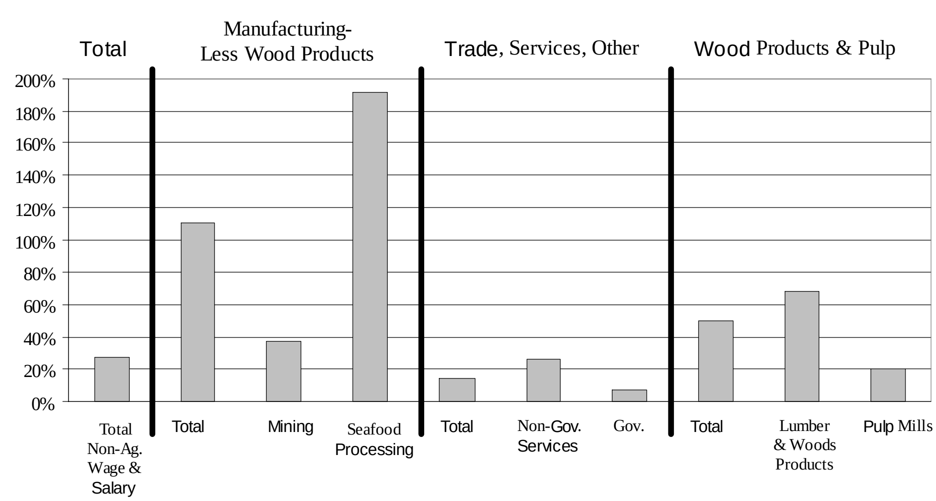
Figure 3-16
1994 Nonresident Share of Direct Employment in Southeast Alaska.
Total and Resource-Dependent Industries.



Source: AK Dept. of Labor and others (see industry subsections for details).
Note: All employment figures are standardized to Annual Average Employment.

Figure 3-17
Average Seasonal Variation in Employment 1990-1994

Difference between Summer maximum and Winter minimum divided by annual average



Source: AK Dept. of Labor and others (see industry subsections for details).
Note: 1990-1994 average is a weighted average of variation in each year.

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Industry-Specific Descriptions

The following subsections contain a more detailed description of each of the industries comprising the resource-dependent sector. In these descriptions the derivations of the statistics discussed above are given along with time series showing their development over the last fifteen years or so. Where possible, we have also presented projections of future levels for employment and other economic indicators. Linkages between the Tongass National Forest and each industry are also discussed.

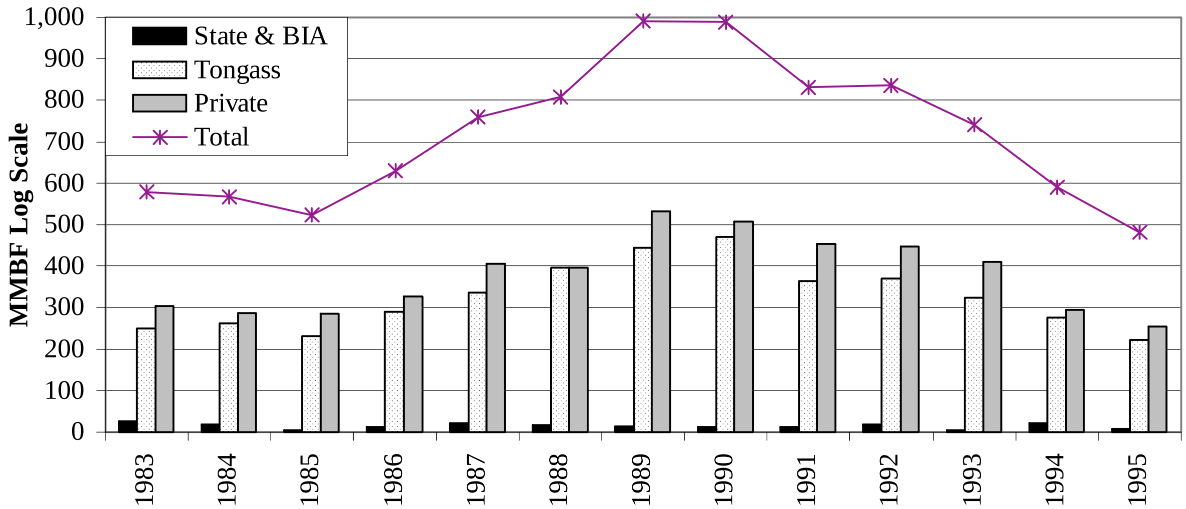
Timber

Southeast Alaska's wood products mix includes dissolving pulp, logs, cants, dimension lumber, wood chips, and a small but growing volume of specialty products. Overall, most of Southeast Alaska's pulp production and a substantial majority of its lumber is shipped overseas, with some 30 nations represented among the purchasers. National Forest logs provide most of the basis for these flows, as private logs move into offshore markets primarily as roundwood. Japan remains the principal customer for Alaskan wood products, accounting for over 70 percent of the total export value of wood-based commodities in 1994. On volume basis, approximately 93 percent of Alaska's lumber exports and 75 percent of its log exports went to Japan in that year. Pulp, on the other hand, has supplied a more diverse market, with just 14 percent of its volume being exported to Japan in 1994.

Southeast Alaska plays a significant role in world markets for wood products. Exclusive of Canada-United States trade, Alaska accounts for about eight percent of the softwood logs moving into Pacific Rim markets, and about four percent of the softwood lumber. While this percentage has remained relatively stable for lumber, it has increased since 1990 for log exports in spite of declining harvest volumes, no doubt reflecting supply constraints in the Pacific Northwest and substitution by Alaskan producers. The market for Alaska's dissolving pulp is global and Alaska's market shares have comprised about one fifth of export trade to major consuming nations, including in the lower 48 states.

As raw material imports comprise only a small proportion of Southeast Alaska's total roundwood consumption (two percent on average for 1983-94), harvests within the region must be seen as the driving force behind the wood products industry. Figure 3-18 shows Southeast Alaska harvests by owner since 1983. Harvest levels range from approximately 600 million board feet (MMBF) in 1983, to peak levels of just under 1,000 MMBF in 1989 and 1990, and then to a period low of 497 MMBF in 1995. This pattern is, in turn, mirrored throughout the various other statistics which are used in this section of the report. It is similar to that in Pacific Northwest harvests where a global recession in the wood products industry depressed output in the early to mid 80s, followed by a boom and then subsequent declines in harvests, in spite of rising prices, due to supply constraints. The variability is striking but not all that unusual for an industry, such as the timber sector, which is prone to boom and bust cycles.

Figure 3-18
Southeast Alaska Total Timber Harvests by Ownership, FY 1983-1995.



Source: USDA Forest Service, "Timber Supply and Demand 1995."

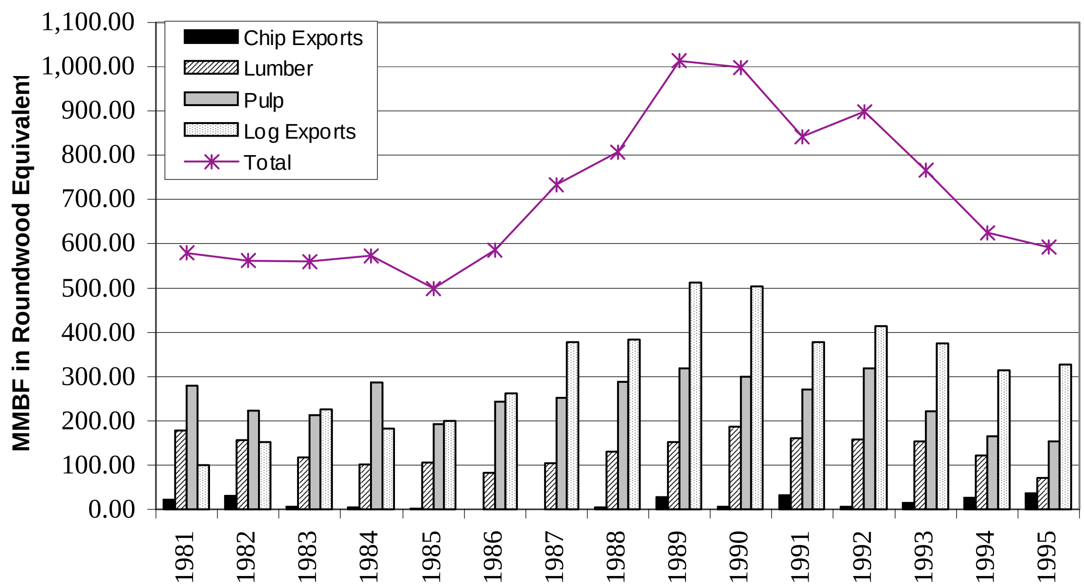
The vast majority of the region's harvests come from two ownerships: the Tongass National Forest and Native corporations (see Figure 3-18). On average, over the 1983 to 1995 period these two ownerships accounted for 45 percent and 52 percent respectively of total harvests, with private harvests exceeding those on the Tongass National Forest by an average of 14 percent. Consequently, the Tongass cannot be seen as the sole driving force in the region's timber economy, and future levels in Native corporation harvests must be incorporated into any predictions regarding the wood products industry's evolution. As is clear from trends in recent harvest levels, timber supply on Native corporation lands is declining. It is widely assumed that Native corporation harvests will continue to decline, stabilizing at a level of around 100 MMBF at the turn of the century (Knapp 1992, Brooks and Haynes 1994). Under this assumption, continued declines in forest sector employment and revenue, particularly in logging and log export related services, is inevitable unless harvests on the Tongass can make up the approximately 100 MMBF difference between 1994 Native corporation harvests and the predicted equilibrium level. Unlike the Pacific Northwest, where the private sector has been relied upon to fill the gap left by declining harvest on National Forest lands, future reductions in the availability of timber from private suppliers in Southeast Alaska can be expected to increase pressure on timber supply from the Tongass National Forest.

Timber from the Tongass National Forest and from Native corporation lands flow into essentially different markets. While Sitka spruce and western hemlock saw logs (the region's mainstay species) from the Tongass must be processed locally (in response to concern for keeping timber jobs in Alaska), the Native corporations face no such constraint, and a majority of their timber is sold in the form of raw log exports. Consequently, changes in Native corporation harvests will manifest themselves primarily in changes in log exports. Both ownerships supply lower grade timber as raw material for pulp production and chip exports, and a locally strong chip market is often cited as an essential outlet for the large volumes of low quality wood which is interspersed with the higher grade sawlogs as well as for the residues generated in lumber production. On average, 19 percent of Native corporation harvests are reported used in pulp production. Similarly, an average of

17 percent of Tongass National Forest logs are classified as utility grade, meaning that they are more likely to be used for pulp or chips. This figure, however, does not necessarily indicate the amount of timber dedicated to pulp production, as lower grade sawlogs will also be chipped for pulp and some utility grade logs may be sawn depending upon market conditions. According to historic reported data, 60 percent of the hemlock and 33 percent of the spruce logs have been chipped for pulp.

Total volumes of wood products produced in Southeast Alaska are shown in Figure 3-19. Several manipulations were necessary in order to obtain these figures. Fiscal year export volumes for the State of Alaska reported in "Timber Supply and Demand 1995." (USDA Forest Service 1995) were used as the primary source. Calendar year data on exports by port from the United States Department of Commerce were used to estimate Southeast Alaska's share in total state exports, and these shares were then used to scale the fiscal year data. The resulting figures represent an estimate of Southeast Alaska's exports based on state totals. Total volumes were obtained by adding estimates for domestic shipments derived from export shares reported in Brooks and Haynes, 1994. In the final step, roundwood equivalents were produced using conversion factors also given in Brooks and Haynes 1994. This same methodology was used to derive gross revenues.

Figure 3-19
Volume of Southeast Alaska Production in Roundwood Equivalents, FY 1981-1995.



Source: USDA Forest Service and U.S. Dept. of Commerce. Domestic shipments and conversions to roundwood equivalent were derived using export shares and conversion factors reported in Brooks and Haynes, 1994.

For comparability, all production units have been converted to roundwood equivalents (MMBF log scale). Roundwood is defined as the amount of raw material input needed to produce the reported volume of output. Comprising 43 percent of total production in the 1981-95 period, log exports are, on average, the largest component of Southeast Alaska's production on volume basis. At 36 percent, pulp production is the second largest component of production and is far more stable than are log exports. Lumber is the smallest component of total production (19 percent). This is somewhat misleading, however, as sawmill

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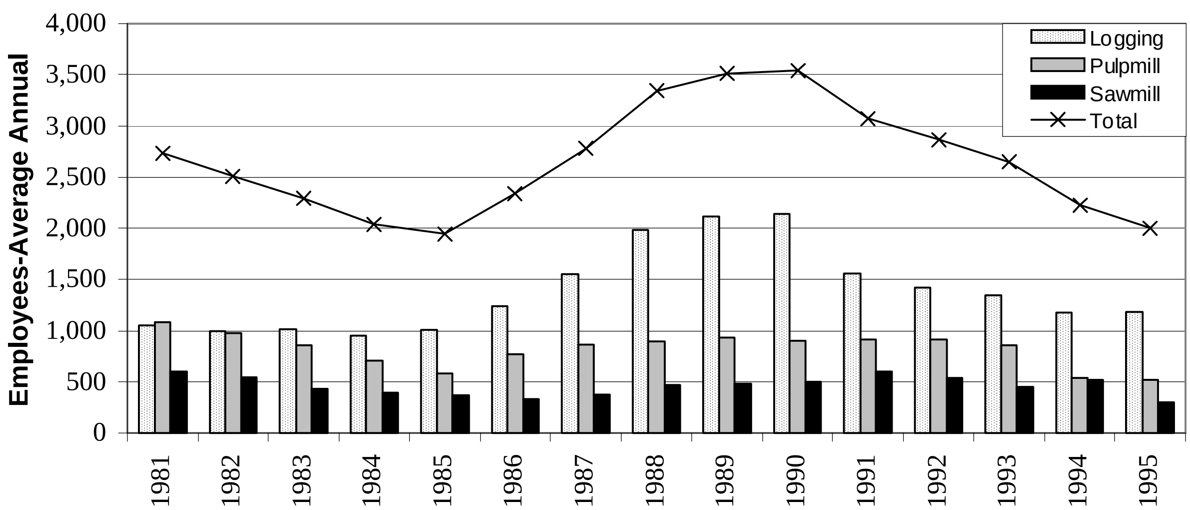
residuals from lumber constitute a major source of chips for pulp. In 1994, for example, mill residues supplied an estimated 102,000 tons of chips to the regional market, or approximately one quarter of Southeast Alaska's 429,000 tons of total chip supply. Logs chipped by sawmills provided another 67,000 tons. This fact serves to highlight the complimentary relationship between lumber production and local chip markets.

Direct employment generated by the wood products sector in Southeast Alaska is shown in Figure 3-20 and further described in Table 3-132. Once again, the pattern is familiar with generally depressed levels in the early 1980s followed by a peak in 1990 and subsequent decline, but the variation is somewhat less than in the harvest or production statistics. Lags in employment response to decreases in production are common, and further declines in employment levels can be expected even if 1995 harvest levels are maintained. On average, over the 1981-95 period, logging employment accounted for about half of total sector direct employment. Pulp production and sawmills accounted for 31 and 17 percent respectively. Both sawmill and pulp mill employment have declined dramatically due to the closure of the Alaska Pulp Corporation's (APC) pulp mill in Sitka and sawmill in Wrangell. In total, the industry has lost 1,540 jobs since 1990, but still has yet to fall below the period low of 1,947 jobs in 1985. Public opinion polls have demonstrated widespread recognition of the timber industry's economic and social importance in Southeast Alaska, as well as people's concerns over job loss and the resulting effects on individuals and communities.

Figure 3-20
Southeast Alaska Timber Sector Direct Employment by Type, FY 1991-1995.



Source: USDA Forest Service, "Timber Supply and Demand, 1995."

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Table 3-132
Southeast Alaska Timber Production, Revenue and Employment 1981-1995.

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Production (MMBF Roundwood Equivalent)															
Log Exports	100	152	225	183	199	262	377	385	513	504	377	414	376	314	328
Lumber	178	156	116	101	107	83	105	130	153	188	161	159	153	121	72
Chip Exports	22	31	7	4	2	0	0	4	29	7	32	7	15	26	38
Pulp	280	224	212	287	192	243	252	289	320	299	271	318	222	165	154
Total	581	563	561	575	500	589	734	808	1,014	997	841	899	766	625	593
Real Gross Revenues (Million 1994 $)															
Log Exports	84	109	142	103	102	137	206	264	290	313	220	258	278	224	221
Lumber	99	95	68	46	45	33	44	65	84	98	85	77	96	81	59
Pulp	279	244	183	226	129	148	180	249	330	272	209	228	157	115	168
Chip Exports	9	10	2	0	0	0	0	0	4	2	8	2	4	8	15
Total	470	458	395	376	276	318	430	579	708	685	522	564	536	429	448
Employment (Average Annual)															
Logging	1,047	991	1,010	946	1,004	1,239	1,545	1,981	2,113	2,144	1,554	1,415	1,344	1,177	1,185
Sawmills	605	540	429	395	363	331	375	468	478	500	604	538	447	515	301
Pulp	1,081	975	854	700	580	772	861	892	925	899	911	910	859	533	516
Total Direct	2,733	2,506	2,293	2,041	1,947	2,342	2,781	3,341	3,516	3,543	3,069	2,863	2,650	2,225	2,002
Indirect & Induced	1,530	1,403	1,284	1,143	1,090	1,312	1,557	1,871	1,969	1,984	1,719	1,603	1,484	1,627	1,464
Total	**4,263**	**3,909**	**3,577**	**3,184**	**3,037**	**3,654**	**4,338**	**5,212**	**5,485**	**5,527**	**4,788**	**4,466**	**4,134**	**3,852**	**3, 466**

Source: USDA Forest Service & Alaska State Dept. of Commerce.
Note: Roundwood equivalents calculated using log overrun and conversion facts found in Brooks and Haynes, 1994. Lumber unit values include revenues from the sale of mill residues for pulp production or chip export. To avoid double counting, receipts from the sale of mill residues were not reported for lumber gross revenue.

The proportion of community residents who lost jobs due to the 1993 closure of the APC pulp mill in Sitka and the 1994 closure of the APC sawmill in Wrangell, highlight the nature of Southeast Alaska's wood processing industry, where the size of certain key facilities is quite large relative both to the supporting community's economic base and to the region's total production capacity in that industry. Openings and closures of such facilities will have direct effects upon employment and production levels within their particular industries. Likewise, through the purchases of inputs, the spending of employee earnings, and through tax receipts, these facilities strongly impact the economies of their supplier markets and local communities.

By most broad measures, Sitka has thus far weathered the APC pulp mill closure reasonably well (See Community Section for additional discussion). These measures, however, do not capture impacts upon certain economic sectors and individuals within the community, impacts which often may be quite severe. In other communities, notably Wrangell, the opportunities for substituting employment with other industries may be more limited. The closure of the Wrangell mill may have a much more extensive impact on the community as a whole. The maintenance of adequate supplies for a specific mill is of great importance for the companies which do business with it, and for the communities in which it is located. Additionally, market forces may force mill closure even if timber supplies for the mills are adequate. In either case, industry response to market or policy changes will not be smooth, involving, instead, discreet and relatively large adjustments in production and employment.

As a result of the above, the amount of timber necessary to provide for operation of Southeast Alaska's mills has become one benchmark for evaluating the annual average allowable sale quantities (ASQ's) specified in the alternatives. Table 3-133 summarizes Southeast Alaska's installed production capacity as of 1995 and

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average consumption by mill over the last ten years. Ketchikan Pulp Company's (KPC) dissolving pulp mill in Ketchikan, now closed, required 190 MMBF of pulpwood and/or chips to operate at its reported full annual capacity of 210,000 tons of pulp. The company also operates two sawmills with a reported combined installed log processing capacity of 110 MMBF annually. Chip by-products from the sawmills are used in pulp manufacture. It is not yet known what alternative capacity or market for the wood used in the pulp mill will develop. Harvest of sufficient timber volume to supply Southeast Alaska sawmill capacity would continue to provide a proportionate volume of lower-grade logs and chips suitable for pulping or alternative processing. The Forest Service could allow pulp logs as well as chips to be exported from Alaska until local alternative processing capacity develops.

In addition to the KPC mills, there are three large independent sawmills operating in the region. These mills have a combined reported installed processing capacity of 175 MMBF per year, and they rely upon independent timber sales from the Tongass National Forest and private timber sales (KPC holds a long-term contract with the Forest Service, but its mills may also be supplied in part by independent and private sale volume). Another market segment for independent timber sales includes four relatively small sawmills with an estimated combined capacity of 30 MMBF. And, finally, there are at least 10-12 other buyers who use very small amounts of wood in the manufacture of musical instruments, cedar shakes, shingles, and lumber using small portable mills. The combined annual processing capacity of these smaller operations is estimated at 7 MMBF.

Table 3-133
Timber Processors in Southeast Alaska in FY 1995.

	Installed Capacity (MMBF) [2]	Wood Fiber Consumed (MMBF Equiv.) [1]	% Capacity Utilized
Major Operators[2]			
Ketchikan Sawmill	50	27	54%
Annette Island Sawmill	60	32	53%
Viking Lumber/Chip Mill	30	16	53%
Seley Corp.	35	19	54%
Wrangell Sawmill [3]	110	59	54%
Smaller Operators[2]			
MITE	10	5	50%
Pacific Rim Cedar	10	5	50%
The Mill, Inc.	5	3	60%
Jim Ensley	5	3	60%
Other Small Mills[4]	7	4	57%
Total	322	173	52%

Source: USDA Forest Service, "Timber Supply and Demand, 1995."
1 Estimated 10-year average consumption.
2 Capacity as reported by mill owner. Consumption estimated.
3 The Wrangell Sawmill is currently closed, but is included in the analysis reflecting potential reopening.
4 Includes music wood, cedar salvage, and small portable sawmilling operations.

The capacity and efficiency of Southeast Alaska mills in conjunction with the availability and cost of raw material inputs will determine the ability of local producers to compete in export markets. This ability to compete roughly corresponds to the economic concept of "supply." "Demand" for Southeast Alaska wood products, on the other hand, will depend upon developments within consumer markets and within other producing regions whose products compete with those of Alaska. Overall, sustained market demand for softwood lumber throughout the Pacific Basin is predicted well into the next century. Likewise, British Columbia and the Pacific Northwest will continue to face severe supply constraints for at least the

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next decade. Although large amounts of second- and third-growth stands in the Pacific Northwest are expected to become increasingly available in the early decades of the next century, it is doubtful that harvest levels will ever approach the peaks experienced in the 1980s and before.

As a partial result of these factors, rising real prices for logs and lumber have been commonly predicted for Pacific markets. While this is promising for Southeast Alaska firms, Alaska is one of the highest cost producers supplying the Asian market. Other regions, notably the Russian Far East and the radiata pine plantations of Chile and New Zealand have a considerable competitive advantage in the production of wood fiber. However, they cannot supply in quantity the sort of quality species and grades which constitute the higher range of Southeast Alaska's product mix. The development of future demand for dissolving pulp, Southeast Alaska's other main wood product export, is more unclear, but it is generally seen as being less favorable than that of lumber.

Installed processing capacity, in conjunction with the market share of Tongass National Forest-based products in export markets, has been used to estimate future levels of demand for Tongass timber. However, this "market demand" is by no means an unambiguous term and has been defined differently (with different results) by various groups and studies (e.g., Brooks and Haynes 1994, The Irland Group 1992). As no supply curves and subsequent price equilibrium are used in these studies, their results do not correspond to an economic concept of demand and are more correctly viewed as predicted levels of production and sales under certain key assumptions. The approach used by Brooks and Haynes is representative and is used in this analysis as a baseline projection for use in comparing expected employment levels under different planning alternatives (see Table 3-134).

The revised Brooks and Haynes estimates (1997 draft) assume that Southeast Alaska lumber exports (particularly to Japan) will be limited. Given expected trends in consumption and total imports within these markets, expected levels of sawnwood "demanded" from the Tongass are estimated. Due to the closure of both pulp mills, no demand is associated with pulp production. A final assumption of declining harvests on private and State lands (to 186 MMBF is included, and the overall level of derived demand estimated. Employment levels are then estimated using the 1990-1994 average employment per unit output (lumber only). Figures fro 1995 are included for comparison with the year-2000 projections.

The estimated reduction in Native corporation harvests, the absence of a pulp mill, and the assumption of limited overseas markets, all contribute to a timber-industry employment considerably lower than the 1995 level. The loss of logging jobs accounts for over 45 percent of the drop in direct employment, and the loss of pulp mill jobs about 58 percent of the decline. Total timber-related employment is estimated to decline by 47 percent between 1995 and 2000, and employee earnings by the same amount. Gross business income is expected to decline by 39-44 percent.

The scenario presented in the previous paragraph is not intended to indicate the range of potential outputs and industrial activity possible from timber harvests on the Tongass National Forest. It merely describes possible levels of activity given certain assumptions and is meant to be instructive rather than indicative. The feasibility of the outputs described in the scenario (especially lumber) will depend upon the quality of timber available from the Tongass National Forest and the costs associated with its harvest. Larger levels of production are no doubt possible, but only at increasing costs to other market and non-market values associated with the forest.

To the extent that timber supplies are the determining factor for economic activity in the wood products sector, the linkages between Forest Service policy decisions and wood products employment are relatively direct. Harvest volume made available under different planning alternatives will have a direct impact on employment and earnings in the industry.

Table 3-134
Southeast Alaska Timber Production and Employment, FY 1995 and Projections.

	1995	Brooks & Haynes (2000)
Volumes Produced		
Tongass Harvest (MMBF log scale)	221	212
Private & State Harvest (MMBF log scale)	240	186
Total Harvest (MMBF log scale)	461	398
Log Exports (MMBF log scale)	328	162
Lumber Production (MMBF lumber tally)	91	95
Pulp Production (M tons)	183	0
Chip Exports (M tons)	102	130
Employment (Average Annual)		
Logging	1,185	776
Sawmills	301	251
Pulp	516	45
Total Direct Employment	2,002	1,072
Total (Direct, Indirect & Induced)	3,466	1,856
Employee Earnings (Million 1994$)		
Direct Earnings	89	48
Total (Direct, Indirect & Induced)	154	83
Gross Business Income (Million 1994$)		
@ 1994 Prices	428	261
with 2% Annual Real Price Increase	521	290

1995 figures are actual statistics for that year. The 2000 scenario was obtained by holding 1994 figures for National Forest harvest, regional lumber production, and pulp production constant, and then factoring in a 114 MMBF decrease in Native corporation harvests. The Brooks & Haynes scenario is described in Brooks and Haynes, 1994.
Decline in pulp employment in the baseline 2000 scenario relative to 1995 is the result of using average employment per ton of pulp production for the 1990-94 period to derive total employment estimates.
Figures may not sum due to rounding.

Commercial Fishing and Seafood Processing

While commercial salmon fishing comprises the bulk of Southeast Alaska's fishing industry, halibut, crab and herring fishing constitute a substantial proportion of the region's total catch (approximately 24 percent in 1994 on value basis). There is an important connection between salmon and other wildlife and fish species on the Tongass. Crab, halibut, herring, bears, eagles, and other species depend on the annual return of millions of salmon and on the juvenile salmon produced in the Tongass streams and lakes. However, these relationships are not well understood. Therefore, even though the crab, halibut, and herring fisheries are linked to salmon produced on the Tongass, Tongass management has indirect effects on these fisheries. Discussing these indirect effects as part of the 'affected environment' is very difficult and information is not available on the relationships between Tongass management and these fisheries. Consequently, statistics on commercial fishing presented in this section will be specific to the salmon fishery. Statistics available for the seafood processing industry, however, do not allow for an easy distinction between salmon processors and other firms, and the entire industry will be included in subsequent tables and figures.

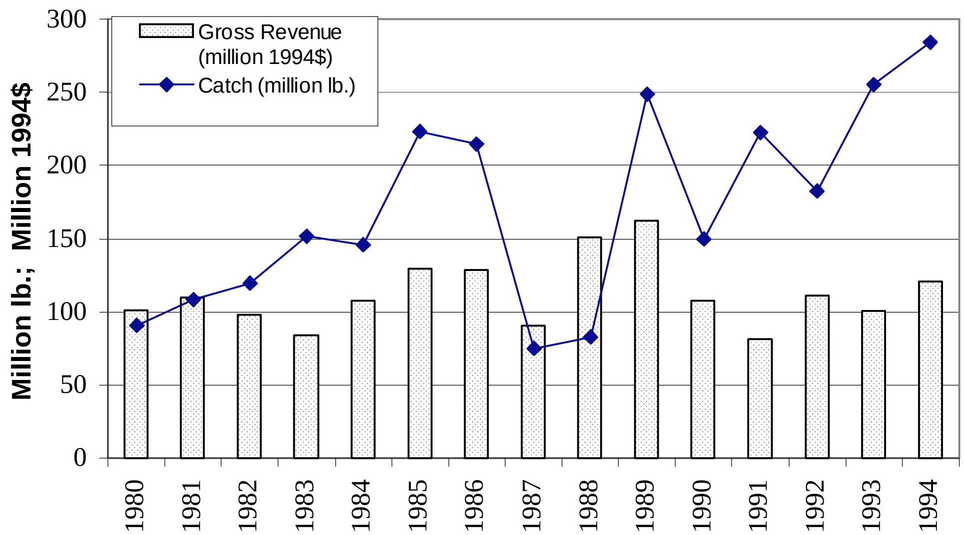
Although the profitability of the seafood industry in Southeast Alaska continuously changes, it remains a major component of the regional economy. Taken together, commercial fishing and seafood processing formed the region's largest private industry in 1994. At an estimated 3,500 average annual employees in 1994, combined direct employment in the salmon fishing and seafood processing industries exceeded that in wood products by 61 percent and that in recreation and tourism by 28 percent. State government, Southeast Alaska's largest basic industry employer is concentrated in Juneau while components of the seafood industry are spread throughout the region with a significant presence in virtually every community. Sitka leads Southeast ports in the number of permits fished, and Petersburg residents lead the region in catch and gross earnings.

Most fresh and frozen Alaska Salmon is sold in the United States and Japan with lesser amounts sold in Europe, primarily to France and the United Kingdom. Canada and Korea also buy significant amounts of fresh and frozen salmon from Alaska. Canned salmon is sold primarily in the United States other markets include the United Kingdom, other European nations, Australia and Canada. World fish consumption far exceeds the productive capability of the Tongass National Forest, and any changes in commercial fish production attributable to forest management will not have a significant effect on market prices. In economic terms, participants in Alaska's seafood industry are "price takers" and subject to wide price fluctuations as a consequence of changes in the international market for seafood products of all types.

Salmon stocks have recovered from their low levels in the early 1970s, and salmon continues to dominate the industry both in the volume and value of catch and in harvest-related employment. Despite overall growth in Alaska's salmon production and worldwide increases in consumption, Alaska's market share of global salmon supply (estimated at 31 percent in 1990) has been falling. The loss of market share is not a function of poor stocks or low supply, but a consequence of the growing acceptability of farmed fish as a source of fresh salmon. The consistent year-round availability and quality of fresh-farmed salmon has made wild Alaska salmon, with its short season and quality and supply inconsistencies, a secondary choice. Seafood processing, another vital component of Southeast Alaska's economy, has also undergone fundamental changes. Of major significance are the increased use of floating fish processing facilities and a trend toward frozen rather than canned salmon.

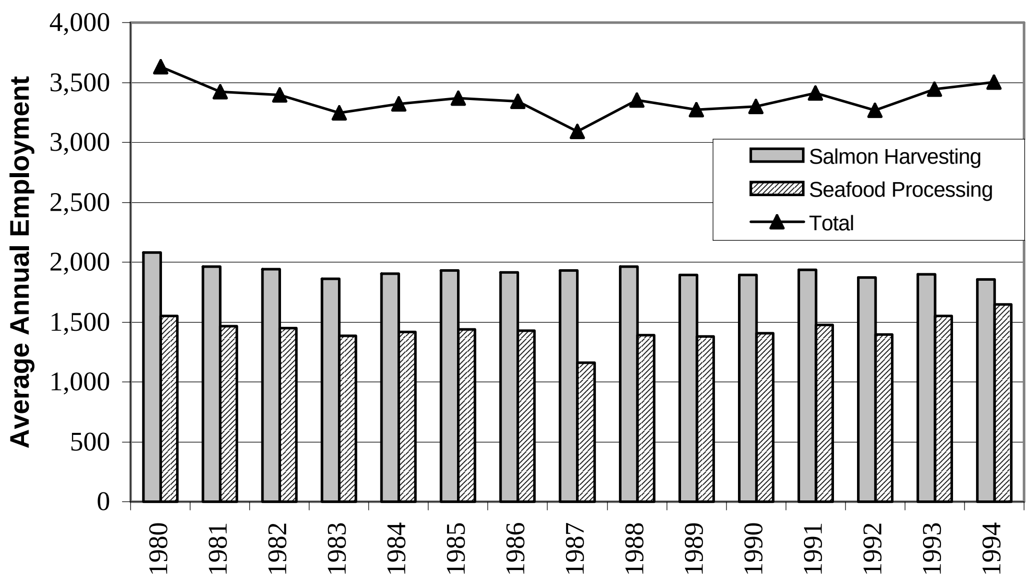
Value and volume measures of salmon harvest for Southeast Alaska are shown in Figure 3-21 and further enumerated in Table 3-135. In spite of extreme variation from year to year, harvest levels show a definite upward trend since 1980. Gross revenues (in 1994 constant dollars), on the other hand, display no apparent trend. This divergence of volume and value trends is the result of falling prices for Alaskan wild salmon (see "unit values" in Table 3-135), and provides quantitative support for the arguments made in the previous paragraph. In contrast to revenue and catch figures, employment (Figure 3-22) in both salmon fishing and, to a lesser extent, seafood processing is remarkably stable. A generally increasing catch using the same work force has, on average, allowed fisherman to maintain real incomes in spite of falling prices (see "1994$ / Employee" in Table 3-135). Alongside the high degree of seasonality and nonresident participation in salmon fishing and processing, the extreme variation in yearly income in this employment category stands out. Nonetheless, the relative size and stability of employment in the industry identifies fishing and processing as an extremely important and apparently sustainable element in Southeast Alaska's regional economy.

Figure 3-21
Southeast Alaska Salmon Harvest: Gross Landings & Gross Earnings, 1980-1994.



Source: AK Commercial Fisheries Entry Commission.
Gross Earnings to commercial fishers are ex-vessel values deflated using the national Producer Price Index (PPI).

Figure 3-22
Direct Salmon Harvesting & Fish Processing Employment in Southeast Alaska, 1980-1994.



Source: AK Commercial Fisheries Entry Commission, AK Dept. of Labor.
Salmon harvesting employment derived using average crew size and number of permits (see text).

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Employment and earning statistics published by the Alaska Department of Labor are compiled from quarterly reports of employers who are subject to state unemployment insurance law. Self-employed persons, such as those in commercial fishing are excluded from these figures. Consequently, employment for the salmon fishing industry had to be estimated. The technique used relies heavily upon the methodology and results used by the McDowell Group in their 1989 report on the Alaska seafood industry (McDowell Group 1989). In order to estimate employment levels, surveys were first undertaken to obtain average crew sizes, time spent fishing and preparation time for different fisheries. These figures are then used to estimate the number of employee-years associated with a permit fished in a given fishery. Multiplying this estimate by permits fished yields estimated annual employment by fishery (expressed in a full-time equivalent basis). Earnings figures are estimated by dividing up net revenues amongst captains and employees in the fishery, profits to captains are not included. This allows for comparability with Department of Labor figures and helps to explain the extremely low yearly earnings estimates reported in Table 3-135. This method yields a best approximation of the economic activity attributed directly to commercial salmon fishing but may be subject to a substantial degree of error. Even if employment levels are subject to error, employment trends will be more accurately reflected.

There are several assumptions used to relate the salmon fishing and seafood processing industries back to the Tongass National Forest. For example, it is assumed that 80 percent of Southeast Alaska salmon originate on the Tongass, and thus, 80 percent of the salmon fishing industry is dependent upon the National Forest. The dependence of fish processing employment on the Tongass was derived similarly with the added assumption that salmon represented 60 percent (on volume basis) of the total processed catch. Consequently, 48 percent of seafood processing employment is assumed to be dependent upon the Forest.

Table 3-135
Southeast Alaska Salmon Industry Employment and Earnings Estimates.

Fisheries Included	Crew Shares and Income Coefficients from McDowell: Crew Shares — Average Annual Employee/Permits Fished	Income Coefficients — % of Gross Ex-Vessel to Earnings
S04D Yakutat Salmon Set Net	0.58	0.29
S01A S.E. Salmon Seine	1.62	0.52
S03A S.E. Salmon Drift Gill Net	0.80	0.29
S05B S.E. Salmon Hand Troll	0.25	0.26
S15B S.E. Salmon Power Troll	0.80	0.26

	1980	1981	1982	1983	1984	1985	1986	1987
Salmon Harvesting								
Permits Fished	3,448	2,915	2,825	2,670	2,615	2,695	2,613	2,591
Catch (million lbs.)	90.8	108.6	119.2	151.4	145.5	223.4	214.8	75.0
Gross Revenue (million 1994$)	$101	$110	$98	$84	$107	$129	$128	$91
Unit Value of Catch (1994$/lb.)	$1.11	$1.01	$0.82	$0.55	$0.74	$0.58	$0.60	$1.21
Direct Employment (Avg. Annual)	2,081	1,961	1,943	1,860	1,901	1,928	1,915	1,931
Total Employment (Avg. Annual)	2,955	2,784	2,760	2,640	2,700	2,737	2,720	2,742
Estimated Payroll (million 1994$)	--	--	--	--	$38.7	$50.3	$49.6	$31.3
1994$/Employee (Avg. Annual)	--	--	--	--	$20,368	$26,078	$25,918	$16,189
Seafood Processing								
Direct Employment (Avg. Annual)	1,553	1,463	1,450	1,388	1,419	1,439	1,429	1,158
Total Employment (Avg. Annual)	2,981	2,810	2,785	2,664	2,724	2,762	2,744	2,224
Payroll (million 1994$)	--	--	--	--	--	--	--	--
1994$/Employee (Avg. Annual)	--	--	--	--	--	--	--	--
Total								
Direct Employment (Avg. Annual)	3,633	3,424	3,394	3,247	3,320	3,366	3,345	3,089
Payroll (million 1994$)	--	--	--	--	--	--	--	--

	1988	1989	1990	1991	1992	1993	1994
Salmon Harvesting							
Permits Fished	2,628	2,515	2,521	2,557	2,462	2,435	2,337
Catch (million lbs.)	82.5	248.5	149.6	222.2	182.6	255.6	284.4
Gross Revenue (million 1994$)	$151	$162	$108	$81	$111	$101	$121
Unit Value of Catch (1994$/lb.)	$1.83	$0.65	$0.72	$0.36	$0.61	$0.39	$0.43
Direct Employment (Avg. Annual)	1,962	1,894	1,892	1,939	1,870	1,896	1,855
Total Employment (Avg. Annual)	2,787	2,689	2,687	2,753	2,655	2,692	2,634
Estimated Payroll (million 1994$)	$58.4	$73.3	$42.9	$32.0	$43.9	$40.6	$48.0
1994$/Employee (Avg. Annual)	$29,776	$38,708	$22,672	$16,499	$23,477	$21,425	$25,886
Seafood Processing							
Direct Employment (Avg. Annual)	1,392	1,379	1,408	1,475	1,396	1,550	1,646
Total Employment (Avg. Annual)	2,672	2,648	2,704	2,832	2,680	2,976	3,160
Payroll (million 1994$)	$29.9	$33.9	$33.4	$38.6	$33.8	$36.5	$40.8
1994$/Employee (Avg. Annual)	$21,461	$24,577	$23,696	$26,159	$24,183	$23,528	$24,775
Total							
Direct Employment (Avg. Annual)	3,354	3,273	3,300	3,414	3,265	3,446	3,501
Payroll (million 1994$)	$88.3	$107.2	$76.3	$70.6	$77.6	$77.1	$88.8

Source: Alaska Commercial Fisheries Entry Commission, and The McDowell Group, 1989.
Employment estimates for salmon harvesting were obtained using the McDowell methodology and associated estimates (see text for details). Before 1987, seafood processing is not broken out in AK Dept. of Labor figures. Figures prior to 1987 which are reported here were estimated using volume of Salmon caught.
All income figures are deflated using the Anchorage CPI. Gross revenue figures for salmon harvesting are deflated using the national producer price index (PPI).
No total is given for indirect employment as multiplier effects in the seafood processing industry will be result in indirect employment in salmon harvesting. Adding indirect employment for harvesting and processing would result in double counting.

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Estimates from the fisheries habitat panel assessment and the fisheries environmental effects section of this EIS indicate that forest management activities are anticipated to pose some risks to anadromous fish habitat on the Tongass National Forest (see fish section). However, much of the future of the fishing industry in Southeast Alaska will be dependent upon occurrences outside of the National Forest such as off-shore harvest levels and changes in ocean currents. Due to these and other confounding factors, no reliable projections of salmon harvests were obtainable.

Recreation and Tourism

General recreational use and tourism within the Tongass has more than doubled in the last ten years. This, in turn, reflects a rapid increase in recreational and tourism related activities for all of Southeast Alaska, and economic activity in this industry (including sport fishing and hunting) now accounts for an estimated 2,941 jobs in the region (direct employment only). This figure constitutes approximately seven percent of Southeast Alaska total 1995 employment and is the second largest employment level amongst the region's resource-dependent industries. A substantial proportion of this activity, however, does not occur on the Tongass National Forest. In other cases (such as the cruise ship business), linkages with National Forest policy are assumed to exist but have not been quantified. The Tongass National Forest, and public perceptions of its undisturbed character, plays an important role in bringing out-of-state visitors to Southeast Alaska, who, in turn, will generate jobs and income through activities not directly related to the Tongass. However, the statistics presented in the following paragraphs are related to activity directly occurring on the Tongass.

Added to this ambiguity is the fact that economic activity related to recreational use is extremely difficult to accurately quantify. Since tourists spend their money throughout the local economy, there is no single "tourism industry," and no direct measures of tourist-related income or employment. Other recreational activities likewise impact numerous different sectors of the economy. And finally, unlike a traded commodity such as timber, there is no direct way to integrate supply and demand to yield a level of consumption or market value for recreational experiences on public lands.

As a result, the employment measures and projections of expected use presented below should be seen as tentative estimates whose purpose is merely to flesh out broad trends within the industry and the region. Various assumptions had to be made in order to proceed with the analysis, and each of these has the potential of introducing errors to our estimates. The nature of these assumptions and their impact on the analysis are discussed in detail in the concluding paragraphs of this section.

The basic measurement of recreational activity on the National Forest is the Recreation Visitor Day (RVD), usually obtained through the counting of use permits, visitor surveys, or observation. An RVD is 12 hours of recreation use by one individual. The RVDs used in this analysis quantify visitors' use directly related to use on the Tongass. These RVDs are categorized into three distinct groups in accordance with the Recreational Opportunity Spectrum (ROS) classification system (see Recreation Section for complete definitions). The three groups used in the analysis are a combination of the seven ROS classes. These classes are: "Primitive and Semi-Primitive Non-Motorized" (here termed ROS1); "Semi-Primitive Motorized" (ROS2); and "Roaded Natural, Roaded Modified, Rural, and Urban" (ROS3). Each of these categories is discussed separately below. See Table 3-136.

By far the largest component of recreation use on the Tongass has been in ROS2, or the Semi-Primitive Motorized category. Areas suitable for this activity primarily include natural-appearing shorelines, lakes and rivers which provide for semi-primitive experiences, but are classified as motorized due to boat and float plane activity in the vicinity. Estimates for 1994 indicate that ROS2 class use accounts for approximately 62 percent of all RVDs occurring on the Tongass. The 62 percent figure for ROS2, and estimates for ROS1 and ROS3, are assumed to be constant throughout the time span considered in this analysis and were used to break out levels of usage by ROS class from the raw data which was reported as simple RVDs. The next largest component of general recreational activity is within ROS1. Recreation use in this category is predicated on a natural or natural appearing setting with little evidence of human use and little motorized activity. This category accounts for an estimated 20 percent of recreational activity on the Tongass. The smallest component of recreation use is ROS3 which is estimated to comprise 18 percent of total recreational use. Recreation use in this category occurs in roaded settings where signs of human activity are apparent.

Table 3-136
Tongass Related Recreation and Tourism: Historic and Predicted Consumption in Recreation Visitor Days (RVDs).

	Consumption to 1995 and Projected Demand for Tongass Related Recreation (1,000 RVDs)														
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	2000	2005	2010
ROS1	207	307	225	276	312	365	484	511	536	435	455	484	706	857	1,008
ROS2	622	922	676	828	937	1,095	1,451	1,534	1,609	1,305	1,364	1,452	2,117	2,571	3,024
ROS3	158	234	172	210	238	278	368	390	409	331	346	369	538	653	768
Total	**987**	**1,463**	**1,073**	**1,315**	**1,487**	**1,738**	**2,303**	**2,435**	**2,554**	**2,071**	**2,165**	**2,305**	**3,361**	**4,080**	**4,800**

Available Recreation Opportunities RVDs by Class in 1994 (1,000 RVDs)	
ROS1	1,443
ROS2	1,668
ROS3	1,851
Total	4,962

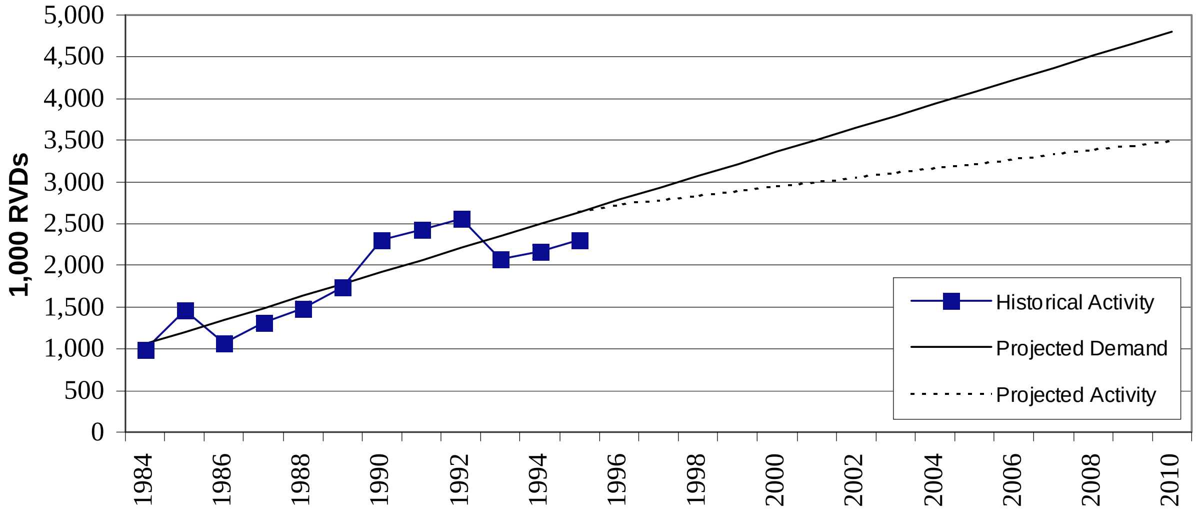
Projected Consumption of RVDs by Class (1,000 RVDs)	1995	2000	2005	2010
ROS1	484	706	857	1,008
ROS2	1,452	1,668	1,668	1,668
ROS3	369	538	653	768
Total	2,305	2,912	3,178	3,444

	Historic and Projected Employment Generated in Average Annual Employment														
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	2000	2005	2010
Direct Employment	730	1,082	793	972	1,100	1,285	1,703	1,801	1,889	1,532	1,601	1,705	2,154	2,351	2,547
From Nonresident	321	475	349	427	483	565	748	791	830	673	704	749	946	1,033	1,119
Total from Nonresident	424	629	461	565	639	747	990	1,046	1,098	890	930	991	1,251	1,366	1,480

Source: USDA Forest Service.
Figures to 1995 are estimated from historical data of recreational use. Figures in subsequent years are estimates based on linear projection using historical use. See text for definitions and explanations.

Statistics for Tongass related RVDs along with projected demand and supply relations, shown in Figures 3-23 and 3-24, are further detailed in Table 3-136. Historical recreational activity, shown in Figure 3-23, is the base from which all other statistics are derived and is in the form of simple RVDs (undifferentiated by ROS group). A trend line (based on a linear regression using 1984 - 1994 data) is also shown, and this is used to project future levels of demand for RVDs of all types. When spliced together, these two elements yield a single series composed of past consumption and future demand for RVDs on the Tongass National Forest. This series is shown in the "Total" row in the first part Table 3-136. It is then used in combination with the ROS class shares given in the previous paragraph to break out RVDs by ROS groups 1, 2, and 3, and these estimates are, in turn, shown in the columns of Figure 3-24. The horizontal lines correspond to the 1994 supply of recreational settings within each ROS class and are taken from a geographical database describing the Forest. Note that in the past no level of use within a given ROS category has met or exceeded its 1994 available supply. However, in 1996, the projected number of RVDs in ROS2 exceeds current estimated supply, and, given a linearly increasing projection of demand for a fixed resource, this shortfall in ROS2 increases as the years pass. This predicted shortfall is based on current levels of supply, and further decreases in ROS2 settings due to competing forest uses will exacerbate the shortfall.

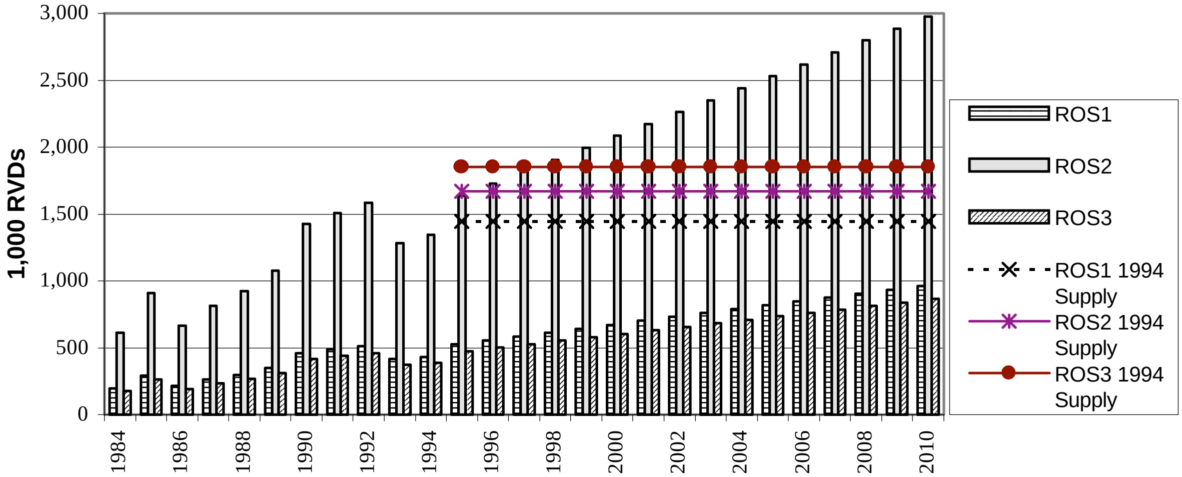
Figure 3-23
Historical and Projected Recreational Activity on the Tongass National Forest in RVDs.



Source: USDA Forest Service.
See text for definitions and explanations.

Recreational use upon public lands is not a market good, and, where supply is binding, use restrictions rather than price increases are the most likely result. It is here assumed that RVD use within a certain ROS class will not exceed supply within that class (for this analysis, supply is equated to the current level available, but alternative supply levels will be treated in the Effects Analysis). ROS2 is the only class in which supply is binding over the period considered, and by constraining ROS2-related RVDs to their 1994 supply level, a projected level of use for the Forest is derived. This projected consumption of RVDs is shown in the dotted line in Figure 3-23 and further broken out by ROS groups in Table 3-136. It represents a baseline projection of recreational activity on the Tongass National Forest under the assumption of no change in current availability of recreational settings.

Figure 3-24
Historical Consumption, Projected Demand and 1994 Supply for Recreation Activity on the Tongass National Forest by ROS Group.



Source: USDA Forest Service.

Several additional steps are necessary to translate the number of RVDs into employment levels for Tongass-related recreation. In the first step, visitor survey data outlining cash expenditures were used in conjunction with a regional economic model (IMPLAN) to derive the average amount of employment generated per RVD in 1990. Visitor data were taken from a comprehensive visitor survey conducted in 1988 by the Data Decisions Group. The actual figure used for employment was 0.00074 jobs/RVD. The Tongass-related direct employment estimates, derived by multiplying jobs/RVD by historical and projected RVDs on the Tongass are shown at the bottom of Table 3-136. This approach assumes that the average amount of employment generated by a single RVD is constant over time and that this number is the same for both Tongass-related recreation and for the region as a whole. Although these assumptions may not accurately reflect underling economic realities, they were necessary to produce a quantified estimate of the relation between recreation activity and employment.

In addition to the “Direct Employment” category, Table 3-136 shows a “From Nonresident” employment category. Nonresident employment refers to those jobs generated by expenditures from out-of-state visitors and is comparable to an export industry which brings new money into the region. Consequently, employment generated by nonresident expenditures in the recreation and tourism sector creates new wealth and development opportunities for Southeast Alaska. Resident recreational activity, on the other hand, brings no new money to the region, and thereby does not expand the local job base. Since nonresident visitors to the Tongass National Forest account for an estimated 44 percent of total use, nonresident generated employment figures are considerably less than those for direct employment. The last row in Table 3-136, entitled “Total from Nonresident” quantifies the total effect of nonresident recreation and tourism expenditures on employment in Southeast Alaska. This occurs through the previously mentioned “multiplier effect” in which visitor expenditures create direct employment, and the wages paid to these new employees, in turn, generate other jobs in the regional economy. A reduction in out-of-state recreational activity due to decreased recreational opportunities (ROS settings) will result in a net economic loss to the

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region. Local residents, on the other hand, are assumed to spend their money elsewhere in Southeast Alaska, and no net loss in economic activity is incurred.

This is not to say that the effect is neutral. Local residents who would wish to use the Forest but are unable to must choose a less preferred alternative, and thus lose some of the value associated with the recreational experience. Likewise, while no net loss in employment is entailed in the long run from a reduction in resident recreation activity, some employees catering to the resident recreation and tourism trade will lose their jobs. The hardships faced by these individuals will be very real even if they are not reflected in regional employment totals.

There are numerous potential sources of error in the foregoing analysis, and each highlights both key issues surrounding recreational use on the Tongass National Forest and the difficulty in deriving and predicting economic measures associated with this use. Some of the most important sources of error are as follows:

1. The RVDs used in the analysis do not reflect total recreational use or value associated with the forest. Viewing opportunities from cruise ships and other water-borne activity are not included. Likewise, the role of the Tongass National Forest as a general draw for out-of-state tourism is not addressed. In the first case, the value of viewing an undisturbed coastline from a boat is difficult to measure. Moreover, it is questionable to define this activity as a "use" in the same way that RVDs actually occurring on National Forest land may be defined. A final complication lies in the importance of location; clearcuts occurring along cruise ship corridors will be noticed more than those occurring elsewhere.

   In the second case, the Tongass National Forest must be viewed in combination with other recreational opportunities in the region. Out-of-state visitors, for example, will often divide their time between activities on the Tongass National Forest and those available elsewhere in Southeast Alaska. While National Forest-related recreation may not comprise all, or even a majority, of their activity, the availability of Tongass-based recreation opportunities may still be a key factor in their decision to come to the region in the first place. A main attraction for visitors to Southeast Alaska is its pristine nature, and public perceptions of Tongass National Forest management will affect this attraction. In either of the cases discussed in this and the above paragraph, the result will be a tendency to underestimate the economic value of Tongass-related recreation and tourism in the statistics presented above.

2. The use of a linear projection (i.e., the assumption that Tongass-based recreation activity will increase in the future at the same rate as it has in the past) is problematic when used with extended projections into the future. Numerous factors will affect the future demand for recreation. These include general economic trends, trends in public tastes, changes in relative costs (airfare to Juneau for example), and temporary factors such as the weather, gasoline shortages, fear of international terrorism, ferry strikes, and other local, national and international factors. Linear projections ignore all of these elements and assume that steady use will continue indefinitely.

   More complex methods of estimating future recreation demand on the Tongass using population and income trends have been considered in the past. In this case, however, these methods serve only to increase the complexity of the analysis while yielding no gains in accuracy. Consequently, the linear projection was used in spite of its shortcomings.

Nonetheless, judgment should be used (including common sense predictions of future developments) in assessing probable trends in recreational use on the Tongass.

3. Another potential source of error is the fact that a one-to-one relationship between RVDs and ROS class opportunities is assumed. If, for example, 200 RVDs in ROS1 are demanded but only 150 ROS1 settings are available, 150 RVDs in ROS1 are assumed to take place. A reduction of 10 ROS1 settings will likewise result in a equal reduction in RVDs. This assumption ignores the possibility of people substituting different recreational types for the one in short supply. If opportunities in ROS2 (the most common RVD type) are unavailable in the future, it is reasonable to assume that individuals will substitute using ROS1 or ROS3 settings. Some value to consumers will be lost as they opt for these less preferred alternatives, but the economic activity generated by recreation and tourism need not be negatively impacted by the shift. Trying to adequately account for these substitution effects, however, is difficult and beyond the scope of this analysis. By assuming no substitution between recreation types, an overestimation of the negative economic impacts of reduced recreational activity on the Tongass will result.

4. Location has not been considered in this analysis, and recreation settings within a given ROS class are considered to be equivalent regardless of where they are located. However, in terms of both access and quality, location is an important factor in determining the relative value of recreational sites. This is especially true for local residents who may have a number of favorite or customary places for recreation. If these places are affected by alternative uses, local residents may find that they have to travel much farther to find a comparable site and may opt to forego the trip altogether. Consequently, a local reduction in recreational settings will result in a decline in recreation activity even if comparable settings are available elsewhere on the Forest. In this case, the error leads to an underestimation of the economic impacts resulting from changes in the supply of recreational opportunities. An added aspect, which is not measured in figures for RVDs and employment, is that residents who are forced to visit less desirable or convenient sites suffer a genuine loss in welfare.

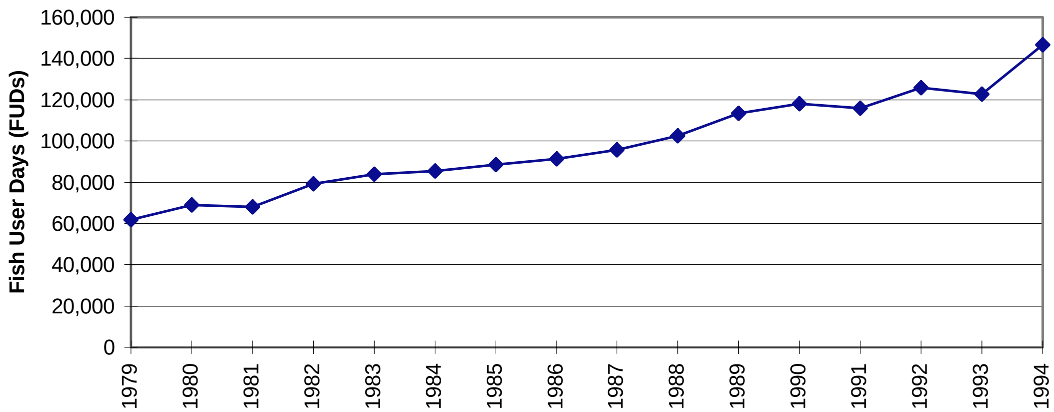
5. The final potential source of error considered here is related to the derivation of employment figures from reported RVDs. In addition to the difficulty of differentiating recreation-related employment from total employment in the services sector, there are problems associated with assuming that the number of jobs per RVD is constant over time. Changes in the types of recreation undertaken by residents and visitors will, in turn, result in changes in the amount of employment generated by these activities. A shift from ROS2-type recreation to ROS3, for example, may result in a decrease in float plane business but an increase in ferry traffic and other automobile-related services. There is no reason to believe that these impacts will necessarily balance out. Consequently, a change over time in the composition of recreational activity will change the amount of employment generated by aggregate recreational activity. Other changes, such as a shift in the average daily expenditure of visitors or the technology used to supply recreational services, will likewise change the jobs per RVD figure. The error associated with the assumption of a stable amount of employment generated per RVD could be either positive or negative.

The foregoing discussion highlights the difficulty in measuring and predicting economic activity associated with recreation and tourism on the Tongass National Forest. These errors do not necessarily balance out; knowledge and judgment should be used to determine whether the estimates given here are biased one way or the other. Nonetheless, two important facts are evident in Figures 3-23 and 3-24 and Table 3-136: 1) recreation on the Tongass has been growing at a very fast rate over the last ten years, and 2) ROS2-type recreation and tourism is by far the most common type, and demand within this category will very soon exceed the available supply of suitable recreational settings even if no more settings are lost to competing forest uses. This will, in turn, constrain benefits to resident users, and serve to limit, to some extent, the economic activity generated by resident and nonresident recreation and tourism in Southeast Alaska.

Hunting and Sport Fishing

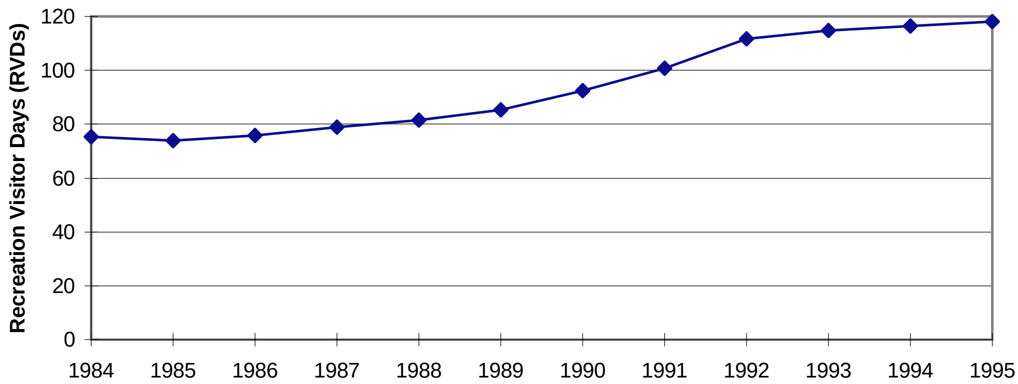
Hunting and sport fishing represent a large proportion of total recreation activity on the Tongass National Forest. Figures 3-25 and 3-26 show historical levels of activity in sport fishing and hunting respectively. Sport fishing activity is obtained from the Alaska Department of Fish and Game (ADF&G) sport fishing survey and is reported in fish user-days (FUDs). Hunting activity, on the other hand, is reported in RVDs and was obtained from the Recreation Information Management (RIM) database which is maintained by the Forest Service. These numbers are not directly comparable. Sport fishing includes trout and steelhead fishing occurring within the National Forest as well as a share of salmon fishing which is thought to represent the proportion of Southeast Alaska salmon originating in National Forest streams. Upward trends in both activities are quite pronounced. In the case of sport fishing, the majority of recent growth has reportedly been generated by nonresident fishers, indicating the increasing importance of this activity as a source of new money and employment for the region.

Figures 3-25
Sport Fishing on the Tongass National Forest, 1979-1994.



Source: ADF&G Sport Fishing Study

Figure 3-26
Hunting Activity on the Tongass National Forest, 1984-1995.



Source: USDA Forest Service

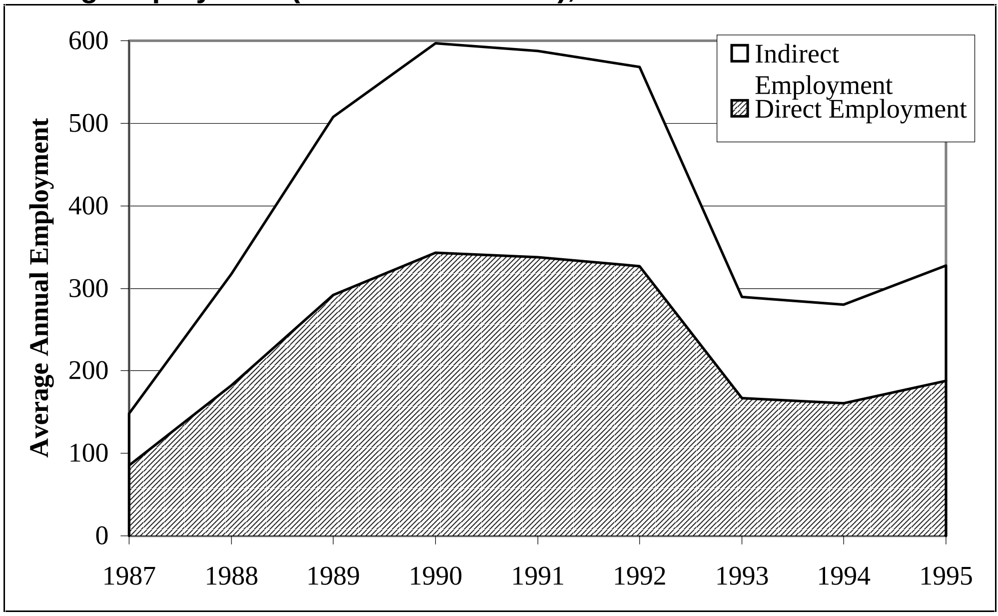
Mining and Mineral Development

Mineral exploration and mining have been a part of life in Southeast Alaska for over 120 years. Today, the mining industry is exploring new areas for potential mineral deposits and is revisiting historic mining areas using modern exploration techniques. There are 13 identified mineral deposits on the Tongass National Forest that appear economically viable under today's market conditions. The Present Net Value of these 13 deposits is estimated at 25.6 billion dollars. Today, mining development activities are primarily on the Quartz Hill molybdenum site in Misty Fiords, the Greens Creek silver and gold mine on Admiralty Island, and the Kensington mine north of Juneau, currently under active consideration.

In 1995, 196 workers were directly employed by the mining industry, down from a recent peak of 342 employees in 1991 (see Figure 3-27 and Table 3-137). 1995 mining-related indirect employment is estimated at 145 workers, yielding a total figure of 341 jobs generated in Southeast Alaska by the mining industry in that year. At over $60,000 per year, employee earnings are twice the regional average. In 1995, direct employee earnings for the industry stood at $11.7 million (1995$) and total earnings at $20.4 million. Mining employment in the region is concentrated among only a few operations, the Greens Creek mine being chief among them.

The Greens Creek project is a major metals mine containing silver, gold, zinc and lead on the northwest end of Admiralty Island, approximately 18 miles from Juneau. Exploration of the site began in 1973 and the mine started full operations in 1989. Greens Creek is the largest silver mine in North America, producing up to 100 tons of ore per day. At its peak in 1990-91 the mine employed approximately 265 workers with an estimated payroll of $14.1 million (1995$), making it Juneau's largest private employer. Mine workers commuted from Juneau daily via a work boat to Young Bay on Admiralty Island. The Greens Creek mine closed temporarily in 1992, and has reopened in 1996.

Figure 3-27
Mining Employment (Direct and Indirect), 1987-1995.



Source: AK Dept. of Labor. Multiplier used to derived indirect employment obtained from the IMPLAN regional economic model.

Table 3-137
Mining Employment, 1995 and Full Development Scenario.

	1995	Greens Creek	Potential Sites Quartz Hill	Kensington	AJ Mine
Direct Employment (Average Annual)	196	307	875	340	450
Indirect Employment	145	414	648	252	333
Total employment	341	721	1,523	592	783
Direct Earnings (mill. 1995$)	$11.7	$18.7	$53.3	$20.7	$27.4
Indirect Earnings (mill. 1995$)	$8.7	$25.3	$39.51	$15.3	$20.3
Total Earnings (mill. 1995$)	**$20.4**	**$44.0**	**$92.8**	**$36.1**	**$47.7**

Source: AK Dept. of Labor and others (see industry subsection for details).
Earnings were calculated using an average mining earning estimate of $60,971/year (in real 1995 $). Numbers may not add due to rounding.

The Quartz Hill molybdenum deposit in Misty Fiords National Monument was discovered in 1974 and is considered to be one of the largest such deposits in the world, containing as much as 10 percent of the world's known reserves. Molybdenum is used as a hardening agent in the production of steel. If the tailings disposal issue can be resolved, and molybdenum values increase, development of the mine could occur. The mine could produce 80,000 tons of ore per day through an open pit mine operation, and employ 850 to 900 people, most of whom could commute from Ketchikan. Expected life of the mine is predicted to be a minimum of 70 years.

The Kensington property lies within the boundaries of the City and Borough of Juneau, approximately 45 miles north of Juneau on Lynn Canal and is mostly on National Forest System Lands. Coeur Alaska, a division of Coeur d'Alene Mines, is planning a 4,000 ton per day operation over a projected mine life of 12 years. Once in full operation, the

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Kensington Mine would employ 340 workers, with an annual payroll of approximately $20.7 million (1995$). A 250-person camp would be constructed at the mine site and workers would be transported to and from Juneau by helicopter. An environmental impact statement was completed by the Forest Service, Environmental Protection Agency, and United States Army Corps of Engineers in early 1992. These agencies are currently preparing a Supplemental EIS to analyze impacts of proposed changes to the project. In addition, Coeur Alaska is working on obtaining permits from other agencies. Construction is planned for late summer, 1996.

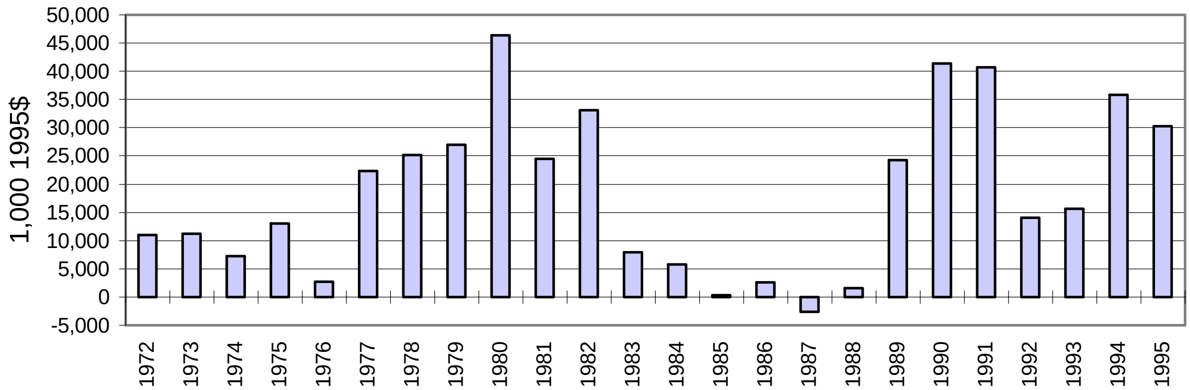
The Alaska-Juneau (AJ) Mine, located near downtown Juneau, would recover approximately 350,000 ounces of gold annually for a minimum projected life of 13 years. Echo Bay Mines, Ltd. of Edmonton, Alberta is obtaining permits to operate the AJ mine which is on property owned by the City and Borough of Juneau and Alaska Electric Light and Power Company (AELP). The City and Borough would earn approximately $3 million annually in royalties, depending on the price of gold. Once in production, the AJ mine would employ 450 workers operating three shifts year round. These workers would earn approximately $27.4 million (1995$) in annual payroll. The Environmental Protection Agency is the lead agency in preparing a Supplemental Environmental Impact Statement to analyze the effects of submarine tailings disposal. If the tailings issue can be resolved, development of the mine could occur.

In general, the short- to medium-term prospects for Southeast Alaska's mining industry appear to be good, but much will depend upon whether prices for precious metals and other minerals can support Alaska's high exploration, development and production costs. Should all the potential mining operations discussed above actually open, the resulting eleven-fold increase in direct employment and related figures will have a major positive impact on the regional economy, especially in Juneau where most of the new activity will be located. The mining industry, however, is based upon a non-renewable resource. Once the viable life-span of a project is over, or prices fall below levels allowing for profitable operation, these mines will close. Due to the high concentration of mining activity in only a few large projects, such closures will be quite disruptive both for mine employees, and for other companies servicing the mining industry as well as to social systems centered on mining and associated activities.

Forest Receipts and Payments to State

Twenty-five percent of all moneys received by the Tongass National Forest is paid to the State of Alaska. These funds are then distributed to the communities of Southeast Alaska to augment public school and public road budgets. Total receipts for the Tongass National Forest are shown in Figure 3-28 and are further described in Table 3-138 (all numbers are given in 1995 dollars). The most striking aspect of the chart is the extreme variation in revenues received by the Forest. While 1980-95 average income is over $20 million, yearly income over that period has ranged from approximately $46 million in 1980 to -$2.6 million in 1987. (Tongass receipts in FY 1987 were negative due to Comptroller General Decision B-224730 of March 31, 1987, to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2.1 million. As a result of the negative receipt, no payments to the State of Alaska were made in that year.) Later peaks occur in the boom years of 1990 and 1991, but 1994 also posted one of the highest revenue years on record in spite of declining harvest volumes. Average payments to the State of Alaska were $5 million over the 1980-95 period, and 1995 figures stood slightly over $7.5 million.

Figure 3-28
Tongass National Forest Total Real Income, 1972-1995.



Source: USDA Forest Service.
Adjusted for inflation using the U.S. producer price index.

Table 3-138
Tongass National Forest Income and Payments to State of Alaska (1,000 1995$).

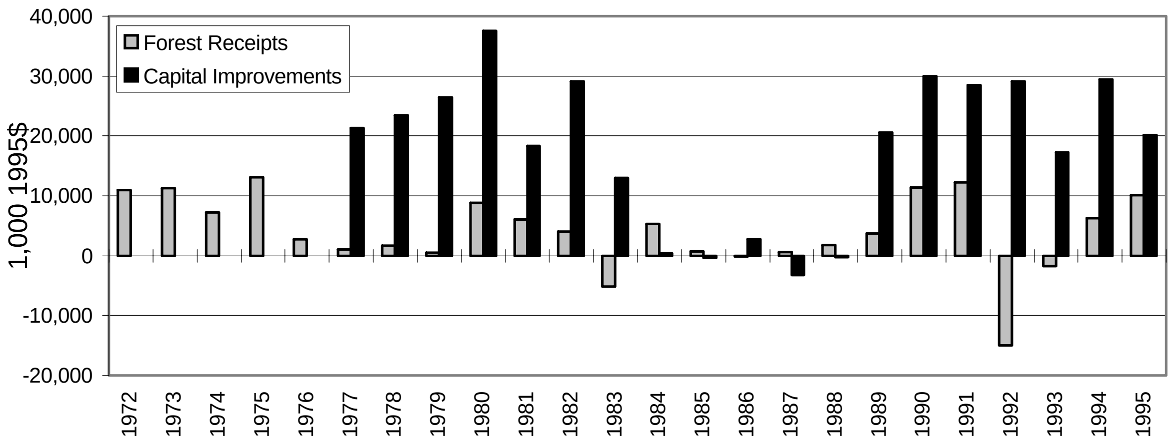
	1980-1995 Average	Share	1995	Share
Forest Receipts				
Timber	$2,744	13.7%	$9,595	31.7%
Other (1)	$328	1.6%	$531	1.7%
Total	$3,072	15.3%	$10,135	33.5%
Capital Improvements				
Road Credits	$13,668	68.0%	$16,980	56.1%
Other (2)	$3,349	16.7%	$3,134	10.3%
Total	$17,017	84.7%	$20,114	66.5%
Total Forest Income	**$20,090**	**100%**	**$30,249**	**100%**
Payments To State of Alaska	**$5,064**	**25%**	**$7,560**	**25%**

Source: USDA Forest Service.
Figures adjusted for inflation using U.S. producer's price index (Economic Report to the President). Forest Receipts are actual payments received by the forest. Capital Improvements are capital goods (e.g. roads) received.
[1] Includes recreation and other user fees.
[2] Includes CWKV funds (silviculture and stand improvement) and salvage funds.

The lack of a close correlation between harvests and forest revenues is a result of several factors: Tongass revenues are comprised of various sources in addition to timber sales; time lags between harvest and receipts; road construction credits comprising a large portion of receipts and harvest of areas accessed roads; market changes; etc. Total forest revenues can be broadly broken down into two categories: 1) "forest receipts" which are here defined as actual cash payments received by the National Forest; and 2) "capital improvements" which are broadly defined as capital goods received by the forest usually in lieu of payment. Since 1980, forest receipts have comprised, on average, about 15 percent of total forest revenues (Table 3-138). Capital improvements, on the other hand, constitute over 84 percent, and are thus the driving force behind revenues and subsequent payments to the State of Alaska. Yearly figures for revenues within these two categories are shown in Figure 3-29 (prior to 1977 capital improvements were not included in yearly forest revenue accounts).

Almost 90 percent of forest receipts are comprised by revenues from timber sales. Other revenue sources within this category are recreational user fees, payments for power line Right-of-Ways, fees paid by mineral developers, and other land use fees. At 80 percent of total capital improvements, purchaser road credits is the largest revenue source both within this category and within total forest revenue. These credits represent road construction expenditures undertaken primarily by logging firms which are then reimbursed by the National Forest in the form of reduced cash payments for timber. The roads and related facilities which remain after harvest is completed are the property of the federal government. These assets, in turn, decrease future management costs and allow easier access for forest users. Other capital improvements include investments in forest stand regeneration and improvements or other silvicultural activities which are aimed at either augmenting the future sale value of forest stands or meeting other forest objectives.

Figure 3-29
Tongass National Forest Real Income by Revenue Category, 1972-1995.



Source: USDA Forest Service.
Forest Receipts include revenue from timber sales, recreation fees and other user fees. Capital improvements include purchaser road credits, CWKV (silviculture and stand improvements) funds and salvage funds. Adjusted for inflation using the U.S. producer price index. Prior to 1977, purchaser road credits and other capital improvements were not included in Tongass income accounting.

Various factors will determine future revenues from the Tongass National Forest. Harvest volumes, international market prices, species and log quality mixes, and harvest costs will influence timber revenues and thereby forest receipts. In as much as purchaser road credits and silvicultural activity are correlated with timber harvest, revenue from capital improvements will depend upon annual sale and harvest volumes. If the past is any guide, however, there is little reason to expect harvest and capital improvements to be closely correlated in the future (see Figure 3-29). This is further evidenced by the fact that 1994 capital improvement revenues posted a 75 percent gain over the previous year in spite of a 15 percent decline in total harvest volume. As a result, the sort of baseline projections provided for the timber industry earlier in this report are not feasible for National Forest revenues and payments to the State of Alaska because capital improvements are not adequately predicted by expected (or assumed) levels of harvest or product prices. The Forest Plan alternatives do provide a thorough accounting of projected revenues, and this topic will be discussed again in the effects analysis of this document.

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Regional Economy

Environmental Consequences

Introduction

This section describes the projected direct and indirect economic effects of each of the ten forest plan alternatives. The analysis is divided into two main sections: impact analysis and efficiency analysis. Impact analysis refers to the estimation of employment levels and income associated with projected implementation of a given alternative. Efficiency analysis attempts to measure all of the costs and benefits to society, both future and present, of a planning alternative. These benefits are not restricted to cash transactions, but also include non-market benefits such as consumer surplus. The concepts and methodologies used in each of these analyses are described in detail in the following subsections. In general, it must be remembered that impact and efficiency analysis measure different things and are not directly comparable. Planning alternatives with positive impacts on jobs and income will not necessarily entail high benefits under efficiency analysis. This is because impact analysis views employment as a benefit, while efficiency analysis views wages to employees as a cost which reduces the net benefits to society.

Timber employment fluctuates the most between the alternatives in the current analysis. Recreation and tourism, mining, and salmon harvesting, while important in the calculation of both employment levels and the values associated with efficiency analysis, are not greatly affected by the differences in the alternatives. Recreation and tourism employment is projected to increase over the next ten years in all alternatives, however, only minor differences in the amount of increase are expected. There will likely be sufficient capacity to meet all of the projected ROS1 and ROS3 demand over the next ten years with only minor changes in recreation capacity due to timber harvest anticipated. The projected use for ROS2 will be limited by the current capacity. Future ROS2 capacity is unlikely to increase. In the case of mining, no change across the planning alternatives is anticipated. Since none of the alternatives will withdraw any of the higher-priority mineral activity tracts from mineral entry, the adopted forest plan will not preclude the development of those mines projected to open or reopen in the next ten years.

Effects upon salmon harvesting are more problematic. The risk of adverse effects from timber harvest on stream productivity is recognized (see Fish section). Additionally, actual salmon production and harvest could fluctuate greatly due to factors other than National Forest management, such as ocean currents, high seas interception, weather conditions and changes in commercial fishing regulations. Providing quantifiable measures of these effects is extremely difficult. For reasons outlined in the subsequent section on salmon harvesting, none of the proposed alternatives are projected to have a measurable impact on commercial fisheries employment over the next ten years. Long-term potential impacts are projected, but they are expressed in terms of risk and are not easily translated into expected catch and employment levels.

Since timber, and recreation and tourism, are the only resource-dependent outputs projected to vary between the alternatives, they are the only resources included in the efficiency analysis. For both resources, net willingness to pay (or consumer surplus) is used to calculate the values used in the analysis. While existence values and other related values are undoubtedly a major component of the total value society derives from the Tongass, no reliable estimates were available for this analysis. The nature and potential importance of these values is discussed in more detail in the section on efficiency analysis, but it should be remembered that any dollar measure of social benefits appearing in this report excludes these values.

Economic Impacts Analysis

Estimations of direct and total employment and income levels for the resource-dependent industries projected for each alternative are presented below. These estimates are a decade average of projected annual employment for the 1995 to 2005 period. In most cases, estimates represent the amount of employment and income which can be expected in the year 2000. Levels for timber and recreation and tourism employment were derived by first calculating projected levels of outputs and then multiplying by the average number of jobs generated by each respective output. For timber, projected levels of logging, lumber production and pulp production were used in conjunction with the average number of jobs generated per unit of output (MMBF equivalent) within each category. In recreation and tourism, Recreation Visitor Days (RVDs) were used in combination with the jobs per RVD estimate derived from the IMPLAN regional economic model and which was used in the Affected Environment portion of this section. In salmon harvesting, 1994 levels of employment and income were used as an estimate for future employment in this industry. In mining, two additional mines (Greens Creek and Kensington) were assumed to be operating in the year 2000 resulting in a projected employment level of 810. These mines are projected to be operating under all of the alternatives.

Year 2000 Baseline Projection

To provide a reference for comparing the alternatives, we have constructed a baseline projection for regional employment and earnings in the year 2000 (shown in Table 3-139). This projection was derived by first subtracting timber and basic recreation/tourism employment (i.e., employment resulting from recreation/tourism expenditures on the Tongass National Forest by nonresidents) from total regional employment levels. An exponential growth trend was then estimated for the remaining regional employment using the 1980-95 time period. Growth over this period averaged approximately two percent per year. By applying this rate to 1995 levels of nonagricultural wage and salary employment excluding timber and basic recreation/tourism employment, we obtained an estimate 34,873 projected wage and salary jobs in the year 2000 excluding timber and Tongass National Forest-related recreation/tourism employment (“SE AK Total w/o Wood Products, Mining, and Nonresident Rec-Related Employment” in Table 3-139).

Estimates of wood products employment are derived using the Brooks and Haynes demand scenario presented in the Regional Overview section describing the timber industry. Recreation-related basic employment is estimated under the assumption that 1995 recreational supply remains unchanged and that demand increases at the same rate as in past years (this is more fully explained in the previous section on recreation and tourism). Estimates in these sectors are then added back to the regional total to derive an estimate of the total number of wage and salary jobs projected in 2000 if the Brooks and Haynes demand scenario is realized and no change in the availability of recreational opportunities occurs. Projected earnings in the year 2000 are derived in a similar fashion using projected employment levels and estimates of 1994 wages (in 1995$) by industry type.

Table 3-139
Year 2000 Baseline Employment and Earnings Estimates.

	Employment (Average Annual)	Earnings (Million 1995 $)
SE AK Total w/o Wood Products, Mining & Nonresident Rec-Related Employment	34,873	$1,037
Wood Products Direct	1,072	$48
Wood Products Total	1,856	$83
Mining Direct	810	$49
Mining Total	1,409	$86
Nonresident Recreation Direct	1,632	$52
Nonresident Recreation Total	2,158	$69
Total Southeast Alaska	**40,296**	**$1,274**

Source: USDA Forest Service

The Year 2000 projections of total employment and earnings are seven percent and ten percent higher, respectively, than their 1995 levels (Table 3-131. These projections rely upon numerous assumptions and should be interpreted with some caution. The most important assumption is that previous trends in employment and earnings are maintained over the next five years and that no major economic downturn or other unforeseen event with large impacts on the region's economy intervenes.

Summary

Tables 3-140 and 3-141 summarize projected average employment and income levels for the next ten years. These estimates include employment generated by National Forest activities as well as state, private and other federal activities, including non-Tongass related salmon harvesting, timber harvests on private and state lands, and non-Tongass related recreation and tourism activity. While Table 3-140 assumes that all acres designated in the annual sale quantity (ASQ) in each alternative will be harvested, Table 3-141 assumes that only those acres within the Non-Interchangeable Component I (NIC I) economic classification will be harvested (see Timber section for a discussion of NIC I). Unless a large increase in timber prices occurs in the next ten years, the NIC I figures are considered a more accurate estimate of projected harvest levels. In terms of employment generated, the alternatives range from Alternative 1, which assumes no harvest on the Tongass National Forest, to Alternative 7, the most timber-intensive of the alternatives. Under the assumption that the total ASQ is harvested (Table 3-140), Alternative 1 yields a total of 6,740 direct jobs in the resource dependent industries included in this analysis. The total for Alternative 7 is 8,897, 32 percent higher than Alternative 1. Most of the difference between these two extremes (2,157 jobs) is caused by differences in timber-related employment. Estimates under the assumption of NIC I harvest only are slightly lower but mirror the total ASQ harvest levels closely. Recreation and tourism employment, in contrast to timber employment, shows much less variation across the alternatives, with a difference between high and low employment levels of only 58 jobs. For reasons discussed elsewhere, mining and salmon fishing employment are assumed to be constant in this analysis.

Total (i.e. direct, indirect and induced) employment and income are also shown in Tables 3-140 and 3-141. In general, changes in total estimates across alternatives will closely follow direct employment and income estimates since the multipliers used for each industry were constant for all alternatives. The last two rows in the tables show aggregate estimates for total employment and income generated in Southeast Alaska by the included industries for each alternative. To derive these estimates, total employment and income figures for each industry were summed. Rather than use the total recreation and tourism figures, only the portion of recreation and tourism economic activity generated by nonresidents was used. Resident recreational activity does not bring new money into Southeast Alaska and does not generate new employment in the region. Estimates of total employment and income generated in the region show the same pattern across alternatives as do estimates for the total level of direct employment and income. A more detailed description of the alternatives relative to each industry and the methods by which these estimates were derived is included in the industry-specific subsections below.

Table 3-140
Employment and Income Levels--Total ASQ (1995-2005 Average).

		Alternatives									
	2000	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Direct Employment and Income											
Direct Employment (Average Annual)											
Wood Products	1,072	363	1,965	1,248	814	784	1,431	2,578	2,264	1,402	1,288
Recreation/Tourism	3,714	3,712	3,692	3,699	3,703	3,703	3,694	3,654	3,695	3,695	3,698
Salmon Harvesting	1,855	*	*	*	*	*	*	*	*	*	*
Mining	810	810	810	810	810	810	810	810	810	810	810
Southeast Alaska Total	**40,296**	**39,068**	**41,829**	**40,591**	**39,843**	**39,791**	**40,907**	**42,868**	**42,348**	**40,856**	**40,660**
Direct Earnings (Million 1995$)											
Wood Products	49	16	88	56	36	35	64	115	101	62	57
Recreation/Tourism	118	118	117	118	118	118	117	116	117	117	117
Salmon Harvesting	49	*	*	*	*	*	*	*	*	*	*
Mining	49	49	49	49	49	49	49	49	49	49	49
Southeast Alaska Total	**1,274**	**1,219**	**1,342**	**1,287**	**1,254**	**1,252**	**1,301**	**1,389**	**1,366**	**1,299**	**1,290**
Total Employment and Income											
Total Employment (Average Annual)											
Wood Products	1,856	629	3,401	2,160	1,410	1,357	2,478	4,463	3,919	2,427	2,230
Recreation/Tourism	4,911	4,909	4,882	4,891	4,896	4,897	4,885	4,831	4,886	4,886	4,890
Recreation (Basic)	2,158	2,157	2,145	2,149	2,151	2,151	2,146	2,123	2,147	2,147	2,148
Salmon Harvesting	2,634	*	*	*	*	*	*	*	*	*	*
Mining	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409
Total Earnings (Million 1995$)											
Wood Products	83	28.0	151.5	96.2	62.8	60.5	110.4	198.8	174.5	108.1	99.3
Recreation/Tourism	156.0	156.0	155.1	155.4	155.5	155.6	155.2	153.5	155.2	155.2	155.4
Recreation (Basic)	68.6	68.5	68.2	68.3	68.3	68.4	68.2	67.4	68.2	68.2	68.3
Salmon Harvesting	69.6	*	*	*	*	*	*	*	*	*	*
Mining	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9
Total Employment Generated in Southeast Alaska (Average Annual)											
All Categories	**8,057**	**6,829**	**9,590**	**8,352**	**7,605**	**7,552**	**8,668**	**10,629**	**10,109**	**8,617**	**8,422**
Total Earnings Generated in Southeast Alaska (Million 1995$)											
All Categories	**306.7**	**252.1**	**375.2**	**320.0**	**286.7**	**284.3**	**334.1**	**421.7**	**398.3**	**331.8**	**323.1**

Total employment and income levels derived using multipliers cited in previous section.
See text for explanation for explanation of assumptions concerning Salmon Harvesting employment and income.
Recreation employment generated from resident recreation activity was omitted from the calculation of total employment generated in Southeast Alaska. See text for explanation of estimates for specific industries.

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Table 3-141
Employment and Income Levels--NIC 1 Only (1995-2005 Average).

	2000	Alternatives 1	2	3	4	5	6	7	9	10	11
Direct Employment and Income											
Direct Employment (Average Annual)											
Wood Products	1,072	363	1,665	1,093	735	713	1,230	2,169	1,913	1,213	1,109
Recreation/Tourism	3,714	3,712	3,692	3,699	3,703	3,703	3,694	3,654	3,695	3,695	3,698
Salmon Harvesting	1,855	*	*	*	*	*	*	*	*	*	*
Mining	810	810	810	810	810	810	810	810	810	810	810
Southeast Alaska Total	**40,296**	**39,068**	**41,309**	**40,324**	**39,705**	**39,667**	**40,557**	**42,160**	**41,741**	**40,529**	**40,350**
Direct Earnings (Million 1995$)											
Wood Products	47.7	16.2	74.1	48.7	32.7	31.7	54.8	96.6	85.2	54.0	49.4
Recreation/Tourism	118	118	117	118	118	118	117	116	117	117	117
Salmon Harvesting	49	*	*	*	*	*	*	*	*	*	*
Mining	49	49	49	49	49	49	49	49	49	49	49
Southeast Alaska Total	**1,274.0**	**1,219.3**	**1,319.3**	**1,275.4**	**1,247.8**	**1,246.1**	**1,285.8**	**1,357.5**	**1,338.5**	**1,284.5**	**1,276.5**
Total Employment and Income											
Total Employment (Average Annual)											
Wood Products	1,856	629	2,882	1,893	1,272	1,234	2,129	3,755	3,312	2,101	1,919
Recreation/Tourism	4,911	4,909	4,882	4,891	4,896	4,897	4,885	4,831	4,886	4,886	4,890
Recreation (Basic)	2,158	2,157	2,145	2,149	2,151	2,151	2,146	2,123	2,147	2,147	2,148
Salmon Harvesting	2,634	*	*	*	*	*	*	*	*	*	*
Mining	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409
Total Earnings (Million 1995$)											
Wood Products	82.7	28.0	128.4	84.3	56.6	54.9	94.8	167.3	147.5	93.6	85.5
Recreation/Tourism	156.0	156.0	155.1	155.4	155.5	155.6	155.2	153.5	155.2	155.2	155.4
Recreation (Basic)	68.6	68.5	68.2	68.3	68.3	68.4	68.2	67.4	68.2	68.2	68.3
Salmon Harvesting	69.6	*	*	*	*	*	*	*	*	*	*
Mining	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9
Total Employment Generated in Southeast Alaska (Average Annual)											
All Categories	8,057	6,829	9,070	8,085	7,466	7,429	8,318	9,921	9,502	8,291	8,111
Total Earnings Generated in Southeast Alaska (Million 1995$)											
All Categories	306.7	252.1	352.0	308.1	280.5	278.8	318.5	390.2	371.2	317.3	309.3

Total employment and income levels derived using multipliers cited in previous section.
See text for explanation for explanation of assumptions concerning Salmon Harvesting employment and income.
Recreation employment generated from resident recreation activity was omitted from the calculation of total employment generated in Southeast Alaska. See text for explanation of estimates for specific industries.

Potential employment impacts to the wood products and recreation/tourism industries are also summarized in Table 3-142 in relation to the year 2000 baseline estimates. Here again, wood products displays the most variation across alternatives, with Alternative 7 demonstrating a 140 percent projected increase in wood products employment relative to the baseline (102 percent under a NIC 1 harvest) and Alternative 1 shows an 66 percent decline for both ASQ and NIC 1. Due to factors discussed in more detail in the following recreation analysis, variation in recreation/tourism-related employment is extremely small, and, since the baseline projection assumed no change in the supply of recreational opportunity settings from 1994 levels, all alternatives have negative impacts relative to the baseline. Projected impacts to regional total employment and earnings for all alternatives show negative impacts relative to the baseline.

Projected impacts to regional total employment and earnings are also displayed in Table 3-142. These potential impacts incorporate changes in both direct and indirect employment under the different planning alternatives in both industries. In

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the case of recreation/tourism, only that proportion of employment which is due to nonresident use is included in the total. Potential impacts to total employment and earnings are most sensitive to changes in the wood products industry. Maximum negative impacts occur under Alternative 1, which displays a three percent decline in employment and a four percent decline in earnings. Conversely, Alternative 7, shows a six percent increase in employment and a nine percent increase in earnings relative to the baseline. In all alternatives, earnings impacts exceed employment impacts on a percent basis because wood products jobs pay significantly higher wages than the regional average.

Table 3-142
Employment and Income Levels Relative to Baseline 2000 (1995-2005 Average).

		Alternative									
	2000	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Total ASQ Harvest Direct Employment (Average Annual)											
Wood Products	1,072	-66%	83%	16%	-24%	-27%	34%	140%	111%	31%	20%
Recreation (Basic)	1,632	0%	-1%	0%	0%	0%	-1%	-2%	-1%	-1%	0%
SE AK Total Employment	40,296	-3%	4%	1%	-1%	-1%	2%	6%	5%	1%	1%
SE AK Total Earnings	1,274	-4%	5%	1%	-2%	-2%	2%	9%	7%	2%	1%
NIC 1 Harvest Direct Employment (Average Annual)											
Wood Products	1,072	-66%	55%	2%	-31%	-34%	15%	102%	78%	13%	3%
Recreation (Basic)	1,632	0%	-1%	0%	0%	0%	-1%	-2%	-1%	-1%	0%
SE AK Total Employment	40,296	-3%	3%	0%	-1%	-2%	1%	5%	4%	1%	0%
SE AK Total Earnings	1,274	-4%	4%	0%	-2%	-2%	1%	7%	5%	1%	0%

Source: USDA Forest Service.

Wood Products Industry

The estimation of average wood products-related employment and income levels for the next decade involves a three-step process. In the first step, forest inventory data are used to divide the projected timber harvest projected by each alternative into separate species and log grades. In the second step, data related to mill operations are used in combination with the estimates derived in the first step to estimate projected final product outputs (i.e. lumber, pulp and chip exports). The final step uses these outputs to estimate employment levels given historical ratios of jobs to volume of final product output. Each step and its results are described in greater detail below. While the following estimates are projected averages for the next decade, sustained yield requirements for each alternative will result in relatively stable projected harvests throughout the rotation. Log class and species mix may vary to a small extent, but the following estimates are generally applicable to decades following 2005 until harvesting of second growth dominates harvest levels.

Supply. Average species and log grade distributions for high medium and low levels of stocking in the Chatham, Ketchikan and Stikine areas were used to divide the projected harvest levels into log grades and species types. Lower sawlog grades, especially number 3 sawlogs, have commonly been used for pulp production, and could now be chipped as well as for lumber. In this report, we have used historical averages of the percentage of log volume in each log grade which is shipped to sawmills (as opposed to pulp or chip mills) to estimate the proportion of hemlock and spruce logs used for lumber and for pulp. An additional 186 MMBF of non-National Forest harvest is assumed for each scenario, with 20 MMBF of this volume being available for chip production and the rest leaving the region as log exports.

Resulting estimates of supply by species and general log class are shown in Figure 3-31 and further detailed in Table 3-143. Approximately 52 percent of the Tongass National Forest harvest is comprised of hemlock and spruce sawlogs used in the production of lumber under each alternative; 43 percent of the harvest is used for pulp wood and 5 percent is comprised of cedar logs which are generally exported in unprocessed form. While there is some variance in these ratios across the different alternatives, differences are small (on the order of one percent). Table 3-143 also includes estimates of log production under the assumption that only acres in the NIC I are cut. Acres included in the ASQ but not in the NIC I are more costly to harvest, and it is likely that they will not be cut given current market conditions. On average, NIC I estimated harvests are 19 percent less than total ASQ estimates on volume basis, and this ratio is relatively stable across all alternatives. The distribution of harvest by general log type is approximately the same as that for the total ASQ.

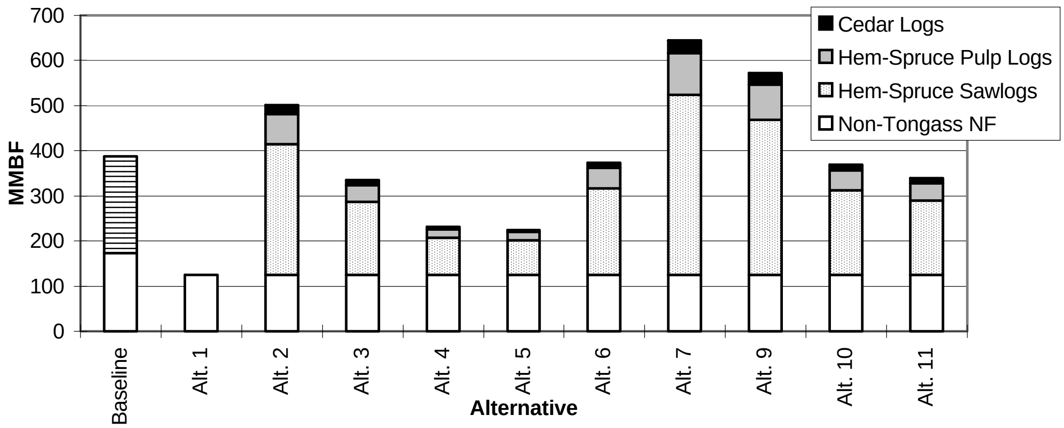
Table 3-143
Estimated Timber Supply (1995-2005 Average).

		Alternative									
	2000	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Total ASQ Harvested (MMBF log scale)											
Non-Tongass NF	186	186	186	186	186	186	186	186	186	186	186
Hem-Spruce Sawlogs	--	0	240	133	68	63	160	332	285	156	139
Hem-Spruce Pulp Logs	--	0	198	109	56	53	134	274	234	128	114
Cedar Logs	--	0	25	14	6	6	15	34	30	15	15
Total Tongass NF	**212**	**0**	**463**	**256**	**130**	**122**	**309**	**640**	**549**	**299**	**267**
Total SE Alaska	**398**	**186**	**649**	**442**	**316**	**308**	**495**	**826**	**735**	**485**	**453**
NIC 1 Only Harvested (MMBF log scale)											
Non-Tongass NF	186	186	186	186	186	186	186	186	186	186	186
Hem-Spruce Sawlogs	--	0	196	110	56	53	130	272	233	128	112
Hem-Spruce Pulp Logs	--	0	159	89	46	43	107	220	189	104	91
Cedar Logs	--	0	20	11	5	5	12	28	25	12	12
Total Tongass NF	**212**	**0**	**375**	**210**	**107**	**101**	**249**	**520**	**447**	**244**	**215**
Total SE Alaska	**398**	**186**	**557**	**392**	**289**	**283**	**431**	**702**	**629**	**426**	**397**

Source: USDA Forest Service. See text for explanations.

Compared with the Year-2000 baseline, all alternatives except Alternatives 1, 4 and 5 provide the supply for a potentially higher harvest. This is true for total harvest, if a market for pulp logs is assumed, and also for the hem-spruce sawlog component only, if no pulp logs are harvested.

Figure 3-31
Estimated Supply by Alternative: NIC1 Only (1995-2005 Average).



Source: USDA Forest Service.

Employment and Income. Average levels of employment per unit of product output for the 1990-94 period were used to estimate projected levels of direct employment for logging and lumber. This time period includes both high levels of production in 1990 (resulting in low levels of employment per unit output) and significantly lower levels in the last two years. Consequently, the averages used here represent a fair estimate of the equilibrium level of employment per product output assuming no change in labor productivity. This assumption is reasonable for the ten year time horizon used in this portion of the analysis. In the long-term, however, increased labor productivity from technology gains could reduce the amount of jobs generated by a given level of output. Jobs per unit of output estimates are shown in the second column of Table 3-145 on a roundwood equivalent (MMBF log scale) basis. These numbers are then multiplied by the product output estimates presented in the table to derive projected employment levels for each alternative. Once again, all estimates represent ten year averages with a midpoint at the year 2000. Total employment and earnings estimates were derived using a multiplier of 1.73 which was derived from the IMPLAN regional economic model. All alternatives except Alternatives 1, 4 and 5 show employment increases relative to the baseline for both total ASQ and NIC I component only. The same alternatives also show increases in total income for both scenarios.

Table 3-145
Timber Industry Employment (1995-2005 Average).

	1990-94 Ave. Jobs/MMBF	2000	Alternative 1	2	3	4	5	6	7	9	10	11
Total ASQ Harvested												
Employment (Average Annual)												
Logging	1.95	776	363	1,268	861	617	601	967	1,613	1,436	949	885
Sawmills	3.33	251	0	661	366	187	174	441	914	785	430	382
Pulp Mills	3.03	0	0	0	0	0	0	0	0	0	0	0
Total Direct[1]	--	1,072	363	1,965	1,248	814	784	1,431	2,578	2,264	1,402	1,288
Total	Multiplier = 1.73	1,856	629	3,401	2,160	1,410	1,357	2,478	4,463	3,919	2,427	2,230
Income (million 1995 $)												
Direct	@44,542 $/Job	48	16	88	56	36	35	64	115	101	62	57
Total	Multiplier = 1.73	83	28	151	96	63	60	110	199	175	108	99
NIC 1 Only Harvested												
Employment (Average Annual)												
Logging	1.95	776	363	1,096	773	572	559	852	1,379	1,236	842	783
Sawmills	3.33	251	0	540	303	154	146	358	749	642	353	308
Pulp Mills	3.03	0	0	0	0	0	0	0	0	0	0	0
Total Direct[1]	--	1,072	363	1,665	1,093	735	713	1,230	2,169	1,913	1,213	1,109
Total	Multiplier = 1.73	1,856	629	2,882	1,893	1,272	1,234	2,129	3,755	3,312	2,101	1,919
Income (million 1995 $)												
Direct	@44,542 $/Job	48	16	74	49	33	32	55	97	85	54	49
Total	Multiplier = 1.73	83	28	128	84	57	55	95	167	148	94	85

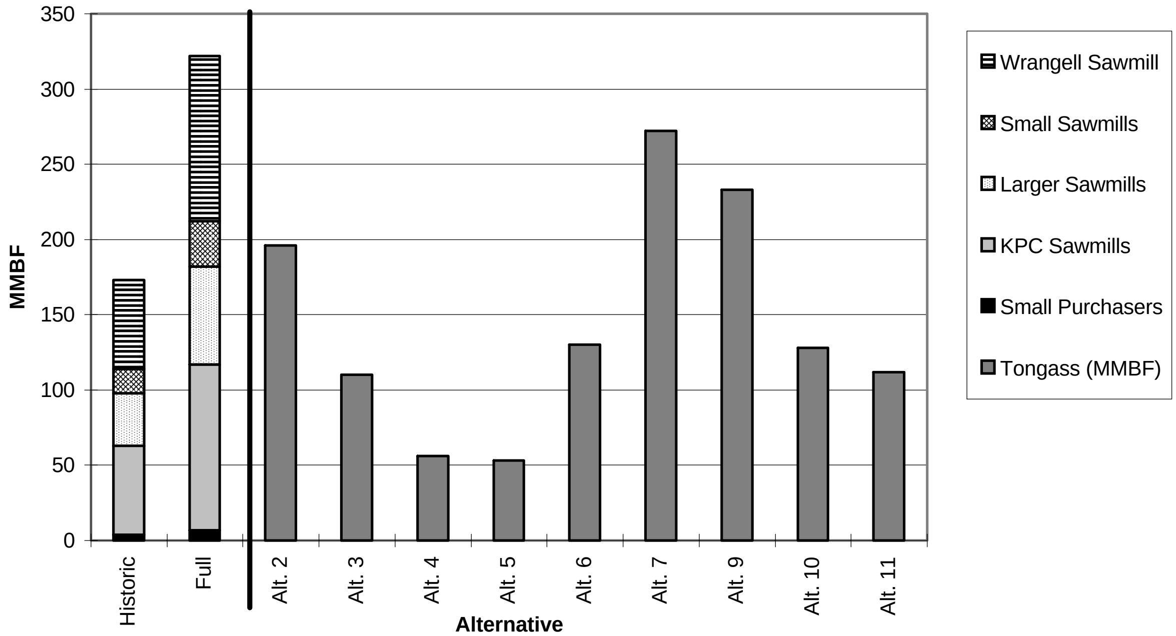
Source: USDA Forest Service. See text for explanations.
[1] Includes Employment related to Chip Export within the total, although not separately reported.

Capacity. The foregoing analysis assumes a linear relationship between product outputs and employment; a one percent decline in lumber production, for example, will result in a one percent decline in sawmill employment. In the real world this smooth relationship does not exists. Mill closures or openings cause abrupt declines or increases in employment levels which may be extremely destabilizing for the small communities which typify Southeast Alaska. In estimating the projected economic impacts of planning alternatives, the relationship between predicted harvest volumes and current lumber and pulp processing capacity cannot be ignored.

Sawmill and pulp mill capacity estimates were presented under the Affected Environment. The installed reported production capacity (two shifts) of Southeast Alaska sawmills is 322 MMBF (log scale) and 1985-94 historic capacity utilization is estimated at 66 percent (approximately one shift), or 173 MMBF. The 66 percent utilization rate is probably inefficient in the long-run, and additional mill closures could be expected as the more efficient mills move towards installed capacity and the less efficient mills are forced to close. At the same time, a 100 percent utilization rate at all mills is unlikely. Consequently, the 322 MMBF and 173 MMBF serve to mark the extreme boundaries of sawlog supply needed to support the sawmills currently in place in Southeast Alaska.

Figure 3-32 compares the projected timber supply with the installed capacity and historical utilization requirements of sawmills in Southeast Alaska for each alternative. These figures assume that only that volume which is considered currently economically viable (NIC I) will be harvested. As no private logs are assumed to be available for sawmilling, Alternative 1 (no Tongass National Forest harvest) is assumed to result in the closure of all sawmills in the region. Assuming only a NIC 1 harvest, no alternative is projected to provide enough sawlogs to meet installed processing capacity. Three alternatives (2, 7, and 9), however, are sufficient to meet historic utilization. These projected surpluses and deficits for sawlogs relative to current capacity are further detailed in Table 3-146 along with predictions under the assumption of full ASQ harvest.

Figure 3-32
Sawmill Historic and Installed Capacity with Estimated Supply (NIC 1 Only).



Source: USDA Forest Service.

Wood Product Industry Summary by Alternative. The wood products industry in Southeast Alaska includes some components that are not likely to be affected directly by any of the alternatives. The current trends in wood products industry jobs associated with Native Corporation harvest, or other private and state harvest are not likely to be impacted by any alternative. In 1995, Native Corporation, private and state timber harvest accounted for over 650 logging jobs. Native Corporation harvest has been declining since 1990, and is expected to continue to decline, stabilizing at 100 MMBF by the year 2000. With this downward trend, those alternatives which do not increase the Forest Service timber supply to 'make-up' for the decline in other harvesting, will show a combined decrease in total logging employment. Communities supporting Native Corporation logging jobs would continue to benefit under all alternatives both from direct employment and indirect supporting facilities and services, these benefits would likely decline if harvesting continues to decrease. Communities including; Juneau, Hoonah, Tenakee Springs, Angoon, Kake, Ketchikan, Sitka, Yakutat, and communities on Prince of Wales Island are likely to be impacted by a projected decline in private timber harvesting.

Some level of Tongass timber supply for smaller mills is likely to continue under all alternatives in the form of salvage sales, Small Business Association (SBA) program sales, beach logs, and free use. Independent, small portable mills are numerous throughout Southeast Alaska. Portable mills for dimensional lumber, music wood, or shake and shingle production are located in most communities in Southeast. These small and portable mills, easily sold and transported, do not

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usually establish themselves as a significant portion of a community's economy. The owners are independent, self-employed and often the main employees. Total employment per mill ranges from one to five people, usually working less than full time. Some mills purchase salvage sales or SBA sales from the Forest Service and hire local people on an as needed basis to assist with the harvest and transport of the logs. Other mills and manufactures purchase their supply from larger operations, like KPC, and by-pass the harvesting operations. Under some alternatives, mills may be able to expand and support more full time employment. The following analysis of employment and income does not include these self-employed people because the data is not available.

The larger sawmills in Southeast Alaska currently rely largely on Tongass timber supply. The estimated ten-year effects of each alternative on Southeast Alaska timber processing facilities, under the assumption that only the historically more economically viable timber (NIC 1) will be harvested, are summarized in the following analysis.

Because mills are established in a community, it is easier to estimate the potential impacts of alternatives with regard to this component of the wood products industry than other employment sectors. The logging jobs associated with a mill are more mobile, with impacts tied spatially to specific timber sale locations. However, these jobs do impact the community supporting the activity and can be significant. How each community responds to a mill closure, and the type of resources they choose to take advantage of will, in large part, determine the future of the community. Over the past 10-year period, the Southeast region has seen steady growth in population and most sectors of employment. Even as timber harvest and associated timber industry jobs on Forest Service and Native Corporation lands have declined, Southeast Alaska has continued to grow. Mill closures would likely be a downward point in an otherwise growing economy.

While job losses from mill closures are easily measured and linked to a specific community, logging and support sector employment is more difficult to tie directly to one community due to the mobility of sales and movement of operations. Determining which logging jobs are associated with Forest Service timber sales, and which are associated with private harvesting is also problematic. Of the over 1,200 logging jobs in Southeast Alaska in 1995, approximately 600 were tied directly to timber harvesting on the Tongass National Forest, (based on the percentage of total timber in Southeast harvested by the Forest Service, assuming that all timber harvested requires the same number of loggers per MMBF). However, determining which 600 jobs specifically are associated with Forest Service timber harvest, accounting for the wages and expenditures of people residing in one community but who are physically working in another, and accounting for the 46 percent of nonresidents employed in the logging sector, is difficult to do with accuracy.

For these reasons, estimates of each alternative's logging employment impact at a community level has not been undertaken. The regional impact analysis estimates the aggregated potential impacts to logging sector in Southeast by alternative (see Table 3-145). Table 3-147, displaying the current distribution of logging employment, indicates the importance of logging employment by boroughs or community groups, and estimates total employment and income resulting from logging activity.

Table 3-147
1995 Employment and Income of Southeast Alaska Logging Sector.

Community Group or Borough/Census Area	Employment NAWS[1]	Logging	%NAWS	Income ($1000)[2]	Employment Total[3]	%NAWS	Total Income ($1000)[4]
Ketchikan Gateway Borough	7,939	398	5.0%	$17,728	892	11.2%	$31,378
City and Borough of Juneau	15,775	80	0.5%	$3,563	139	0.9%	$6,165
North Chichagof	565	142	25.1%	$6,325	247	43.7%	$10,942
Chatham Strait	324	112	34.6%	$4,989	195	60.1%	$8,630
Haines Borough	791	10	1.3%	$445	17	2.2%	$771
Kake	282	47	16.7%	$2,093	82	29.0%	$3,622
Central Prince of Wales	1,059	117	11.0%	$5,211	204	19.2%	$9,016
Yakutat Borough	419	68	16.2%	$3,029	118	28.2%	$5,240
North Prince of Wales	447	243	54.4%	$10,824	423	94.6%	$18,725
Sitka Borough	3,765	30	0.8%	$1,336	52	1.4%	$2,312
Total [5]	**31,366**	**1,247**	**4.0%**	**$55,544**	**2,369**	**7.6%**	**$96,800**

Source: ADOL 1995 Employment by Community-Group. (for a listing of individual communities included in each community-group, see the preceding "Sub-regional section". Employment is equivalent to average annual.

1 Non-Agricultural Wage and Salary -- does not include self-employed people.

2 Average wage based on ADOL employment and earnings in 1995 dollars. Average wages for Ketchikan from McDowell, 1996.

3 Total Employment calculated using IMPLAN employment multiplier and employment multiplier for KPC from McDowell 1996.

4 Total Income calculated using IMPLAN income multiplier and income multiplier for KPC from McDowell 1996.

5 This is the total only for those community-groups containing logging jobs in 1995 -- not for all of Southeast Alaska.

Boroughs or community groups containing an active logging camp have the highest percent of employment associated with logging. Logging in the North Chichagof, Chatham Strait, and North POW community groups make up over 25 percent of wage and salary employment. The North POW group had 447 total wage and salary jobs in 1995, with 54 percent were in the logging sector, almost 95 percent of total employment, 423 jobs, was supported by logging activity. In contrast, the Boroughs of Juneau, Haines, and Sitka support less than two percent of total wage and salary employment in logging. While this breakdown does not attempt to quantify potential impacts in logging activity to communities – those communities with a greater percentage of employment dependent on logging activity will be most affected by changes in timber harvesting in Southeast Alaska.

There are other impacts that communities could experience besides jobs and income. These include; decreasing revenues to communities from taxes, decreasing real estate prices, increasing utility costs, increasing school costs per student, and a decrease in school funding from the State and Federal funds that are based on number of students. Large employers like a sawmill or pulp mill also contribute to a community through support of local events and charities. These potential impacts to communities have not been quantified in this analysis.

Alternative 1 is projected to not provide enough timber supply for any of the larger mills in Southeast to continue operating, assuming private harvest continues to be exported and the import of logs does not increase. Assuming that all sawmills close down there would be some immediate impacts communities could expect.

The closing of all the sawmills would likely result in a loss of about 320 direct mill and 950 total jobs throughout Southeast. Total jobs refers to additional employment related to the expenditures of the mills and mill employees in the local community. Using ADOL employment data and community group boundaries, the potential impacts to community groups supporting a sawmill and or pulp mill are estimated and displayed in Table 3-148. This analysis only considers salary and wage jobs, self-employed people are not represented in the data-set.

The communities with sawmills would lose over 14 percent of their combined total employment. Annette Island would lose 35 percent of total employment, the greatest loss for a single community group assuming Alternative 1 closes all sawmills. Ketchikan would lose about 18 percent of total employment, and the other community groups would lose between one and six percent of total employment. While Table 3-148 indicates Wrangell would likely lose a total of 37 jobs, this would be in addition to jobs and income already lost when the APC Wrangell sawmill closed in 1994.

Alternative 2 is projected to provide a timber supply for all sawmills to continue at current levels of production, with additional supply available for current sawmills to expand operations. The Wrangell mill could open, but only if it can out-compete current operations for the available volume. It is impossible to know which, if any mills would expand or open under these alternatives. These are business decisions based on market and industry trends. What actually happens will depend on competition between mills for efficient use of the volume available and other factors.

Relative to 1995 harvest levels, logging activity related to Forest Service timber sales would be likely to decline, assuming only NIC 1 was made available to the industry. The spatial location of Forest Service timber sales would also be likely to change, impacting communities dependent on direct sale activity.

Table 3-148
1995 Employment and Income for Southeast Alaska Sawmills.

Community Group	Employment NAWS[1]	Employment Mill	Employment % NAWS	Income ($1000) [2]	Employment Total[3]	Employment % NAWS	Total Income ($1000) [4]
Ketchikan	7,939	641	8.1%	$30,509	1,435	18.1%	$54,001
KPC Sawmill		39	0.5%	$1,888	87	1.1%	$3,342
Other Sawmills		97	1.2%	$4,321	217	2.7%	$7,647
Annette Island	550	111	20.2%	$5,224	193	35.1%	$9,206
KPC Sawmill		88	16.0%	$4,200	153	27.8%	$7,434
Other Sawmills		23	4.2%	$1,024	40	7.3%	$1,772
Wrangell	813	21	2.6%	$935	37	4.6%	$1,618
North POW	447	14	3.1%	$624	24	5.4%	$1,079
Central POW	1,059	20	1.9%	$891	35	3.3%	$1,541
Petersburg	1,555	12	0.8%	$535	21	1.4%	$925
Total [5]	**12,363**	**819**	**6.6%**	**$38,718**	**1,764**	**14.3%**	**$68,370**

Source: ADOL 1995 Employment by Community Group (for a listing of individual communities included in each community group, see the preceding 'Subregional section'). Employment is equivalent to average annual employment.

1 Non-Agricultural Wage and Salary - does not include self-employed people.

2 Average Wage based on ADOL employment and earnings, average wage for KPC mills from McDowell Groups 1996 Draft study in 1995 dollars.

3 Total Employment was calculated using IMPLAN employment multiplier; employment multiplier for KPC mills from McDowell Groups 1996 Draft study.

4 Total Income was calculated using IMPLAN income multiplier; income multiplier for KPC mills from McDowell Groups 1996 Draft study.

5 This is the total only for those community-groups containing logging jobs in 1995, not for all of Southeast Alaska.

Alternatives 3 and 11 are projected to provide insufficient volume with a NIC 1 harvest for all sawmills to continue at current levels of production. Due to the competitive ability faced by individual operators, some sawmills are projected to close. Again, referring to Table 3-148, potential impacts to community-groups can be assessed with possible sawmill closures. These closures would have an impact over a larger area including Prince of Wales Island, Metlakatla, Wrangell, Petersburg, and the Ketchikan Gateway Borough. Similarly, the logging employment that would be lost with sawmill closures would also be spread over a greater area.

Relative to 1995 harvest levels, logging activity related to Forest Service timber sales would be likely to decline, assuming only NIC 1 was made available to the industry. The spatial location of Forest Service timber sales would also be likely to change, impacting communities dependent on direct sale activity.

Alternatives 4 and 5 are projected to provide insufficient volume for all sawmills to continue operating at current levels of production. Due to the competitive ability faced by individual operators, some sawmills are projected to close. Again, referring to Table 3-148, potential impacts to community-groups can be assessed with possible sawmill closures. These closures would have an impact over a larger area including Prince of Wales Island, Metlakatla, Wrangell, Petersburg, and the Ketchikan Gateway Borough. Similarly, the logging employment that would be lost with sawmill closures would also be spread over a greater area.

If KPC sawmills were to close down, there would be sufficient volume for the remaining sawmills to continue production. The impacts of KPC closure would be concentrated in the Ketchikan Gateway Borough and Annette Island, with logging employment likely to be impacted in several areas. In total employment, the KPC sawmill closures are estimated to result in a loss of 1 percent of all wage and salary jobs, about 87 jobs, in Ketchikan Gateway Borough and 28 percent of all wage and salary jobs, about 153 jobs, in Metlakatla.

Relative to 1995 harvest levels, logging activity related to Forest Service timber sales would decline, assuming only NIC 1 was made available to the industry. The spatial location of Forest Service timber sales would also be likely to change, impacting communities dependent on direct sale activity.

Alternatives 6 and 10 are projected to provide insufficient volume for all currently operating sawmills. Due to the competitive ability faced by individual operators, some sawmills are projected to close. Again, referring to Table 3-148, potential impacts to community-groups can be assessed with possible sawmill closures. These closures would have an impact over a larger area including Prince of Wales Island, Metlakatla, Wrangell, Petersburg and the Ketchikan Gateway Borough. Similarly, the logging employment that would be lost with sawmill closures would also be spread over a greater area.

Relative to 1995 harvest levels, logging activity related to Forest Service timber sales would be likely to decline, assuming only NIC 1 was made available to the industry. The spatial location of Forest Service timber sales would also be likely to change, impacting communities dependent on direct sale activity.

Alternatives 7 and 9 are projected to provide sufficient volume for all currently operating sawmills. There would also be some volume for mills to expand, or for additional mills to enter the market, such as the Wrangell sawmill. If the Wrangell mill did reopen at historical levels, the community would increase their total employment by about 575 people, with an increase in income of over $25 million (1995 dollars). It is impossible to know which, if any mills would expand or open under these alternatives. These are business decisions based on market and industry trends. What actually happens depend on competition between mills for efficient use of the volume available, and other factors.

Relative to 1995 harvest levels, logging activity related to Forest Service timber sales would not be likely to decline, assuming the NIC 1 was made available to the industry. However, the spatial location of the sales would likely change and impact communities directly dependent on timber sale activity.

Recreation and Tourism

Unlike timber production in which a generally sustained output of products is assumed under each alternative, recreation supply is subject to cumulative impacts. 1995-2005 averages for available recreation opportunity settings (expressed in terms of ROS groups) will not be sustained into the future. Instead, the impact of harvest activity on recreation capacity will accumulate over time with increasing impacts in latter decades. However, the fact that current supply generally exceeds demand results in employment and income estimates across alternatives for the next decade which show very little variance relative to timber. Impacts in subsequent decades may be somewhat more pronounced, and these impacts will be treated more explicitly later in the section involving efficiency analysis.

Supply. The general methodology for deriving projected levels of recreation and tourism employment is described in detail in the discussion of recreation and tourism in the Regional Overview. Three types of recreation opportunity settings (ROS1, ROS2 and ROS3) are used in the economic analysis. Timber harvest and other activities result in a reclassification of certain acres from one ROS group to another. Road construction, for example, will generally cause a given area to be reclassified as ROS3 ("Roaded Natural, Roaded Modified and Rural"). The availability for use of ROS3 designations will also depend upon the connection between proposed road networks and ferry landings or local communities. Had these acres been classified as ROS1 (or ROS2) previously, the result would be a net reduction of ROS1 and an increase in ROS3 . Depending upon the relative demand for different ROS groups, the result could be either an increase, a decrease or no change in recreation and tourism activity. If, in the current example, demand for ROS1 exceeds supply and ROS3 settings are in surplus, then the net result will be a decrease in recreational activity. If, however, demand exceeds supply for both ROS classes, the net impact on recreation and tourism activity will be zero. Each ROS group has a maximum capacity based on the type of experience expected within the setting. ROS1 has the lowest capacity per acre for primitive activities in which users will not be within sight or sound of other users. ROS2 has a larger capacity per acre than ROS1, but users in this setting expect to see only a few other parties during their trip. ROS3 has the highest capacity and offers opportunities for users to interact frequently with others. While timber harvest activity may actually result in greater total capacity, recorded as RVDs, this will represent an increase of ROS3 capacity and a decrease in ROS1 or ROS2 capacity.

Demand. As described in the previous section, future demand for recreational activity on the Tongass National Forest was predicted using a linear projection of total Recreation Visitor Days (RVDs). Historical patterns of RVD use by ROS class was then used to predict future recreation and tourism demand by ROS class. Using this methodology, demand for ROS2 class RVDs ("Semi-Primitive Motorized") is projected to exceed supply of ROS2 settings in 1996. In all planning alternatives demand for ROS1 RVDs surpasses supply in 2020-30. Demand for ROS3 exceeds supply in 2050-60 or 2060-70 depending upon the timber harvest intensity of alternatives (high rates of harvest entail expanded road construction and thereby more ROS3 settings). Since ROS2 activity is the only activity affected in the first decade, and since impacts related to harvest activity will have had little time to accumulate, differences in projected levels of first decade recreational activity between the alternatives are relatively small. Moreover, due to the large amount of Wilderness, LUD II and other designated areas, the overall sensitivity of recreation and tourism activity estimates to the planning alternatives is small.

Consumption. Due to expected increases in demand, recreation use increases steadily in all alternatives until the year 2060, when demand in all ROS classes meets or exceeds available supply. In the following decades RVD levels, being wholly determined by supply, stabilize around the five million RVD level. Predicted supply, demand and RVD use by alternative for the next decade is presented in Table 3-149. These estimates include a category termed "Non-capacity Use" which represents Southeast Alaska recreational activity which is not directly dependent upon the Tongass (e.g. tour boating or ocean fishing for species other than salmon). In general, average 1995-2005 projected total RVD activity is 26 percent higher than 1995 levels, and there is little variation in these estimates across different alternatives.

Table 3-149
Recreation/Tourism Supply, Demand and Consumption (1995-2005 Average).

					Alternative						
	2000	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
Supply (1,000 RVDs)											
ROS1	1,443	1,432	1,405	1,415	1,419	1,420	1,408	1,386	1,394	1,409	1,412
ROS2	1,668	1,666	1,639	1,647	1,652	1,653	1,641	1,587	1,599	1,642	1,646
ROS3	1,851	1,850	1,902	1,883	1,876	1,871	1,892	1,946	1,924	1,887	1,885
Total	**4,962**	**4,948**	**4,945**	**4,945**	**4,947**	**4,945**	**4,941**	**4,918**	**4,917**	**4,938**	**4,943**
Demand (1,000 RVDs)											
				1995	**2000**						
ROS1				484	706						
ROS2				1,452	2,117						
ROS3				369	538						
ROS Total				2,305	3,361						
Non-capacity Use				1,582	2,110						
Total				**3,887**	**5,471**						
Projected Consumption (1,000 RVDs)											
					Alternative						
	2000	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**10**	**11**
ROS1	706	706	706	706	706	706	706	706	706	706	706
ROS2	1,668	1,666	1,639	1,647	1,652	1,653	1,641	1,587	1,599	1,642	1,646
ROS3	538	538	538	538	538	538	538	538	538	538	538
ROS Total	2,912	2,909	2,882	2,891	2,896	2,897	2,884	2,830	2,843	2,886	2,890
Non-capacity Use(1)	2,110	2,110	2,110	2,110	2,110	2,110	2,110	2,110	2,110	2,110	2,110
Total	**5,022**	**5,019**	**4,992**	**5,001**	**5,006**	**5,007**	**4,994**	**4,940**	**4,953**	**4,996**	**5,000**

Source: USDA Forest Service. See text for explanations.
[1] Non-capacity use includes activities that do not take place physically on the forest, (viewing scenery from cruise ships).

Employment and Income. Table 3-150 translates predicted RVD use into projected employment using the 1,352 RVD per job ratio derived from the IMPLAN model and discussed in the Regional Overview. Total recreation and tourism related employment was derived using a 1.32 employment multiplier (also estimated in IMPLAN). In order to determine the jobs supported in Southeast Alaska resulting from recreational activity, RVD estimates were further divided into resident and nonresident components using historical ratios of resident and nonresident use. Employment resulting from nonresident use is the source of jobs supported in the region. The category, "Total from Basic", was obtained by

Glossary

multiplying non-generated employment by the IMPLAN derived employment multiplier. This estimate represents total net jobs supported in Southeast Alaska due to recreation and tourism activity under each alternative. Income was estimated using the IMPLAN derived estimate of $31,773 per employee. While this estimate may seem high, it is important to remember that much of the income from recreation and tourism employment is concentrated in a short period of time and will thus lead to higher estimates when extended to a whole year on an average annual employment basis. Total income and nonresident supported income were derived in the same fashion as in the case of employment.

Table 3-150
Recreation/Tourism Related Employment (1995-2005 Average).

	Alternative										
	2000	1	2	3	4	5	6	7	9	10	11
Employment @ 1,352 RVDs/Employment (Average Annual)											
Direct Employment	3,714	3,712	3,692	3,699	3,702	3,703	3,694	3,654	3,663	3,695	3,698
Total Employment	4,911	4,909	4,882	4,890	4,896	4,897	4,884	4,831	4,844	4,886	4,890
Basic Employment	1,632	1,631	1,622	1,625	1,627	1,627	1,623	1,605	1,609	1,623	1,625
Total From Basic	2,158	2,157	2,145	2,149	2,151	2,151	2,146	2,123	2,128	2,147	2,148
Income @ $31,773/Average Annual Employment (Million 1995 $)											
Direct Income	118.0	118.0	117.3	117.5	117.6	117.7	117.4	116.1	116.4	117.4	117.5
Total Income	156.0	156.0	155.1	155.4	155.5	155.6	155.2	153.5	153.9	155.2	155.4
Basic Income	51.9	51.8	51.5	51.6	51.7	51.7	51.6	51.0	51.1	51.6	51.6
Total From Basic	68.6	68.5	68.2	68.3	68.3	68.4	68.2	67.4	67.6	68.2	68.3

Source: USDA Forest Service. See text for explanations.

While the differences between total employment the various alternatives is small, some additional qualitative features should be recognized about the recreation and tourism resources in Southeast Alaska. In competing with other recreation and tourism opportunities, the region's main competitive advantage is its image as a vast and essentially pristine wilderness. For some visitors, the presence of roads and timber harvest may conflict with their expectations and impact their experiences. This analysis has not attempted to measure the potential effects on nonresident visitation because of alternative uses of the forest such as timber harvest, mineral development, or commercial fishing.

Salmon Harvesting and Processing

While it is recognized that there is some risk of fish habitat reduction over the next ten years, (see Fish section), there is not expected to be any significant change to commercial fisheries employment resulting from National Forest activities. This is due to the following reasons:

1. There is a time lag between changes in habitat and changes in salmon returns. Typically, reductions in habitat would not be noticed in return levels until three to five years later.
2. Recent fish returns have been at record highs, therefore, under normal ocean conditions, anticipated runs three to five years from now should also be high.
3. The short-term risk to fish habitat is felt to be from large storm events disrupting habitat (see Fish section). Over the next ten years such storm events are likely to be localized and should not affect region-wide commercial fish harvest.

4. A large segment of the commercial fishing industry operates under a limited entry harvest system. New permit holders are not quickly added to the market during high fish harvest years, nor are they removed during periods of low harvest. The result in either case is the same number of commercial fishers catching either more or less fish.
5. Under any of the alternatives, the amount of acreage of timber harvest is at the most less than 20,000 acres per year during the next ten years. This represents a total of approximately 0.5 percent of the total remaining productive old growth (or 5 percent over the next decade), and less than .02 percent of the entire Forest. This level of additional harvest, given some level of riparian protection and Best Management Practices applied throughout the Forest, should not have a significant effect on commercial fisheries employment over the next ten years. However, due to past management actions and risks associated with future harvests, it is possible localized impacts could be experienced.

Since we have assumed no significant impact over the next decade, we have used 1994 employment estimates as our predicted average level of employment for the year 2000. The long-term impact of timber related activity on salmon populations could be more severe, but quantified estimates of these impacts on salmon harvest are impossible given current scientific knowledge. The 1991 SDEIS used a fish stream productivity model to estimate future impacts on anadromous fish populations. Due to problems associated with the verification of the model, it was not used in this round of the planning process.

Mining

Since the planning alternatives include minimal withdrawals from mineral entry, no impact on mining employment and income across alternatives is assumed (see the Minerals section in this chapter for clarification). Rock quarries and related operations will be positively correlated with road construction and, thereby, with timber harvest. Employment and income levels related to this activity, however, are included in the multiplier effect associated with timber employment, and are not treated as mining related employment in this analysis. For the next ten years (1995-2005) mining employment is projected to increase to 810 jobs with the opening of the Kensington mine and the reopening of the Greens Creek mine. These developments will not be precluded under any of the alternatives. It should be noted however that the economic viability of these and other potential mine developments could be affected by the amount of mitigation measures required in the different LUDs. While all LUDs have mitigation measures to maintain soil, water and fish productivity, some LUDs have additional restrictions for discretionary mitigation such as visual quality which could affect the economics of some of the developments.

Distribution of Social and Economic Effects

In addition to the effects displayed by the regional employment and income totals shown previously in this section, the distribution of where these effects occur is important to the residents of Southeast Alaska. This is true for residents who support timber harvest, as well as those who are opposed. Timber harvest and road construction are the primary activities permitted by the Forest Plan which can influence employment, income, recreation and tourism, fisheries, hunting, and subsistence. While the maps of the alternatives accompanying the Final display those LUDs which permit timber harvest, they do not illustrate where timber harvest would be scheduled over the next 10 to 15 years – the life of the plan. There are standards and guidelines contained within the alternatives which preclude intensive timber harvest over the next 10 years in LUDs which otherwise would have allowed timber harvest. These standard and guidelines are not displayed on the alternative maps, but affect where timber harvest can occur.

These standards and guidelines include:

1. Maintaining 33% of each VCU as old growth (Alternatives 4, 5 and 6)
2. No intensive timber harvest in VCU's where past timber activity exceeds 25% of the 1954 old growth (Alternatives 4 and 5)
3. No intensive timber harvest in VCU's where past timber activity exceeds 50% of the 1954 old growth (Alternative 6)
4. Establishing small Old growth Reserves containing 1,600 acres of old growth in each watershed (Alternatives 3 and 10)
5. Precluding intensive timber harvest in Wildlife Analysis Areas where the ratio of potential deer populations compared to estimated habitat capability is above area thresholds (Alternatives 3, 4, 5 and 6).

The net effect of these standards and guidelines is that timber harvest will be precluded for the next ten years in areas where the LUD on the alternative map would otherwise permit it. Figures 3-34 through 3-41 illustrate where timber harvest will be permitted in the next 10 years in Alternatives 2-11. Alternative 1 has no scheduled timber harvest and was not included in this analysis. The darker areas on the maps show NIC 1 (normal operability), lands available for harvest. The lighter shaded areas represent areas available for harvest in the NIC II (difficult and isolated operability) class. The majority of the normal operability acres are considered currently economically viable for harvest, while only a small portion of the difficult and isolated areas are considered currently economically viable. The difficult and isolated operability areas could become economically viable if timber prices increase or with technology improvements. It must be emphasized that only a small portion of these areas would actually be scheduled for timber harvest over the next decade. It should also be noted that timber harvesting in other portions of the LUDs which permit harvest, but are not shown on this map, may also be permitted. However timber harvest in these areas will consist only of non-intensive selective harvest, and does not exceed 2 MMBF in any alternative.

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Figure 3-34
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 2)

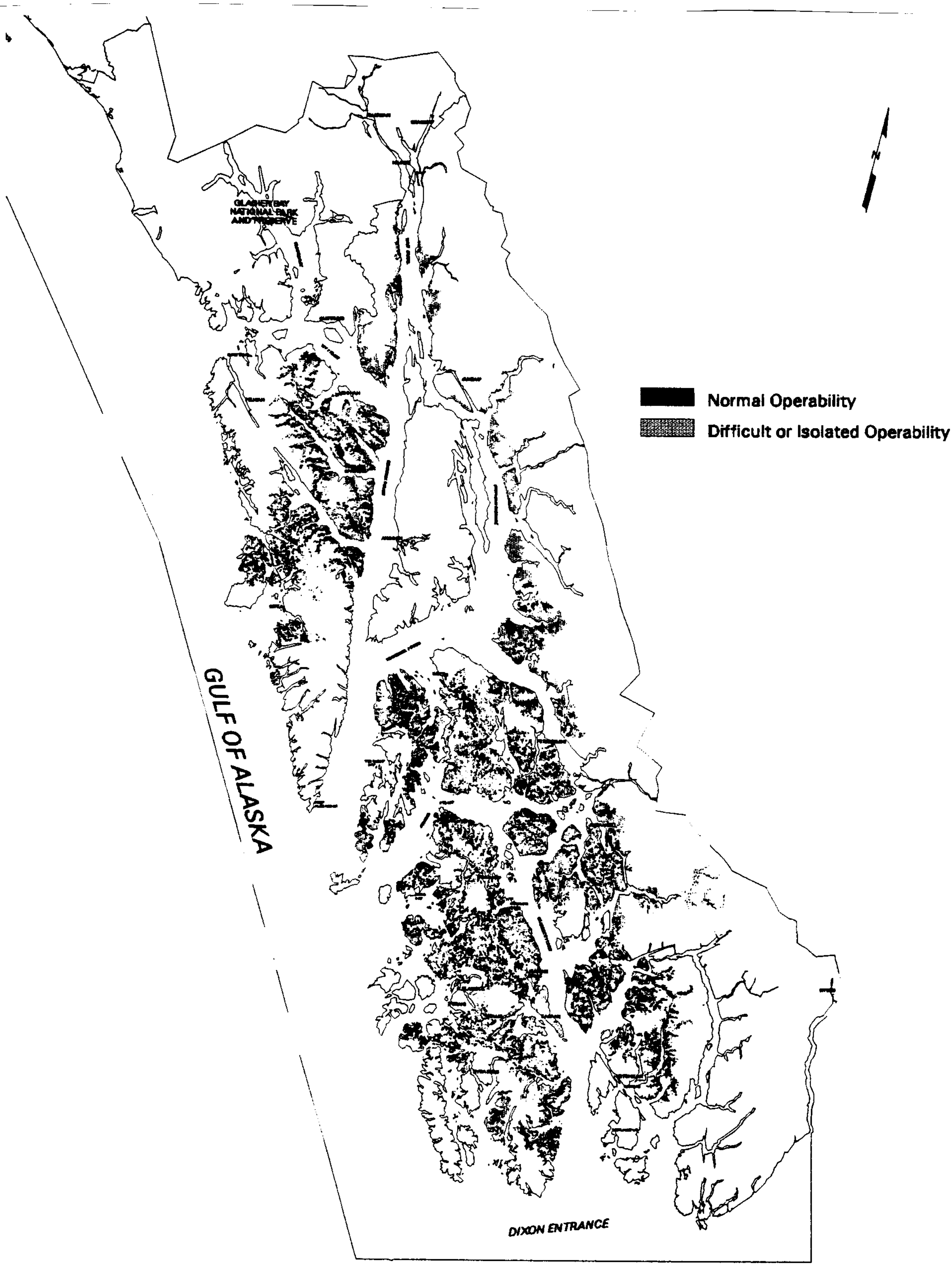


Figure 3-35
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 3)

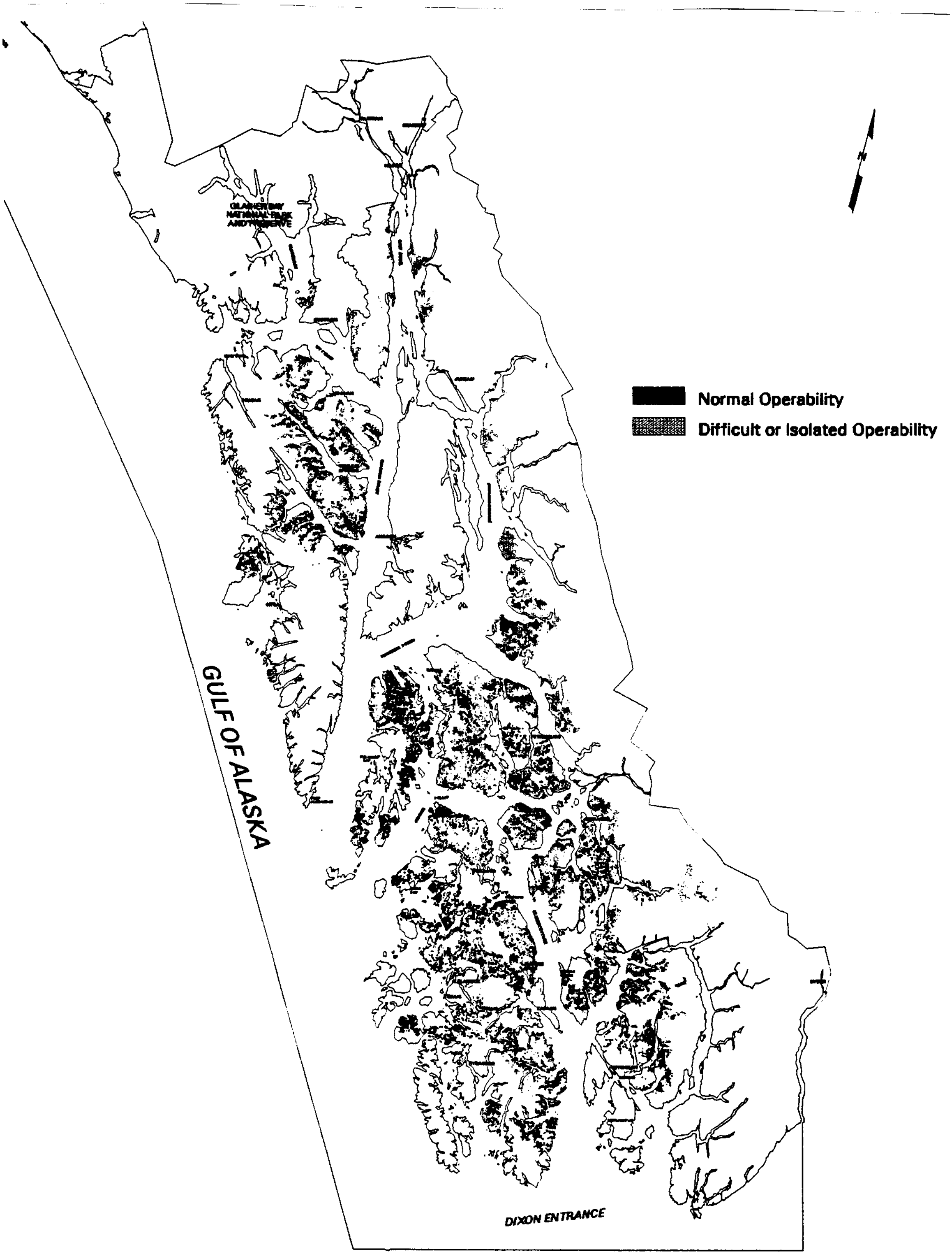


Figure 3-36
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 4)

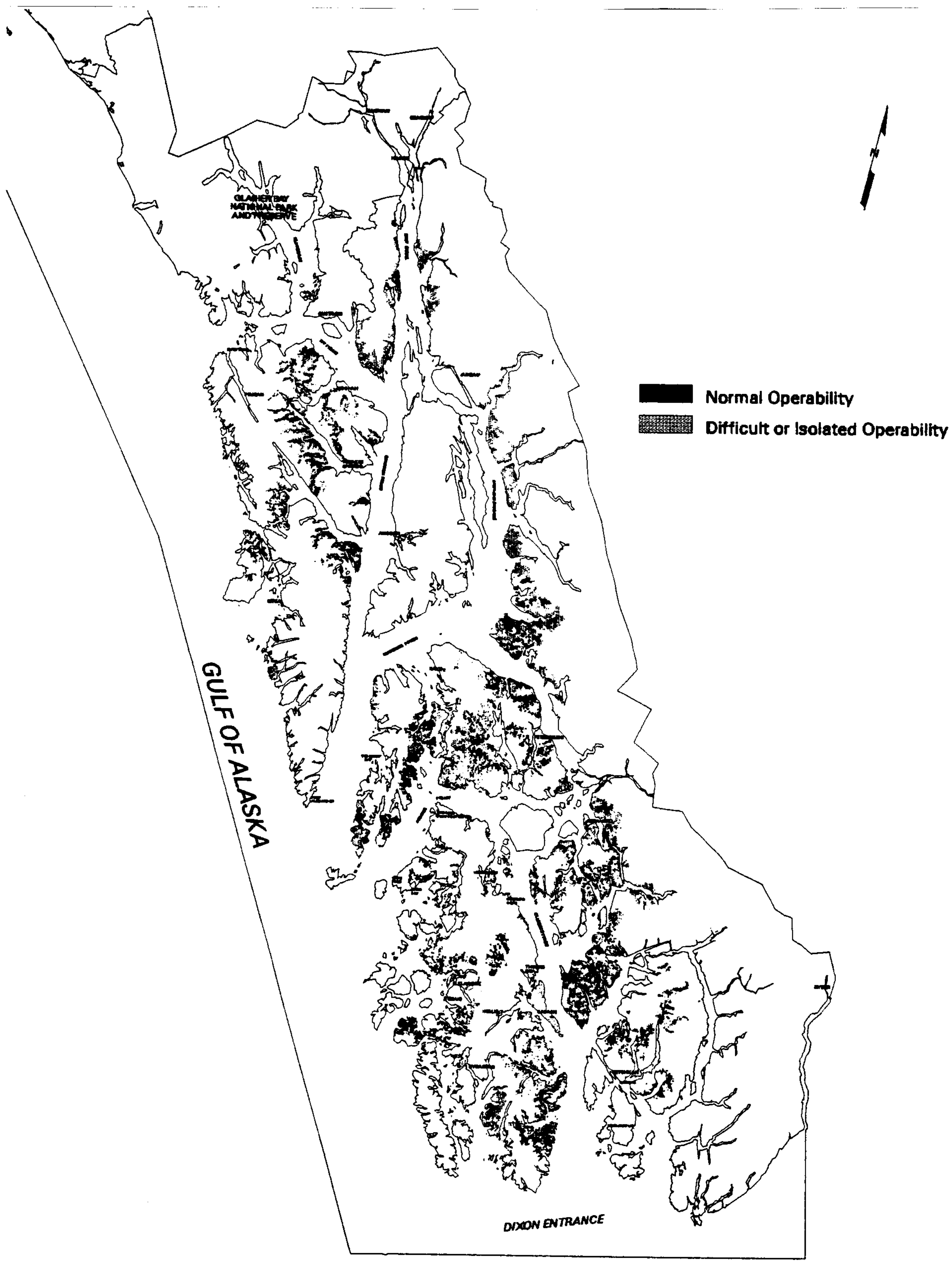


Figure 3-37
Distribution of Areas Available for Harvest During the Next Ten Years (Alternatives 5 & 6)

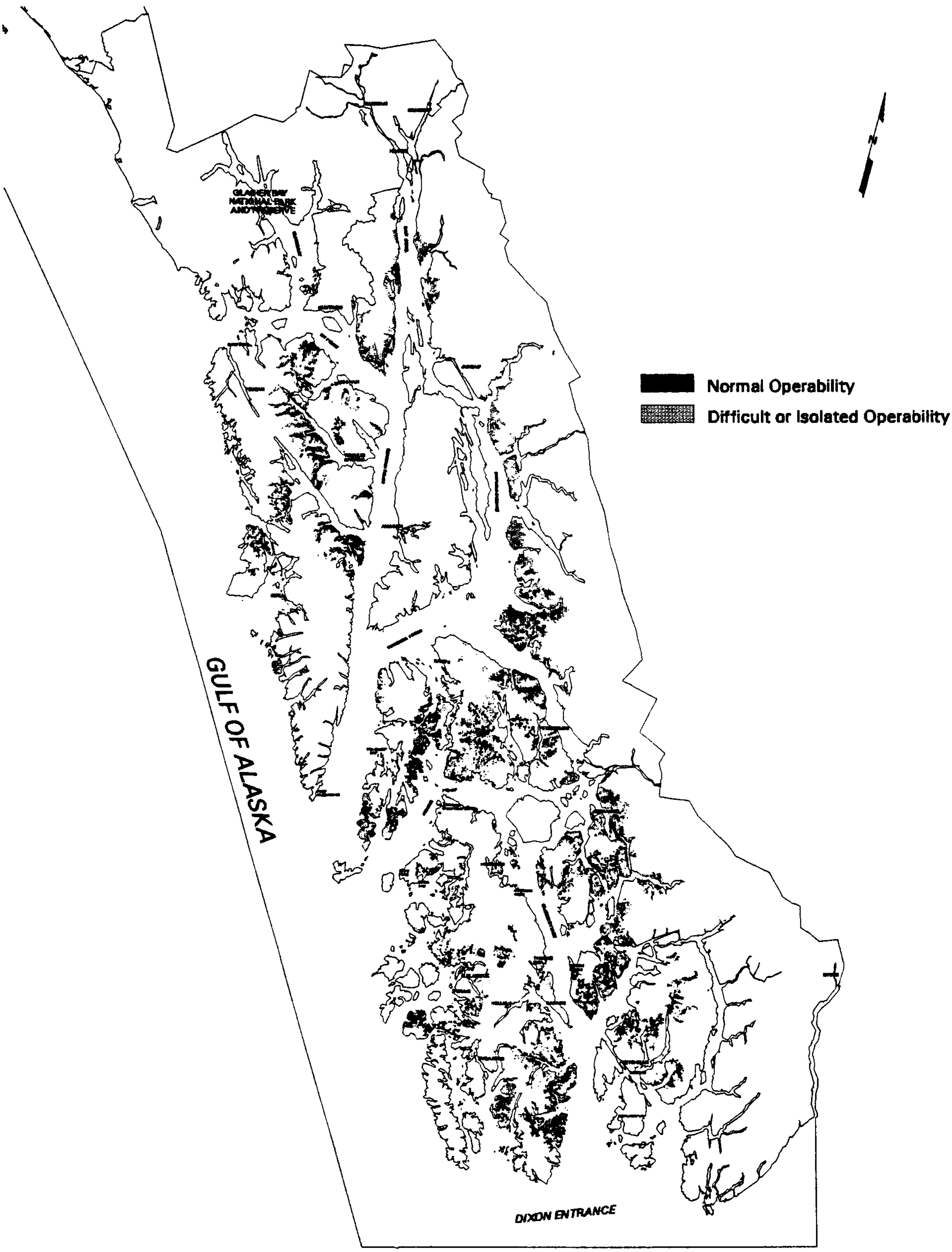


Figure 3-38
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 7)

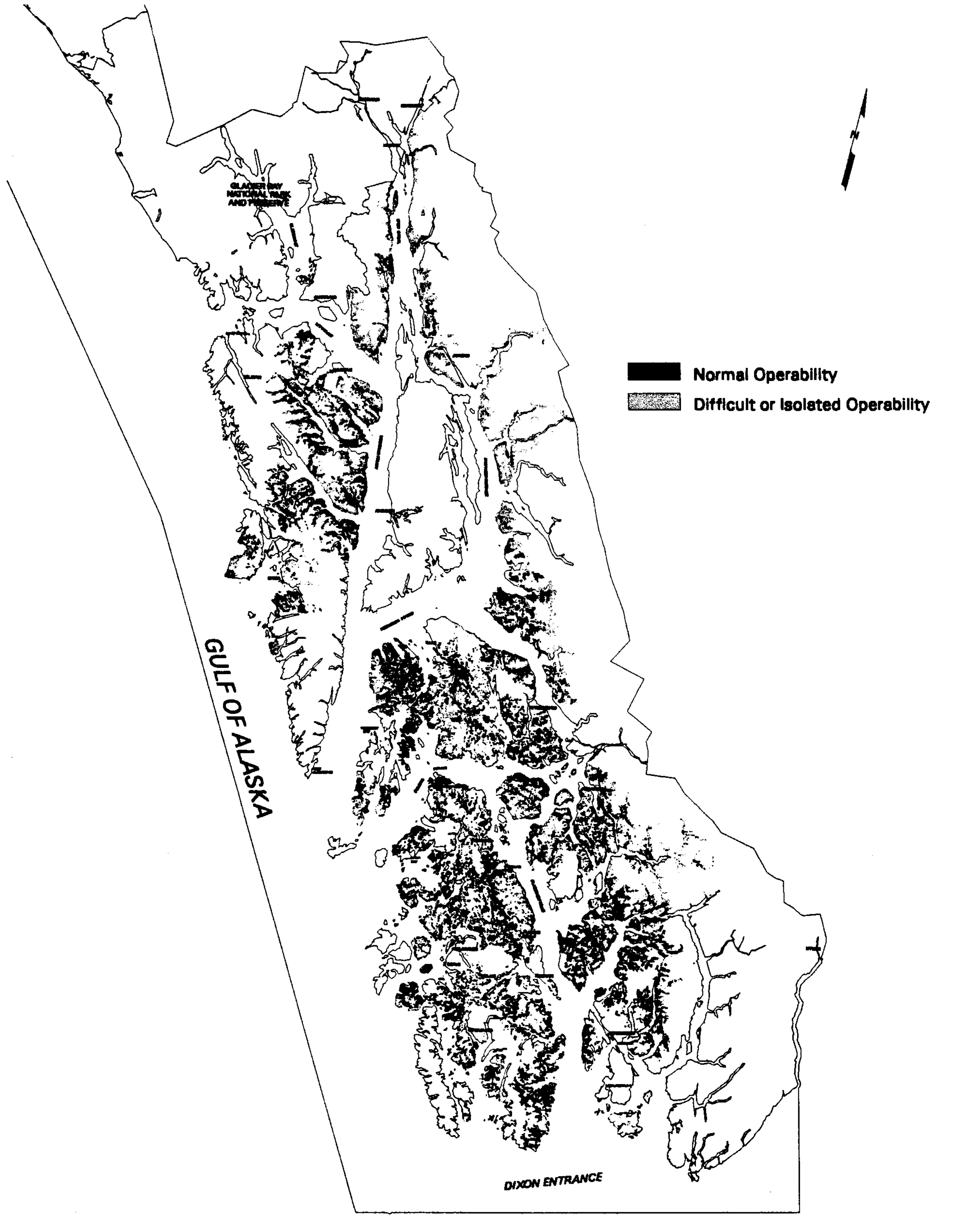


Figure 3-39
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 9)

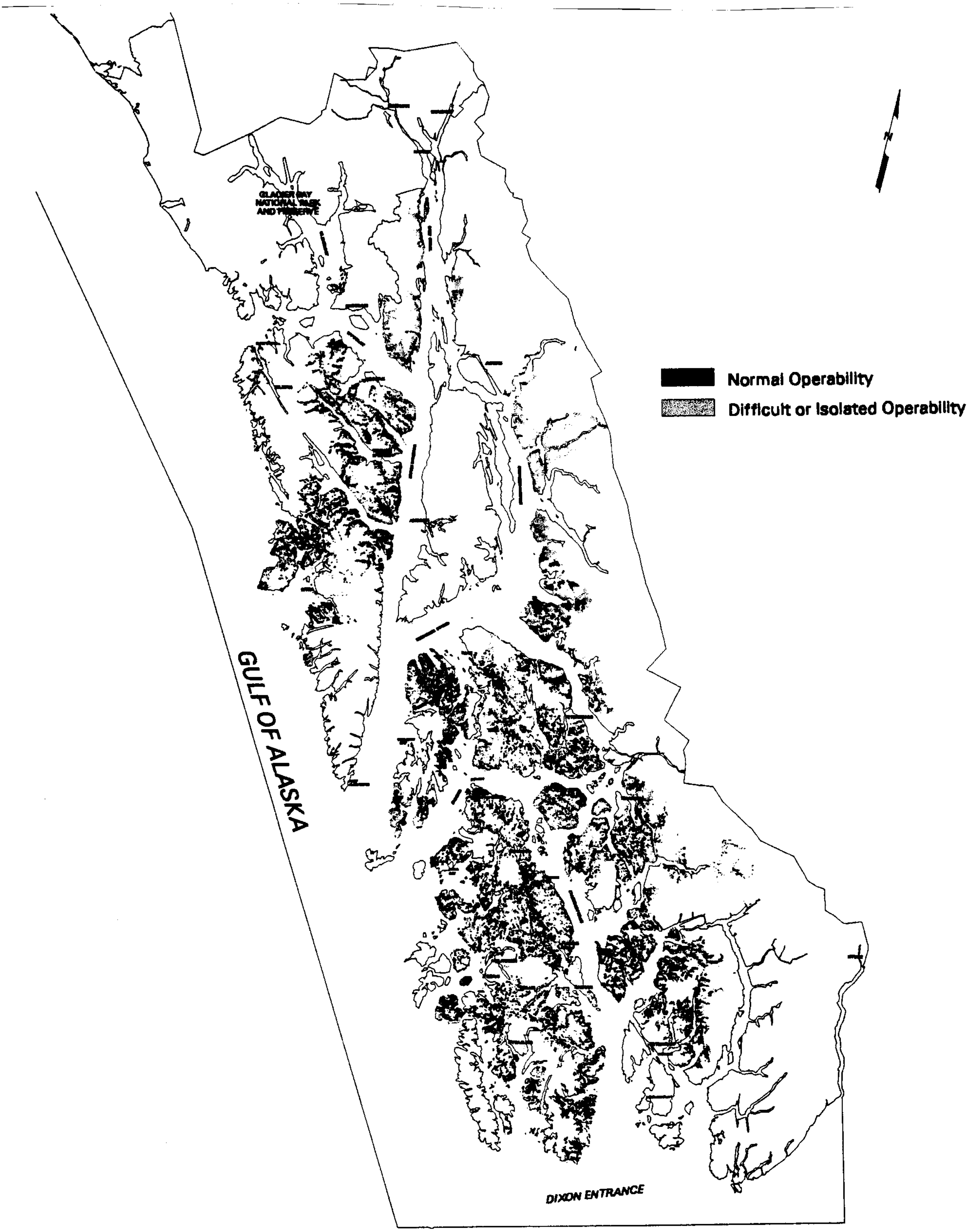


Figure 3-40
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 10)

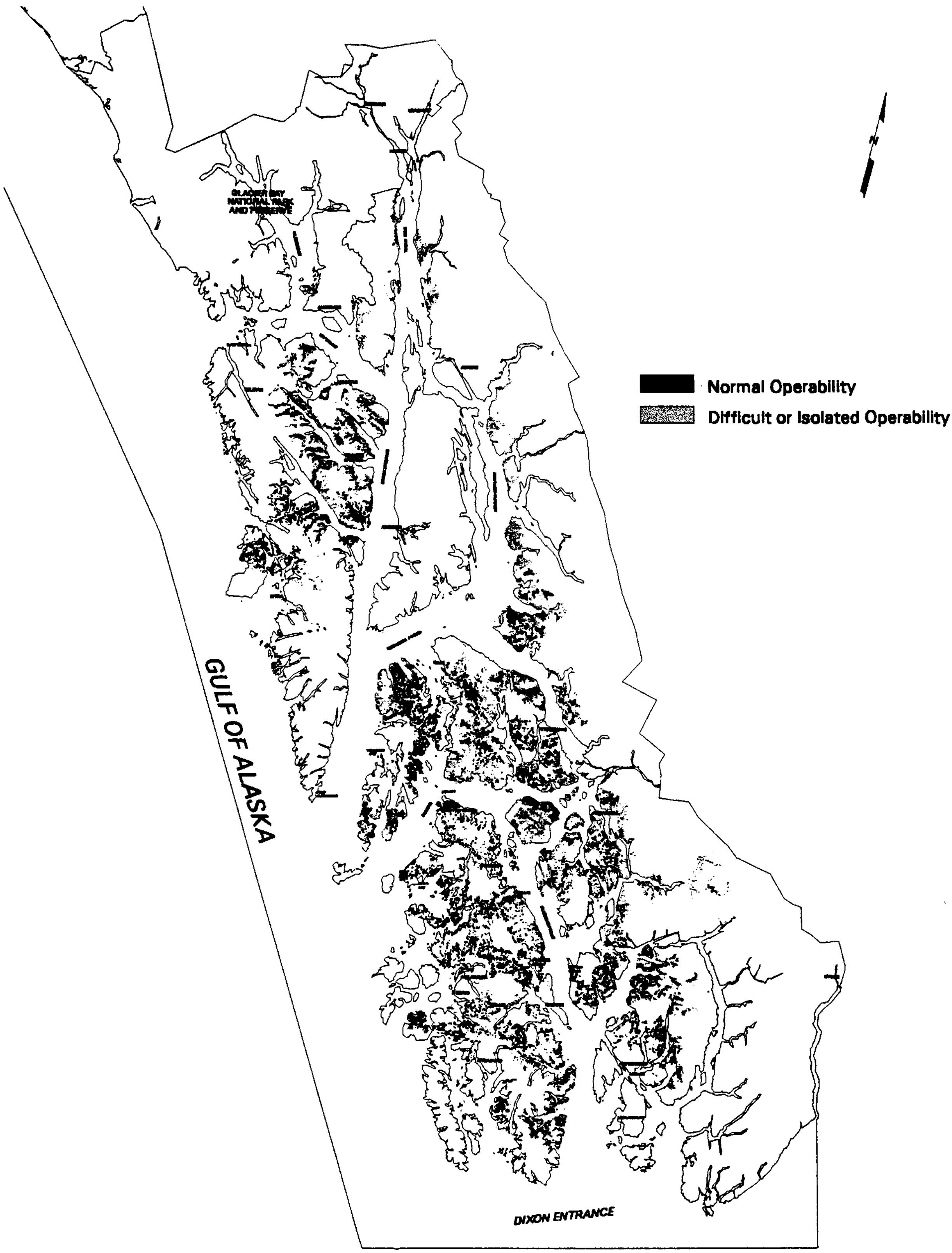
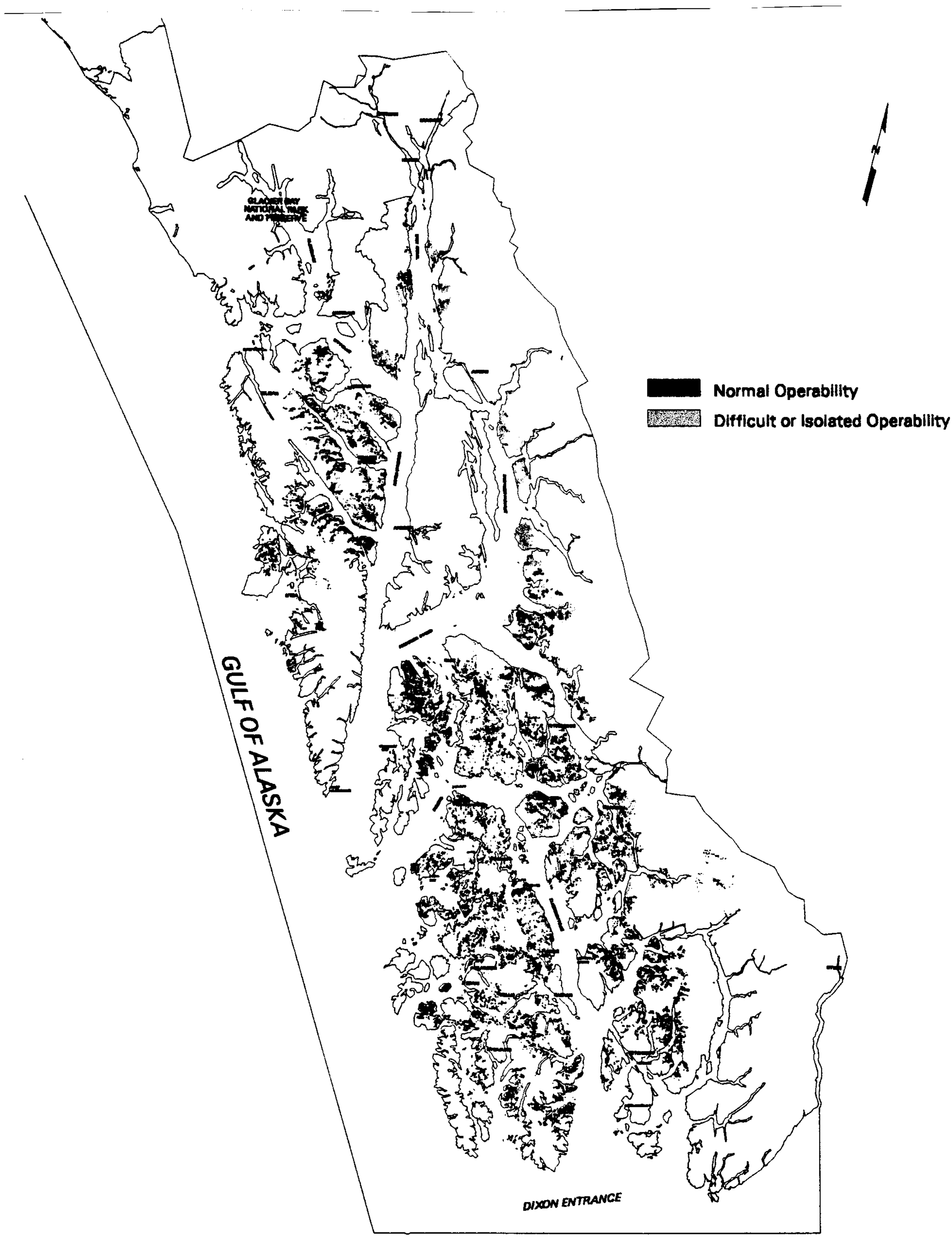


Figure 3-41
Distribution of Areas Available for Harvest During the Next Ten Years (Alternative 11)



The distribution of the timber harvest will have impacts on several communities. For example, Alternatives 4, 5 and 6 preclude virtually all timber harvest on North Prince of Wales and Northeast Chichagof Islands. Communities whose primary employment comes from timber harvesting and road construction in these areas would be adversely affected. Residents of these communities such as Thorne Bay, Whale Pass, Coffman Cove, Naukati, and Hoonah who are employed in the timber industry would either have to relocate, commute longer distances, or live in logging camps during the work week. Similarly, communities which are generally opposed to additional timber harvest in these some areas will benefit from these standards and guidelines. This includes communities such as Point Baker, Port Protection, and Tenakee Springs.

Economic Efficiency Analysis

Efficiency analysis seeks to measure all of the costs and benefits associated with a given planning alternative and summarize them in the form of a "Present Net Value" (PNV). In deriving PNV figures, costs are subtracted from benefits to yield a net value. "Future values" (i.e. benefits received in the future) are discounted using an appropriate discount rate to obtain a "present value." The PNV of a given alternative is the discounted sum of all benefits minus the sum of all costs associated with that alternative. Following Forest Service standard procedures, a four percent discount rate is used. While the question of which discount rate to use is hotly debated, the four percent level is congruent with that is commonly used in evaluation of public policy.

A major component of PNV is comprised of what economists term producer and consumer surplus. Producer surplus refers to the amount of money a company receives from sales over and above its costs of production and is analogous to the concept of profits. Consumer surplus, on the other hand, refers to the amount of benefit a person receives from a good minus the cost of purchasing it. This benefit is commonly conceived of as the maximum amount a person would be willing to pay for the good minus its actual price and is referred to as net willingness to pay (WTP). Where goods are traded in the market place, such as in the case of timber, consumer and producer surplus can be calculated after estimating the demand and supply schedules for the given market good. For goods which are not traded, such as forest recreation and tourism or environmental preservation, more elaborate (and often more tenuous) techniques must be used. Since PNV estimates attempt to condense a large amount of information into a single value, they must be used with caution. A complete accounting of all the costs and benefits (both traded and non-market) is a practical impossibility, and one must be aware of what is and is not included in the PNV estimate.

In the following analysis we have provided estimates for the timber program and recreation and tourism. For reasons discussed below, commercial fishing and mining were excluded from the PNV calculation. Also, non-use values were not included. These are mainly comprised of existence and option values. Existence values refer to the amount an individual would be willing to pay to preserve old growth forest stand, for example, even if they had no intention of ever visiting it. Option values refer to the amount a person would be willing to pay to maintain the option of visiting the stand even if they had no immediate intention of doing so. While the non-use values associated with the Tongass National Forest as a whole are no doubt considerable, they are extremely difficult to accurately measure, particularly on the per acre basis which would be needed in order to make a comparison between alternatives. PNV estimates for timber and recreation and tourism are presented in Table 3-151, and the derivation of these estimates is detailed below.

Table 3-151
Present Net Value for Recreation/Tourism and Timber.

	Alternative									
	1	2	3	4	5	6	7	9	10	11
Cash Receipts (Millions of 1995$)										
Timber	$0	$832	$289	$315	$292	$386	$1,276	$979	$348	$508
Recreation	$4,624	$4,521	$4,539	$4,529	$4,540	$4,521	$4,356	$4,399	$4,521	$4,539
Total	$4,624	$5,353	$4,828	$4,844	$4,832	$4,907	$5,632	$5,378	$4,869	$5,050

Source: USDA Forest Service. See text for explanations.
Discounted to 1997 at 4 % per annum with initial implementation in 1997.

Timber. Southeast Alaska's timber industry is commonly seen as a price-taker with no significant ability to impact prices for timber in national and international markets. Volumes produced by the region are comparatively small and, unlike the Pacific Northwest, a large reduction in Southeast Alaska harvests would not be expected to have a significant impact on lumber prices in the consuming regions. It is likely that the region has some market power in the supply of Sitka spruce, as no immediate substitutes are readily available. However, there is no estimated demand curve for this product, and the consumer surplus would accrue most to consumers outside of the United States (primarily Japan). As a result there is no consumer surplus associated with Tongass National Forest timber. As for producer surplus, it is commonly assumed in competitive market transactions that buyers will bid up the price of an intermediate to the point where no company profits are possible. With the exception of long-term contract offerings, Tongass National Forest sales are based on a competitive bid system. However, the long-term contract was modified by the Tongass Timber Reform Act to assure that long term sale offerings timber prices shall be adjusted to be comparable to independent sale prices. Consequently it is reasonable to assume that no company profit is associated with the Tongass National Forest timber sale program. While at first this claim may seem extreme, it must be remembered that the no-profit assumption applies to the "average firm;" more efficient firms will tend to make profits while less efficient firms will tend to operate at a loss. Likewise, the term "profit" is meant in the economic sense and excludes projected returns to capital at competitive market interest rates.

Given the above assumptions, whatever surplus is associated with Tongass National Forest timber sales is restricted to the net revenues received by the National Forest. Tongass National Forest net revenues are roughly equivalent to the timber cash receipts discussed in the following budget section on forest receipts and payments to Alaska except that in this case Forest Service administration and sale preparation costs are subtracted as an additional expense. These net revenues were derived for each decade in the 160 year planning horizon using the FORPLAN harvest scheduling model. Future revenues were discounted at four percent using 1996 as a base year and assuming full implementation of the given alternative beginning in 1997. All estimates are based on the assumption that the total ASQ is harvested. The results are shown in the first row of Table 3-151. In general, alternatives with higher ASQ levels show higher PNV estimates. In some cases, an alternative with a lower ASQ may have a higher PNV due to lower-costs associated with timber harvest, as seen in the comparison of Alternatives 10 and 11. While these timber intensive alternatives project lower, or even negative, net revenues in latter decades (after 2050) due to the influx of lower grade second growth logs, the effect of the four percent discount rate serves to emphasize the near term over the long-term. Since the sale of timber constitutes the sole source of revenue used in this stage of the analysis, Alternative 1, in which virtually no timber is harvested, shows a zero PNV. Alternative 7, on the other hand, shows a $1.3 billion PNV, and the other alternatives are distributed between these two extremes. No additional analysis for NIC1 only timber harvest has been done, the magnitude of the PNV would be less but, the trend between alternatives would be similar.

Recreation and Tourism. Unlike timber, recreation and tourism is not directly traded in the market place, and the techniques used to calculate PNV for recreational activity are considerably different than those used for timber revenues. Recreational users of the Tongass National Forest generally pay for only a small proportion of the total benefits they receive from the forest. The net benefits they receive are not recorded in any market transaction and must therefore be estimated. The measure used in this analysis is average net willingness to pay which is derived from 1988 survey data. For general recreational activity, this figure is estimated at $25.73 (1995$) per RVD, and for sport fishing the estimate is approximately $800 per RVD). Using the proportion of 1994 total RVDs comprised by sport fishing, a weighted average of $52.46 (1995$) per RVD was derived. This figure represents the average amount a Tongass National Forest recreational user would be willing to pay for a day's recreation over and above expenses already incurred.

Future recreation and tourism use on the Tongass was estimated using techniques already described in the Affected Environment portion of this section and further detailed in the impact analysis of recreation and tourism activity presented above. Projected net future value was derived by multiplying total RVD use by the average net WTP estimate of $52.46. These values were then discounted to 1996 and summed using 1997 as the initial period. The resulting PNV estimates are shown in the second row of Table 3-151. Recreation and tourism PNV estimates are considerably higher than those for timber, indicating the importance of the Tongass National Forest as a recreational resource for both local residents and outside visitors. For example, timber PNV for Alternative 7 (the alternative with the highest estimate) is only about one fourth of the average recreation and tourism PNV across all alternatives. However, since differences in recreational activity are relatively small between the alternatives, recreational PNV values do not show much variance in spite of their high absolute magnitudes. The differences that do exist are negatively correlated with the timber intensity of the alternative, with the highest levels occurring in Alternative 1 and the lowest in Alternative 7. This is primarily due to the negative impact of timber activity on the availability of ROS2 class ("Semi-Primitive Motorized") settings.

Various aspects of recreation and tourism-related value were impossible to measure or estimate for this report. All RVDs have been treated as equivalent, but it is likely that net WTP varies for different ROS classes. Likewise, the net WTP value for a given recreational experience will vary according to a host of factors which may be impacted differently under the different alternatives. By using a constant dollar per RVD estimate, this takes only quantity into account and ignores quality. This quality can take many forms, but must include aesthetic considerations, personal attachments (in the case of local residents who habitually frequent the same "favorite places"), availability of fish and game, and ease of access. Moreover, these quality considerations will extend beyond recreational use directly occurring upon the Tongass National Forest to include cruise ship passengers and others who have come to the region to mainly experience its beauty and wild character.

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Salmon Harvesting and Processing. No PNV estimates for the commercial salmon industry were undertaken in this report. There are three main reasons for this omission. First, no quantified variation in estimates of projected catch are available for the planning alternatives (see previous section on salmon harvesting in the impact analysis). The impacts which are thought to occur will mostly be felt in latter decades, and, due to discounting, they would have little effect on PNV estimates. The second reason is that reliable cost data necessary to calculate producer surplus (profits) is unavailable. In any case, it is probable that the zero profit assumption made for timber processors is also operable here. In open-entry fisheries it is reasonable to assume that new entries will continue until average profits approach zero (after wages and the opportunity cost of capital invested in equipment is factored in). With tradable permits, profits may be preserved, but they will be reflected in the permit price and thereby entail an added opportunity cost of additional capital invested in holding the permit. In either case the zero profit assumption would hold, and the producer surplus associated with the fishery would be zero. The third reason lies in the difficulty of calculating the consumer surplus associated with Southeast Alaska's salmon fishery. While the fishery is large enough to impact international prices, no estimate of these impacts were available.

Mining. Estimates of mining PNV also were omitted from this analysis. Since mining activity is not projected to vary by alternative, this omission will have no substantive effect on the study results. Moreover, estimates of PNV for mineral deposits are subject to many of the same difficulties attending other goods along with the added problem that estimates will vary widely depending upon current mineral prices. To attempt a PNV estimate for this industry was felt to be inappropriate within the context of this report.

Summary. While PNV values for recreational activity are estimated to be significantly higher than those for timber, they do not vary between the alternatives to the degree which timber does. Thus the high relative variance of timber estimates produces a strong correlation between timber intensity and total PNV (Table 3-151). At 5.6 billion dollars, the PNV for Alternative 7 is the highest of all the alternatives. At 4.6 billion dollars, Alternative 1 is approximately 20 percent below Alternative 7 and is the lowest of all alternatives. These PNV estimates mirror the results regarding employment and income presented in the impact analysis portion of this report. In general, higher timber harvests lead to higher employment levels and higher PNV estimates. However, high levels of timber activity will generally have the highest negative impacts on the non-use values which could not be quantified and included in this analysis. These will include aesthetic considerations and concerns about preservation of species habitat and natural ecosystems. They will also include the quality of outdoor recreation and tourism experiences, experiences which comprise a important aspect of the lifestyle of many Southeast Alaska residents as well as the major draw for visitors to the region.

Tongass National Forest Budget

The Forest Service budget is appropriated through Congress on a yearly basis. National Forest budget requests are considered as part of total budget requests submitted to the United States Congress by the executive branch each year, with Congress having final say. Table 3-152 displays an estimated annual budget, in 1995 dollars, for the first decade by alternative. The estimates are determined from past expenditures, current resource needs, and predicted resource output levels to be provided by alternative. Several of the alternative estimates are much larger than the actual expenditures from 1995, illustrating areas where current budgets do

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not match resource needs. The estimates may also differ from the budget outputs estimated through FORPLAN which are based on specific modeled assumptions.

The budget items that vary by alternative are those related to timber harvest activities: as the ASQ, location, and quality of the scheduled timber harvest changes, so do the budget requirements associated with resource outputs. These budget items include all the resource support, like wildlife biologists, necessary for timber harvesting. The individual resource budgets apply to activities not directly related to timber management activities, and therefore do not vary with scheduled timber harvest.

Those budget items related to timber management activities are listed here and briefly defined:

Ecosystem Planning, Inventory and Monitoring includes all resource planning costs of fulfilling the requirements of the National Forest Management Act, including appeals and litigation related to forest planning, the inventory and assessment of resources on NFS lands at the Forest Plan level, and the monitoring and evaluation of forest plan implementation over time. The costs vary by alternative due to the monitoring plan, which is tied to output level; those alternatives with less timber harvesting will have less areas to be monitored.

Road Maintenance supports the main transportation system to provide safe and efficient access for the multiple uses of National Forest lands that is compatible with ecosystem management principles. As more roads are built in Alternatives 2, 7 and 9, there will be more roads to be maintained. Alternatives 1, 4 and 5 have lower timber harvest activity. Currently up to 40 percent of road maintenance not directly related to hauling timber (culvert cleaning, bridge repairs, brushing) is done by timber purchasers using the road system.

Timber Sales Management includes project level timber sale planning (including resource support), silvicultural examinations, sale preparations (including resource support), and harvest administration.

Forest Vegetation Management includes reforestation, Timber Stand Improvements, the genetic resources program, and the nursery program.

General Administration provides line management and indirect administrative support and common services to the extent that benefiting programs or projects cannot be identified.

Timber Road Construction includes engineering, planning, and administration of road contracts for timber sale road building.

The remainder of the budget items, listed and briefly defined below, are constant across alternatives. These budget items benefit resource activities throughout the forest and are necessary for management, maintenance, and improvement under any alternative.

Minerals and Geology includes preparation of environmental documents for proposed operations and monitoring, inspections and final reclamation of current and potential sites.

Real Estate Management includes administration of Special Use Permits (non-recreation), land exchanges and adjustments, land classification and status, and providing up-to-date maps and spatial data.

Landline Location is funded to locate, mark, post, and maintain property lines between the National Forest System and other property.

Facilities Maintenance is funded to maintain and make minor improvements in facilities used for fire and administration.

Law Enforcement includes funds to protect resources, operations, employees and forest visitors.

Recreation Management provides operation and maintenance funds for campgrounds, picnic areas, boating sites, visitor centers and interpretative sites, trailheads, and trails. Administration for educational and promotional information, and recreation Special Use Permits are also included.

Wilderness Management provides protection for wilderness values and resources, as well as wilderness experience and educational opportunities for the public.

Heritage Resources Management provides funds to identify, evaluate, protect and interpret the Heritage Resources on National Forest system lands. Making Heritage Resources accessible to the public while protecting the resource for future generations is also included in this budget item.

Wildlife, Operations and Improvements is funded to 1) protect, restore and improve habitats, to maintain healthy populations of all terrestrial wildlife (excluding threatened, endangered or sensitive species), 2) improve habitats and provide opportunities for consumptive and commercial uses including hunting and trapping, 3) increase the wildlife viewing/appreciation opportunities through education, interpretation, and recreational sites to appreciate wildlife, and 4) provide effective organizational leadership to coordinate activities for productive and useful habitat in cooperation with other agencies, organizations, and partners.

Inland Fisheries Operations and Improvements is funded to 1) protect and restore inland streams and lakes and the fish and other aquatic life they support, 2) increase opportunities for recreational fishing through improved habitat, access and facilities, 3) increase viewing opportunities and public appreciation through aquatic education/interpretation, and 4) promote effective management through collaboration with other federal, State and tribal agencies, conservation and industry groups, and private citizens.

Anadromous fisheries Operations and Improvements is funded to 1) protect and restore streams and lakes and the anadromous fish and other aquatic life they support, 2) increase opportunities for recreational fishing, subsistence, and commercial harvest through improved habitat, access and facilities, 3) increase viewing opportunities and public appreciation through aquatic education/interpretation, and 4) promote effective management through collaboration with other federal, State and tribal agencies, conservation and industry groups, and private citizens.

Threatened, Endangered and Sensitive species Habitat Management is funded to protect and improve habitats to achieve recovery goals for T&E species in coordination with other management goals and activities, and to protect and sustain viable populations of sensitive species.

Soil, Water, and Air Management is funded to protect and enhance soil productivity, air quality, water quality, quantity, and timing of waterflows, to provide information to sustain healthy ecosystems, and meet environmental needs of National Forest System watersheds and airsheds, and to monitor existing soil and water improvements to ensure their continued effectiveness and plan for future improvements.

Fire Management and Suppression provides funding for fire prevention and suppression.

Facilities Reconstruction and Construction provides funding to rehabilitate, renovate, replace, improve, reconstruct, and construct administrative, research, and recreation sites.

General Purpose Road Construction includes engineering, planning and contract administration of road construction and improvement used for public access to forest resources.

Recreation Road Construction includes engineering, planning and contract administration of road construction and improvement used for public access to recreation sites such as trailheads or campgrounds.

Trail Construction includes engineering, planning and contract administration of trail construction and improvements.

Permanent Appropriations and Trusts are budget items that are collected directly through forest activities and are reinvested into the program. The two largest items are the KV fund and the Salvage Sales fund. KV money is collected from timber receipts to be used for reforestation and other silvicultural treatments within the sale-area boundary. Salvage Sale money is collected from timber receipts and from previous salvage sales, to be used for future salvage sales.

Forest Receipts and Payments. The Forest Service is required by law to return 25 percent of Tongass National Forest gross receipts, including purchaser road credits (PRCs), to the boroughs and census areas of Southeast Alaska. These funds are used to augment road and school budgets. While in the past Tongass National Forest money has not constituted a major proportion of these budgets, the potential effects of planning alternatives in this area is of concern to local communities. These estimates of the potential revenues from forest activities and the 25 percent returns to the State of Alaska are included in Table 3-152.

Forest Revenues include 1) timber receipts – the money collected from the purchase of timber sales, net of purchaser road credits, and 2) other receipts – including mineral, recreation, utility and other special use payments. Capital Improvements include purchaser road credits – the value of timber sale roads built by the purchaser for forest use. These estimates are taken from FORPLAN output and assume the full ASQ is harvested.

Alternatives 2, 3, 6, 7, 9, 10, and 11 show an increase in the projected returns to the State. A major factor behind the increase in payments this relative to is due to the assumption of full ASQ implementation of each alternative, whereas activity in 1995 was subject to factors such as litigation and budgets. No additional analysis for a NIC1 only timber harvest has been done. The magnitude of the payments would be

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closer to the 1995 payments and the trend between alternatives would be similar to that of the ASQ based payments.

The more timber-intensive Alternatives 2, 7 and 9 generate higher timber revenues and also entail greater road construction and thereby higher PRC levels. Alternative 7, for example, is estimated to generate about 5 times more total revenue than was obtained in 1995. Alternatives 4 and 5 produce approximately the same amount of revenue for the state as in 1995 in spite of reduced harvest levels for each of these alternatives. Due to the assumption of increasing sawlog prices, Alternatives 2, 3, 6, 7, 9, 10, and 11 show increasing revenues for the next few decades. However, as available old-growth inventory is exhausted and harvests of second-growth stands begin to comprise an increasing component of total sales, gross revenues may decline due to the different mix of log grades.

Table 3-152
First Decade Average Annual Budget by Resource Line Item in $1,000 1995 Dollars

Fund Code	Budget Line Item	FY 1995	Alternative 1	2	3	4	5	6	7	9	10	11
NFEM	Ecosystem Plan/Inventory/Monitoring	$1,269	$4,110	$4,680	$4,355	$4,155	$4,145	$4,430	$4,950	$4,810	4420	$4,380
NFMG	Minerals and Geology	$1,199	$1,275	$1,275	$1,275	$1,275	$1,275	$1,275	$1,275	$1,275	$1,275	$1,275
NFLA	Real Estate Management	$1,000	$1,030	$1,030	$1,030	$1,030	$1,030	$1,030	$1,030	$1,030	$1,030	$1,030
NFLL	Landline Location	$124	$300	$300	$300	$300	$300	$300	$300	$300	$300	$300
NFFA	Facilities Maintenance	$624	$625	$625	$625	$625	$625	$625	$625	$625	$625	$625
NFLE	Law Enforcement	$216	$220	$220	$220	$220	$220	$220	$220	$220	$220	$220
NFRD	Road Maintenance	$949	$400	$2,290	$1,260	$640	$560	$1,530	$3,165	$2,715	$1,485	$1,335
NFTM	Timber Management	$13,351	$5,090	$24,160	$13,350	$6,740	$6,360	$16,020	$33,380	$28,675	$15,640	$14,230
NFFV	Forest Vegetation Management	$1,155	$1,000	$2,835	$2,835	$2,835	$2,835	$2,835	$2,835	$2,835	$2,835	$2,835
NFRM	Recreation Management	$4,511	$5,070	$5,070	$5,070	$5,070	$5,070	$5,070	$5,070	$5,070	$5,070	$5,070
NFWM	Wilderness Management	$1,736	$1,790	$1,790	$1,790	$1,790	$1,790	$1,790	$1,790	$1,790	$1,790	$1,790
NFHR	Heritage Resources Management	$286	$690	$690	$690	$690	$690	$690	$690	$690	$690	$690
NFWL	Wildlife Operations & Improvements	$892	$1,290	$1,290	$1,290	$1,290	$1,290	$1,290	$1,290	$1,290	$1,290	$1,290
NFIF	Inland Fish Operations & Improvements	$154	$375	$375	$375	$375	$375	$375	$375	$375	$375	$375
NFAF	Anad Fish Operations & Improvement	$3,568	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
NFTE	T&E Species Operations & Improve	$194	$670	$670	$670	$670	$670	$670	$670	$670	$670	$670
NFSO/SI	Soil - Water - Air	$800	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
NFGA	General Administration	$6,318	$6,620	$7,825	$7,195	$6,915	$6,880	$7,575	$9,925	$8,040	$7,395	$6,770
WFPR	Fire Management/Suppression	$413	$490	$490	$490	$490	$490	$490	$490	$490	$490	$490
CNFA	Facilities Reconstruction & Construction	$164	$1,300	$1,300	$1,300	$1,300	$1,300	$1,300	$1,300	$1,300	$1,300	$1,300
CNRF	Recreation Construction	$2,900	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
CNTM	Timber Road Construction	$7,959	$3,000	$15,760	$9,440	$5,210	$4,920	$12,010	$20,895	$16,835	$11,590	$10,650
CNGP	General Purpose Road Construction	$940	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
CNRN	Recreation Road Construction	$194	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600
CNTR	Trail Construction	$1,850	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
	Total Costs	**$52,766**	**$48,945**	**$86,275**	**$67,160**	**$55,220**	**$54,465**	**$73,125**	**$103,875**	**$92,635**	**$72,085**	**$68,925**
Permanent Appropriations and Trusts												
CWKV	KV	$1,094	$370	$1,980	$1,125	$590	$560	$1,470	$2,775	$2,115	$1,420	$1,260
SSSS	Salvage Sales	$2,526	$410	$2,185	$1,240	$650	$615	$1,620	$3,060	$2,335	$1,565	$1,400
	Total	**$3,620**	**$780**	**$4,165**	**$2,365**	**$1,240**	**$1,175**	**$3,090**	**$5,835**	**$4,450**	**$2,985**	**$2,660**
Net Cash Receipts												
	Timber Receipts	$9,595	$2,000	$32,330	$10,240	$6,890	$6,370	$11,400	$45,160	$38,430	$13,510	$18,540
	Other Receipts	$531	$525	$525	$525	$525	$525	$525	$525	$525	$525	$525
	Total Cash Receipts	**$10,126**	**$2,525**	**$32,855**	**$10,765**	**$7,415**	**$6,895**	**$11,925**	**$45,685**	**$38,955**	**$14,035**	**$19,065**
Capital Improvements												
	Purchaser Road Credits	$16,980	$0	$55,950	$32,050	$16,330	$15,230	$39,930	$78,800	$66,820	$36,840	$32,200
Total Gross Receipts		**$30,241**	**$4,425**	**$109,855**	**$55,540**	**$29,070**	**$27,100**	**$65,760**	**$153,425**	**$130,590**	**$65,390**	**$64,085**
25% Payments to Alaska		**$7,560**	**$1,106**	**$27,464**	**$13,885**	**$7,268**	**$6,775**	**$16,440**	**$38,356**	**$32,648**	**$16,348**	**$16,021**

Subregional Overview

Introduction

The previous section of this report concentrated on economic impacts to the regional economy as a whole. However, these economic impacts will not be evenly distributed across the various boroughs or communities which comprise Southeast Alaska's economy. Potential impacts (e.g., a reduction of timber related employment arising from declines in harvest) will not be viewed similarly by all communities, or be distributed equally among the communities.

For this reason, communities and individuals are interested in an analysis of social and economic dimensions of potential impacts of TLMP revision alternatives at a more detailed geographic scale. At higher levels of geographic aggregation, the law of averages allows for much more certainty in the application of statistical methods and tends to cancel out errors in data reporting which may be relatively extreme at the local level. The availability of data becomes a problem at the community level as the types of data available at the state or regional level are seldom available for smaller localities. In short, an economic analysis at the local or subregional level is more prone to error, both in description of present conditions and prediction of future conditions.

There is also considerable weight to the argument that Forest Service decisions should not rely to any considerable degree on the local distribution of expected impacts. A job loss in Haines is just as devastating as one in Petersburg to the individual experiencing it. A numerical estimate of expected employment impacts at the borough or community level has not been provided. In addition to problems arising from inadequate data, the lack of detailed information on the exact location of expected harvests and on the competitive position of individual firms makes it impossible to know which jobs or firms may be affected under a given alternative. Any attempt to provide numerical estimates of impacts at the community level would be prone to large errors, and give a false sense of accuracy and certainty.

The following analysis presents a more detailed picture of the current situation and past trends at a community group level, but does not attempt to quantify potential impacts by alternative. This analysis of localities and economic dimensions provides a more complete understanding of the nature of the region's economy, providing decision makers with information concerning the diversity and resiliency of communities.

Economic developments are discussed in the following section using employment data collected by the Alaska Department of Labor (ADOL) by community groups. Community groups are sub-areas of boroughs and census areas (CAs) developed by the ADOL. Some of the community groups represent individual communities, and some include several communities within the boundary. Reported for community groups, this information provides a more detailed picture of local employment patterns than previously available. These data were not released by the state for public use until July 1996 when the legislature changed previous polices that had treated employment statistics at this level of analysis as proprietary information. Consequently, this information was not available when the RDEIS was written.

Southeast Alaska Boroughs and Census Areas

The boroughs and census areas of Southeast Alaska (referred to as the "boroughs") display large differences in their economic structure and development, and the data available from the ADOL for community groups show even more variation. While some community groups or boroughs show concentrations of wood products-related employment, others contain no such employment at all. More general measures of per capita income or total job creation likewise differ widely across boroughs or community groups.

A common problem encountered in the analysis of the Southeast Alaska economy is that, owing to its relative size, Juneau dominates statistics at the regional level. As a result, regional trends in employment or income more closely represent developments in Juneau and often do not reflect changes in other boroughs. By analyzing certain economic statistics at the borough level, differences between boroughs in economic structure and trends which are obscured at the regional level become apparent.

Table 3-153 displays population, income and employment measures for Southeast Alaska boroughs since 1985. In general, trends are similar for each borough, but there are large differences in magnitudes. Population growth in the Prince of Wales and Outer Ketchikan borough (POW-OK) and in the boroughs comprising the "Northern Complex" is considerably higher than the regional average. Change in employment levels is positive for all boroughs, but ranges from 50 percent for the Northern Complex to just 12 percent for Juneau.

The choice of a base year for comparison is by no means uncontroversial. Relatively low timber employment was recorded in 1985, while 1990 was one of the highest years on record. By using 1985 as a base for the RSDEIS data set (U.S. Bureau of Economic Affairs), broader, long-term trends are depicted in the local economies. Using changes in employment by industry since 1990, as shown through the ADOL data, we can display the behavior of borough level employment patterns in the face of rapid changes in timber and other types of employment. The RDEIS data set is available only at the borough level, and consequently, economic analysis of the ADOL community groups relies solely on the ADOL employment data.

Real per capita income is a complex measure which includes trends in population and employment levels, and in wages earned per job. On the whole, per capita income has been falling in the region, with the greatest decline occurring in POW-OK as a result of a sharp rise in population, and a 23 percent decline in average earnings per job. The absolute level of per capita income is also considerably lower for POW-OK, indicating that, on average, POW-OK residents receive 35 percent less income than the regional average. In contrast, Ketchikan-Gateway Borough (Kt-GtWy) and the Northern Complex both experienced gains in real per capita income due mostly to the rapid creation of new jobs in both boroughs.

The Shannon-Weaver Diversity Index, derived for each borough using the ADOL employment data, provides a measure of local economy diversity. To allow easy comparison, the index was constructed so that the borough displaying maximum diversity is scored at 100 percent and other boroughs reported as a percentage of this maximum.

Table 3-153
Summary Economic Statistics For Southeast Alaska Boroughs.

	Population		Real Per Capita Income		Total Employment[1]		S-W Diversity Index[2]	
	1994 (1,000)	1985-94 Change	1994 ($1995)	1985-94 Change	1994 (Jobs)	1985-94 Change	1995	1985-94 Change
Northern Boroughs								
Haines Borough	2.2	10%	26,755	-5.6%	1,582	25.1%	84%	13%
Juneau Borough	28.8	17%	28,055	-13.5%	19,456	11.6%	92%	11%
Sitka Borough	8.8	10%	24,285	-2.1%	5,669	22.8%	95%	5%
Northern Complex [3]	4.5	25%	23,370	4.9%	2,846	50.2%	100%	10%
Southern Boroughs								
Kt-GtWy Borough	14.4	8%	29,941	10.5%	10,472	35.5%	100%	5%
POW-OK	6.9	35%	17,113	-16.0%	2,985	34.4%	90%	16%
Wrangell-Petersburg	7.2	16%	25,682	-12.0%	4,342	13.0%	98%	0%
Southeast Alaska Total	**72.8**	**16%**	**26,372**	**-6.9%**	**47,352**	**21.1%**	**94%**	**8%**

Source: U.S. Bureau of Economic Affairs (REIS Data), Alaska Dept. of Labor.
1 Full and part-time employment. Includes proprietors and self-employed.
2 Shannon-Weaver (S-W) Diversity Index (see text for complete explanation) based on Alaska Dept. of Labor employment by industry. This index is normalized to the maximum index reported by any borough in a given reporting year.
3 Aggregate of Angoon-Hoonah-Skagway Census Area and Yakutat Borough.

The S-W looks at how evenly a measure is distributed across the categories in which it is reported. In this analysis the percent of employment within an industry sector is measured relative to total employment. If employment is evenly distributed across all industry sectors, the S-W will yield a maximum score. In economies with substantial concentration in a single sector, the S-W score will be relatively low. Of course no economy, even an extremely diverse one, will have a perfectly even distribution of employment. As a result, the S-W must be viewed as a relative measure. In this analysis we have normalized the S-W score so that the maximum score is equal to one and all other scores are expressed as a percent of that maximum. For example, if Borough A's economy scored highest at 0.8 and Borough B's scored 0.6, the normalized S-W is reported as 100 percent for Borough A and 75 percent for Borough B. The 100 percent score for Borough A does not mean that its economy is perfectly diverse or even that it is particularly diverse relative to other local economies in the U.S. It merely shows that it is one of the more diverse economies within Southeast. For these and other reasons, the S-W is an imperfect measure which needs to be interpreted carefully. Nonetheless, it does provide some indication of the relative economic diversity.

In addition to demonstrating positive growth in per capita income, the Northern Complex and Kt-GtWy also exhibit the highest relative diversity rating. Haines Borough shows the lowest rating, but this is expected because it has by far the smallest number of jobs, and the index is sensitive to economy size. Juneau, on the other hand, also exhibits a relatively low index rating in spite of its size, and this is the result of high employment concentrations in government and a lack of manufacturing jobs.

Taken together, these general economic statistics show a mixed picture of economic developments in the boroughs of Southeast Alaska. With the highest per capita income, employment growth and diversity score, Kt-GtWy demonstrates the strongest economic performance. The Northern Complex also exhibited dynamic performance over the last decade, but its per capita income is significantly lower than the regional average and, at 11 percent, its average unemployment rate (see Appendix J) is significantly higher (it should also be remembered that the Northern Complex does not comprise a geographically contiguous set). With by far the lowest per capita income and next to lowest diversity score, POW-OK appears to be relatively weak from an economic standpoint, but this conclusion must be tempered with the fact that the borough also demonstrates the highest population growth and increase in diversity, and the second highest rate of new job creation of any of the boroughs listed here.

While Table 3-153 shows generally strong growth throughout the region since 1985, Table 3-154 indicates that growth since 1990, a peak year for timber employment, has been far less robust. The 12 percent increase in Juneau employment dominates the regional statistics, and other boroughs exhibit either stable or declining wage and salary employment levels (the non-agricultural wage and salary employment data provided by the ADOL exclude self-employed individuals and are thus considerably lower than the Bureau of Economic Affairs statistics presented in Table 3-153). In direct contrast to Juneau's experience, Haines and Sitka, both of which have experienced mill closures in the intervening years, have seen substantial declines in wage and salary employment.

Table 3-154
Non-Agricultural Wage & Salary Employment by Borough.

	Total Employment[1]		Wood Products Industry			Seafood Processing			Lodging, Rest. & Rec.[2]		
	1995 Jobs	1990-95 Change	1995 Jobs	1990-95 Change	% Local Total	1995 Jobs	1990-95 Change	% Local Total	1995 Jobs	1990-95 Change	% Local Total
Northern Boroughs											
Haines Borough	791	-17%	10	-935	1.3%	90	9%	11.3%	131	30%	16.5%
Juneau Borough	15,775	12%	80	--	0.5%	59	139%	0.4%	1,505	29%	9.5%
Sitka Borough	3,816	-7%	52	-88%	1.4%	227	-18%	6.0%	390	8%	10.2%
North Complex[3]	2,118	-2%	322	-1%	15.2%	217	-6%	10.2%	423	102%	19.9%
Southern Boroughs											
Kt-GtWy	7,939	1%	1,029	-28%	12.9%	405	-9%	5.1%	647	-4%	8.2%
PW-OK	2,190	-1%	490	-30%	22.4%	76	193%	3.5%	220	53%	10.1%
Wrang-Peters	2,658	0%	84	-81%	3.2%	513	60%	19.3%	174	-16%	6.6%
SE AK Total	**35,287**	**4%**	**2,067**	**-41%**	**5.9%**	**1,586**	**13%**	**4.5%**	**3,490**	**22%**	**9.9%**

Source: Alaska Dept. of Labor.
1 Full and part-time average annual employment. Excludes proprietors and self-employed.
2 Lodging, Restaurants and Recreational & Entertainment Services. This measure does not directly reflect recreation and tourism-related employment but is included as an indicator of trends and relative concentration of recreation and tourism-dependent jobs.
3 Aggregate of Angoon-Hoonah-Skagway CA and Yakutat Borough.

The 41 percent decline in total regional wood products industry employment (including logging) is reflected in sharp declines in wood products industry employment at the borough level for all boroughs (see Table 3-154). In particular, mill closures in Sitka, Haines and Wrangell have resulted in an over 80 percent decline in wood products industry employment since 1990 in each of these boroughs. Logging employment declined from 2,144 to 1,177 (-45%) between 1990 and 1994, while sawmill and pulp mill employment declined from 1,399 to 1,048 (-25%). In contrast to wood products industry employment, employment in lodging, restaurants and recreation-related services has demonstrated strong gains since 1990. The contrast between losses in wood products industry employment versus gains in recreation-related employment is consistent with overall trends discussed in the regional economic section, but there is considerable variation across boroughs. The Northern Complex, for example, saw a doubling of wage and salary employment in this category, and nearly 20 percent of employment in the Northern Complex is accounted for by lodging, restaurants and recreation-related services. The Wrangell-Petersburg CA, on the other hand, saw a substantial fall in employment in this category, and the share of total employment is only seven percent. Certain boroughs (and, by extension, the communities which they encompass) have benefited much more from the expansion of the tourist-related economy than others.

Table 3-154 also indicates a distinction between Northern and Southern boroughs. As of 1995, boroughs in the Northern portion of Southeast Alaska were far less dependent on the wood products industry for their employment base. Northern Complex held 464 wood products industry jobs, or 22 percent of the regional total, and almost all of these jobs were in logging. The vast majority of timber employment and all of the jobs in wood products processing arising from harvests on the Tongass National Forest are concentrated in the southern boroughs, particularly Kt-GtWy and POW-OK. Recreation and tourism employment, by contrast, shows higher concentrations in the north, accounting for 70 percent of the regional total in this category. Growth in employment in this area has also been more pronounced in the north, with the Northern Complex showing relatively strong growth in this category since 1990. At least at this level of aggregation, it is evident that the boroughs of northern Southeast Alaska and those of the south have different interests in the way in which the Tongass National Forest is managed. However, at lower levels of aggregation the story becomes more complex, with certain boroughs of the north demonstrating extremely high concentrations in logging employment, and others in the south demonstrating no wood products industry employment at all.

ADOL Community Groups

In this portion of the document, the employment data provided by ADOL is analyzed using the community groups defined by that agency — the most detailed level available for this data. At this level of disaggregation there is a much greater potential for substantial errors in the data. Changes in reporting jurisdictions or industry definitions, for example, may result in large and abrupt changes in reported employment for a given community or industry with no underlying change in actual employment patterns. It is also important to remember that ADOL community groups are not necessarily synonymous with actual communities. Table 3-155 displays which individual communities are included in each ADOL community group (the community groups have been renamed in order to clearly represent the communities included). The ADOL data for each of the community groups (see Appendix J) show the relative proportion of employment in each major economic sector. These tables demonstrate the role of the government sector, as well as the difference in proportions of employment that stand to be directly affected by Forest Service policies and actions.

The following figures and tables begin to identify which localities are likely to be most at risk from impacts arising from decisions made in the Forest Plan. The communities that have high concentrations of employment in the wood products industry or in recreation/tourism -related employment (the lodging, restaurants and recreation/tourism -related services category introduced in previous sections), will likely be most affected by planning decisions. Additional considerations include the population of a given locality and its overall rate of new job creation.

Table 3-155
Alaska Department of Labor Community Groups Defined.

Boroughs and Census Areas	Community Groups	Communities
City & Borough of Juneau	Juneau	Auke Bay, Berners Bay, Douglas, Dupont, Fritz Cove, Hawk Inlet, Juneau, Lemon Creek, Lena Cove, Lynn Canal, Mendenhall Valley, North Douglas, Salmon Creek, Snettisham, Switzer Creek, Taku Harbor, Taku Lodge, Tee Harbor, Thane, and West Juneau.
Ketchikan Gateway Borough	Ketchikan City	Carlanna, Charcoal Point, Clover Pass, Herring Cove Ketchikan, Mountain Point, Mud Bay, North Tongass Highway, Peninsula Point, Pennock Island, Point Higgins, Refuge Cove, Saxman, Shoreline Drive, Thomas Basin, Totem Bight, Upper Nickeyville, Wacker, and Ward Cove.
	Revillaggigedo	Fire Cove, Gedney Pass, George Inlet, Gravina Island, Guard Island, Hassler Pass, Loring, Neets Bay, Princess Bay, Shoal Cove, and Twin Peaks.
Haines Borough	Haines	Eldred Rock, Excursion Inlet, Haines, Letnikof Cove, Moose Valley, Mosquito Lake, Pleasant Camp, Porcupine, Port Chilkoot, and Saint James Bay.
Sitka Borough	Baranof	Baranof, Big Port Walker, Chatham, Corner Bay, False Island, Lake Eva, Little Port Walter, Port Armstrong, Port Conclusion, Rodman Bay, Saook Bay, Todd, and Warm Spring Bay.
	Sitka	Biorka Island, Chichagof, Cobol, Deep Bay, Goddard, Halibut Point, Jamestown Bay, Japonski Island (Mt. Edgecumbe), Katlian Bay, Klag Bay, Nakwasina Cove, Redfish Cape, Saint John Baptist Bay, Schulze Cove, Sitka, and Sitka Logging Camp.
Yakutat Borough	Yakutat	Situk and Yakutat
Angoon-Hoonah-Skagway Census Area	Chatham Strait	Angoon, Catherine Island, Cube Cove, Hanus Bay, Tenakee Springs, Tyee, and Whitewater Bay.
	Gustavus	Bartlett Cove, Cape Spencer, and Gustavus (Strawberry Point).
	North Chichagof	Elfin Cove, Gull Cove, Hoonah, Idaho Inlet, Lisianski, Pelican, Port Althorp, Port Frederick, and Yakobi Island.
	Stephens Passage	Cape Fanshaw, Five Fingers, Freshwater, Bay, Funter Bay, Hobart Bay, Point Retreat, Port Houghton, Sawyers Landing, Sumdum, and Windham Bay.
	Skagway	Clifton, and Skagway.
Prince of Wales Outer Ketchikan	Central POW	Craig, Hollis, and Klawock.
	Southeast POW	Bokan Mountain Campbell, Dall Island, Dora Bay, Kendrick Bay, Klakas Inlet, Rose Inlet, Twelvemile Arm, View Cove and Waterfall.
	Hydaburg	Hydaburg
	North POW	Cape Pole, Coal Bay, Coffman Cove, Edna Bay, El Capitan, Kasaan, Labouchere Bay, Little Naukati Bay, Naukati Bay, Noyes Island, Point Baker, Port Alice, Port Protection, Ratz Harbor, Red Bay, Salt Chuck, Shakan, Steamboat Bay, Thorne Bay, Thorne Island, Tokeen, Warren Cove, and Whale Pass.
	Metlakatla	Annette, Mary Island, and Metlakatla.
	Hyder	Hidden Inlet, Hyder, Smeaton Bay, Tongass, and Tree Point
	Cleveland Pen.	Bell Island, Meyers Chuck, Union Bay and Yes Bay.
Wrangell - Petersburg Census Area	Kake	Kake.
	Kuiu Island	Alvin Bay, Cape Decision, Coronation Island, Duncan Canal, Fairway Island, Hamilton Bay, Kah Sheets Bay, Port Alexander, Rowan Bay, Saginaw Bay, Security Bay, Tebenkof Bay, and Washington Bay.
	Petersburg	Kupreanof, Mitkof Island, Petersburg, Scow Bay, and Vank Island.
	Thomas Bay	Thomas Bay.
	Wrangell City	Wrangell.
	Wrangell Island	Bradfield River, Burnette Inlet, Deer Island, Ernest Sound, Etolin Island, Kakwan Point, Roosevelt Harbor, Saint John Harbor, Tyler Logging Camp, and Zarembo Island.

Summary statistics for the ADOL community groups are presented in Table 3-156. One of the most striking aspects of these statistics is the extremely high variation in the rate of job creation (or loss) experienced by the different community groups. The highest positive or negative changes are concentrated in those groups with the smallest total employment numbers. This highlights an important aspect of community level impacts — the most severe impacts (relative to total local employment) are often experienced in smaller communities, where even small job losses may be large relative to total employment. Smaller communities also often exhibit higher concentrations of employment in a single industry, such as logging camps or communities based on resorts or concentrations of fishing lodges. Smaller communities often lack the social and institutional resiliency which would allow them to weather negative economic impacts or take advantage of new opportunities. In larger communities, the absolute level of variation is considerably less, and they also demonstrated very different trends in overall employment growth or decline in recent years. Nonetheless, with the exception of Juneau, all of the communities in Southeast Alaska are small enough that the closure of a mill or a sharp reduction in employment in a certain sector from other causes may entail a loss of a relatively large portion of total employment and the risk of accompanying negative economic and social impacts throughout the community.

Table 3-156
Summary of Employment by Industry Statistics for ADOL Community Groups

Community Group	Borough/Census Area	Wage & Salary[1]		Wood Products			Seafood Processing			Lodging, Rest. & Rec.[2]		
		1995 Jobs	1990-95 Change	1995 Jobs	1990-95 Change	% of Local Total	1995 Jobs	1990-95 Change	% of Local Total	1995 Jobs	1990-95 Change	% of Local Total
Baranof	Sitka Borough	51	-4%	39	-17%	75%	0	--	0%	0	--	0%
Central POW	POW-OK	1,059	9%	137	-56%	13%	42	155%	4%	123	24%	12%
Chatham Strait	Northern Complex	324	-2%	112	26%	34%	0	--	0%	21	10%	7%
Cleveland Pen.	POW-OK	14	-38%	0	--	0%	0	--	0%	14	-38%	100%
Gustavus	Northern Complex	159	29%	0	--	0%	4	130%	2%	97	65%	61%
Haines	Haines Borough	791	-11%	10	-93%	1%	90	9%	11%	131	30%	17%
Hyder	POW-OK	21	-33%	0	--	0%	0	--	0%	8	-12%	37%
Hydaburg	POW-OK	61	-20%	0	--	0%	0	--	0%	0	--	0%
Juneau	Juneau Borough	15,775	12%	80	--	1%	59	139%	0%	1,505	29%	10%
Kake	Wrang-Peters	282	-1%	47	-62%	17%	0	--	0%	0	--	0%
Ketchikan City	Kt-GtWy	7,911	1%	1,006	-30%	13%	405	-9%	5%	647	-4%	8%
Kuiu Island	Wrang-Peters	9	-90%	4	-95%	45%	0	--	0%	0	--	0%
Metlakatla	POW-OK	550	-7%	96	-17%	17%	31	--	6%	20	136%	4%
North POW	POW-OK	447	-12%	257	-4%	57%	4	-63%	1%	19	220%	4%
North Chichagof	Northern Complex	565	-5%	139	0%	25%	139	-40%	25%	33	10%	6%
Petersburg	Wrang-Peters	1,555	12%	12	-83%	1%	430	65%	28%	100	-23%	6%
Revillagigedo	Kt-GtWy	28	--	23	--	84%	0	--	0%	0	--	0%
Sitka	Sitka Borough	3,765	-7%	14	-97%	0%	227	-18%	6%	390	8%	10%
Skagway	Northern Complex	602	10%	0	--	0%	0	--	0%	211	190%	35%
Southeast POW	POW-OK	39	369%	0	--	0%	0	--	0%	38	--	97%
Stephens Pass.	Northern Complex	48	-86%	3	-95%	6%	2	200%	5%	0	--	0%
Wrangell City	Wrang-Peters	813	-8%	21	-87%	3%	83	38%	10%	74	-4%	9%
Yakutat	Northern Complex	419	93%	68	86%	16%	72	--	17%	61	114%	14%

Source: Alaska Dept. of Labor.
[1] Full and part-time average annual employment. Self-employed people and proprietors are not included in this data-set.
[2] Lodging, Restaurants and Recreational and Entertainment Services. This measure does not directly reflect recreation and tourism-related employment, but is included as an indicator of trends and relative concentration of recreation and tourism-dependent employment.

Wood Products Industry

Wood products-related employment as a share of total local employment is shown in Figure 3-42 for all ADOL community groups. Extremely high concentrations are found in groups containing logging camps such as the Baranof, Kuiu Island, Revillagigedo and North POW community groups. A loss of timber jobs could eliminate a substantial proportion of total employment within these community groups, and owing to their impermanence, small size and relative lack of social and institutional infrastructure, the communities within these groups may not be able to withstand the impact. Without the timber employment which constitutes the corner stone of their local economy and, in many cases, the reason for their very existence, some of these communities may disappear.

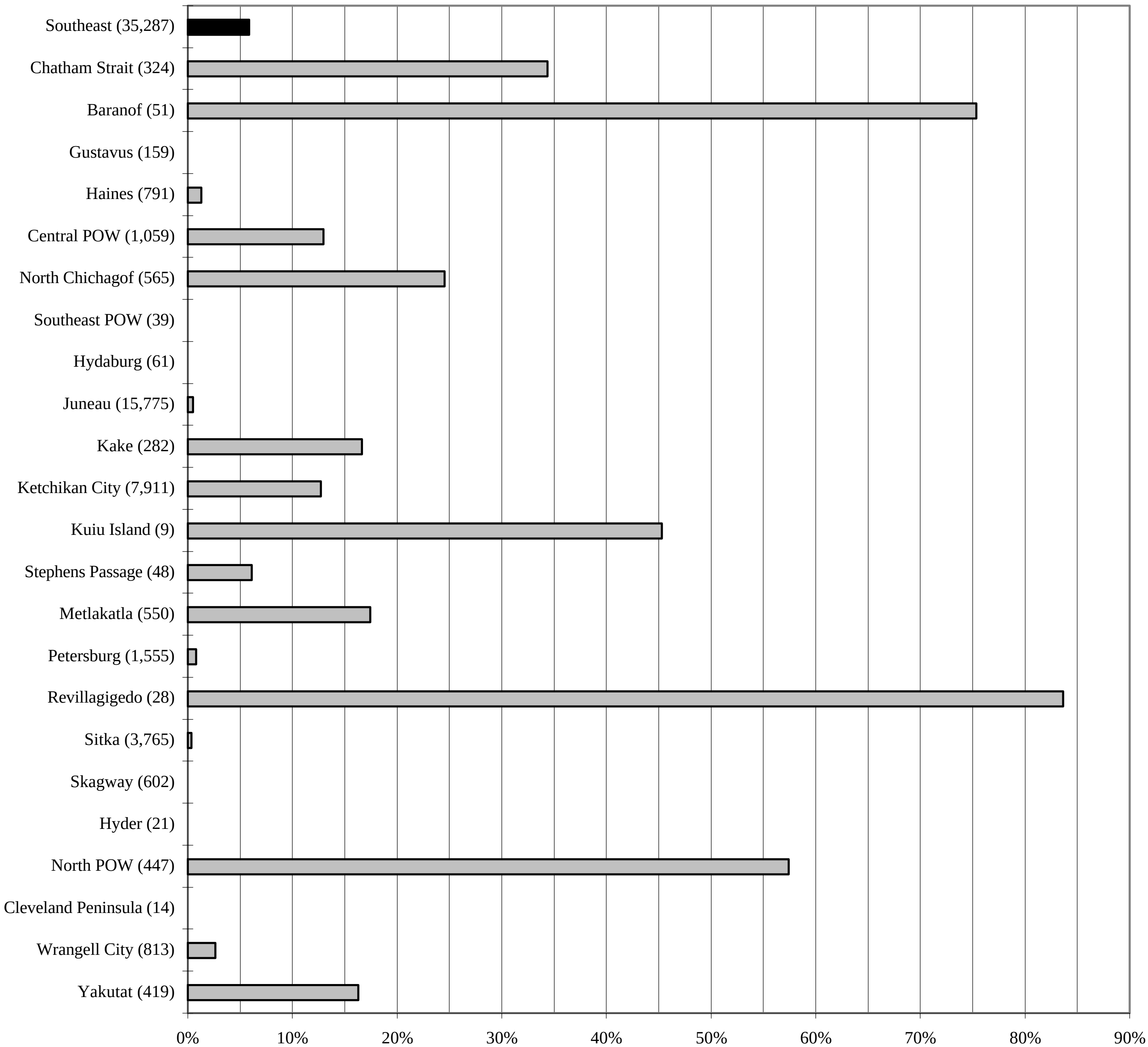
Lower but not insubstantial concentrations of wood products industry-related employment are also found in and around more established communities. In terms of the ADOL community groups, such concentrations can be found in groups such as the Chatham Strait and North Chichagof community groups, where timber employment shares exceed 20 percent of total nonagricultural wage and salary employment. The ability of communities within this category to weather large decreases in timber employment will depend both on other locally available economic opportunities and on the social strength and cohesion of these communities.

Larger communities which are home to wood processing facilities can be dependent on the wood products industry. Ketchikan is the principal example of this type of community, but this characterization could equally be applied to Sitka, Wrangell or Haines prior to their mill closures. Due to their size and general level of economic development, these communities are characterized by a much more developed local economy, and wood products industry employment constitutes a smaller share of total employment. This type of community would likely have the resources available to facilitate recovery from a severe loss in woods products industry-related employment. In most cases, these communities possess a major airport or other transportation linkages, a local business community which is capable of seeking out new opportunities, and developed social and government institutions to promote the communities' interests both locally and at the state level. This is not to claim that the social and economic hardship entailed in job losses is insubstantial for these communities, but they are nonetheless in a better position to take advantage of the growth in employment occurring in the region as a whole than are many of the smaller communities which lack comparable resources.

Mill Closures in Haines, Sitka, and Wrangell

As noted above, changes in timber related employment will not be evenly distributed across the communities of Southeast Alaska. In particular, the opening or closing of wood products processing facilities, such as pulp mills or sawmills, will have large and abrupt impacts on local employment and earnings levels. The last five years have witnessed mill closures in Haines (May, 1991), Sitka (September, 1993) and, most recently, Wrangell (December 1994). An examination of recent employment trends in these communities will help illuminate the role of wood products processing facilities in the local economies of Southeast Alaska and may indicate what can be expected from mill closures in other communities (most notably Ketchikan should the Ketchikan Pulp Company proceed with plans to close its pulp mill in March, 1997).

Figure 3-42
Percent Share of Wood Products-Related 1995 Employment by Community Group.



Source: Alaska Dept. of Labor.
The total number of jobs within each community group is given in parentheses.
Self-employed people are not included in this data-set.

Table 3-157 displays yearly levels in total employment, wood products employment (logging included) and other employment for Haines, Sitka and Wrangell since 1990 (additional information on employment by sector for these and other ADOL community groups is provided in Appendix J). The direct impact of mill closures is evident in the elimination of virtually all wood products related employment in each community. These impact can also be seen in a substantial reduction in total employment, ranging from seven percent in Sitka to 11 percent in Haines over the 1990-1995 period, as compared to a four percent increase in Southeast Alaska total non-agricultural wage and salary employment for the same period. Earnings figures were not available at this level of detail, but it is probably safe to assume that impacts to earnings are higher than those to employment since earnings in the wood products industries are significantly higher than the regional average.

Table 3-157
Wood Products and Total Employment in Haines, Sitka, and Wrangell, 1990-1995.

	1990	1991	1992	1993	1994	1995	1990-95 Change
Haines							
Wood Products	141	60	9	34	28	10	-93%
Other Employment	750	761	678	803	811	781	4%
Total Employment	891	821	688	836	839	791	-11%
Sitka							
Wood Products	404	407	412	343	25	14	-97%
Other Employment	3,653	3,477	3,482	3,667	3,709	3,751	3%
Total Employment	4,057	3,884	3,895	4,011	3,734	3,765	-7%
Wrangell							
Wood Products	162	196	224	272	234	21	-87%
Other Employment	721	716	744	771	819	792	10%
Total Employment	883	912	968	1,043	1,053	813	-8%
Southeast Alaska Total							
Wood Products	3,543	3,069	2,863	2,650	2,225	2,002	-43%
Other Employment	32,241	32,574	33,190	33,775	34,838	35,305	10%
Total Employment	35,784	35,643	36,053	36,425	37,063	37,307	4%

Source: Alaska Department of Labor
Non-Agricultural Wage and Salary Employment, self-employed people are not included.

Indirect impacts (i.e., declines in employment in other sectors generated by the reduction in wood products employment) are far less evident than direct impacts, with each community showing a positive increase in other employment since 1990. Increases in Sitka (3%) and Haines (4%), however, are substantially less than the regional average increase of 10 percent in non-wood products related employment. Though the evidence is far from conclusive, this may indicate that in these two communities, mill closures have had a substantial dampening effect on growth in other employment categories. At 10 percent, growth in other employment in Wrangell matches the regional average, but is likely that much of the indirect impact of the mill closure has yet to be felt and that increases in non-wood products related employment in the next few years will be impeded. This is supported by the fact that in 1995 other employment saw a three percent decline, reversing a strong growth trend since 1991. In Sitka, and especially Wrangell, the total impact from mill closures has probably not had time to work its way through the entire economy, as unemployment benefits and outmigration of unemployed workers may continue for several years after the initial job loss.

The evidence suggests that mill closures have had a strong and lasting impact on these communities. At the same time, it is also evident that, at least in the case of Sitka and Haines, other sectors within these communities have continued to grow in spite of the loss in wood products employment. Given a continued favorable economic climate in the region, it is likely that non-wood products related employment in these communities will continue to expand, and that growth rates will eventually match those of other communities in the region. Favorable location and a developed public infrastructure in Wrangell (including a major airport) will likely lead to a similar pattern of development, though this conclusion is far from certain. The same may be equally said for Ketchikan if the pulp mill closes as planned. The fact that these communities may be able to eventually outgrow the loss of a major proportion of their manufacturing employment, however, in no way lessens the individual hardships caused by the loss of mill jobs and related indirect employment. Likewise, smaller communities with less developed physical and social infrastructure are likely to be less resilient in the face of major reductions in wood products employment. Southeast Alaska as a whole continues to experience dynamic economic growth in spite of sharp reduction in the timber sector, the ability of local communities to partake of this growth will depend upon their individual characteristics.

While communities such as Sitka or Haines have been better able to absorb negative economic shocks related to mill closures, the loss of a critical portion of the local manufacturing sector has reduced overall economic diversity, leaving the communities more susceptible to economic downturns in the future. To the extent that mills are able to maintain relatively steady levels of employment in recession years, they will prove to be an important source of economic stability for their supporting communities. Due to the relatively high wages, the taxes paid, and the charitable activities they engage in, the contribution of larger mills to the local economy may be largely underestimated by employment statistics alone.

On the other hand, there is a tendency to overestimate the importance of mills to the local economy simply because of their high visibility. Other forms of economic activity which may be very important in sustaining local employment and incomes may be overlooked because they are comprised of numerous small firms or individual proprietors and do not possess the same influence or visibility as larger firms. For example, in the interior Columbia basin — Idaho, western Montana, and eastern Washington and Oregon — peoples' perceptions were compared with actual economic profiles of each community (Harris, 1996). Overall, people are fairly accurate in their perceptions, but they tend to underestimate the diversity of their economy and overestimate the importance of traditional industries. People could simply be overestimating dependence on industries such as timber, or people could be basing their perceptions on income effects or social influence instead of percent of employment in a given industry.

Recreation and Tourism Industry

With the exception of larger hotels and resorts, recreation and tourism-related economic activity is often comprised of a number of small operators, and will often augment the sales of other small businesses whose primary activity is to serve the needs of local residents. As such, it provides opportunities for small-scale entrepreneurs. On the downside, wages in this sector are usually less than wood products manufacturing, and the work is usually more seasonal in nature. As shown in the foregoing analysis of the regional economy, recreation and tourism has become a major source of growth for the economy of Southeast Alaska. This has manifested itself in sometimes explosive growth at the local level (see "Lodging, Rest. & Recreation" column in Table 3-156), with the result that certain of the communities of the region are now highly diversified in recreation and tourism-related economic activities.

Figure 3-43 shows Lodging, Restaurant, and Recreation employment for each of the ADOL community groups. As in the case of wood products industry employment, the highest concentrations of recreation and tourism-related employment are in those community groups with small, specialized operations — such as Cleveland Peninsula and Southeast POW, where concentrations are 100 percent and 97 percent respectively. Other community groups with larger total employment levels, such as Gustavus and Skagway, also display relatively high concentrations of employment in the recreation and tourism sectors. To the degree that recreation and tourism-related employment in these localities relies on specific natural locations within the Tongass National Forest, their economic well-being may be affected by forest planning decisions.

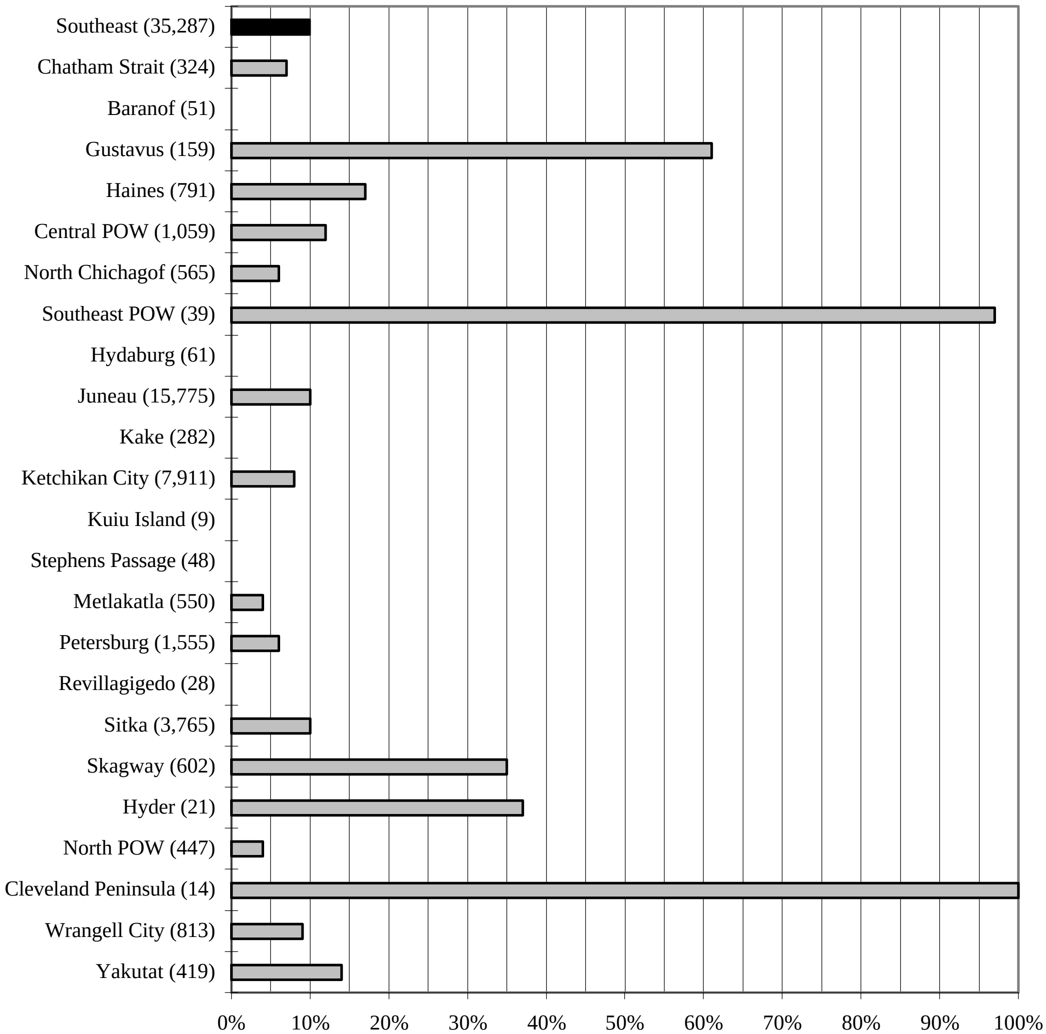
On the whole, impacts to the recreation and tourism industry can be expected to be far more diffuse than those for wood products. The recreation and tourism industry is characterized by smaller firms, thus the closure of a single firm represents a much smaller proportion of the total local employment than would a sawmill or logging outfit. Additionally, recreation and tourism-related employment is more evenly distributed amongst the communities of Southeast Alaska, with all the larger ADOL community groups showing an employment concentration of more than five percent in the lodging, restaurant, and recreation services sectors. Consequently, any policy decision which decreases the overall attractiveness of the region to outside visitors will most likely be felt to varying degrees throughout the region. This is not to say that certain discrete and relatively severe impacts are not possible.

The decision of a cruise ship company to dock or not dock in a community can have a profound effect on the local economy. More importantly, perhaps, is the fact that local environmental amenities may be an important factor in the decision to move to a certain community by retirees, telecommuters, or other individuals whose incomes are not tied to local firms. In the long-term, these local amenities may be a very important factor in the ability of communities to thrive in a changing economy, and the influence of forest management on these amenities should not be underestimated.

Commercial Fishing Industry

Commercial fishing is another extremely important component of Southeast Alaska's economy, but there are no reliable statistics on employment numbers at the borough or community level available. The ADOL nonagricultural wage and salary statistics used in this portion of the document do measure employees of seafood processing firms, and these numbers are reported in Table 3-156. Relatively large concentrations of seafood processing employment are encountered in Haines, Hoonah, Petersburg, Wrangell and Yakutat. While no large impact to commercial fishing activity in the next ten years is expected under any of the planning alternatives (see regional impacts section), these communities and those with concentrations of fishing activity such as Petersburg or Pelican (in the North Chichagof ADOL community group) have a legitimate interest in the outcome in the planning process. Longer-term impacts on the fishing industry may well be greater than the ten-year projections, and the relative lack of knowledge and certainty in these projections entails a certain degree of risk.

Figure 3-43
Percent Share of Lodging, Restaurant & Recreation Services 1995 Employment by Community Group.



Source: Alaska Dept. of Labor.
The total number of jobs within each community group is given in parentheses.
Self-employed people are not included in this data-set.

Glossary

Communities

Introduction

"Community" is a concept with multiple dimensions and definitions. The basic ways that community has been defined include: 1) a geographic/political entity, such as a town or village; 2) a network of people with shared values, world views, or identities (sometimes called a community of meaning) such as an ethnic group (e.g., Native Alaskans) or occupational groups (e.g., loggers); 3) a working social system; 4) a rural social landscape, which would include the first three definitions in a rural setting; 5) a community of interest, or people with a common stake, profession, interest, activity, or set of values, who may live far apart (e.g., anglers, environmentalists, off-road-vehicle operators).

This section uses the geographic/political community—towns and villages—as its basis for several reasons. There are relatively few communities in Southeast Alaska, they are typically isolated geographically, most are recognized as being unique, and data are more commonly available at this level (although some local economic data is compiled by the State for groups of communities).

The FEIS identifies 32 Southeast Alaska communities with a state land selection base that are discussed in greater detail. Information is provided to gain an understanding of the 32 communities and how they are likely to be affected by the alternatives. Each of the communities will be discussed individually below, but it is useful to start with an overview of the whole set. Table 3-158, a display of several statistics by community, indicates these communities are diverse in population and other socioeconomic characteristics. There is also a good deal of variation within many of the communities, as reflected by the range of public comments received during the revision process (and summarized under each community).

Logging camps are communities, and contribute to the social fabric of Southeast Alaska. By their nature, they tend to be mobile, lack a dedicated land base, and are not defined as towns (although many communities, such as Thorne Bay, Hollis, Naukati Bay, Coffman Cove, Whale Pass, and Edna Bay began as logging camps). As a result, little quantitative state or local data are available on logging camps, and they are not included in the community assessments. However, logging camp jobs are included in the regional economic analyses. Following the Community Assessments, there is a list and description of 12 logging camps that are currently operating or that have recently closed.

Community Assessments

The following community assessments section contains brief descriptions of 32 communities in Southeast Alaska, including aspects of their histories, population trends, economic bases, and the subsistence resources used by each community. Much of the community information is taken from the Alaska Department of Community and Regional Affairs "Community Profiles" (1996) and 1990 United States Census data for Alaska. All statistics are estimated and are presented to provide a general overview of the communities. To get a sense of where these communities are and the distances between neighboring communities -- the forest-wide maps (included in the map packet) have identified the location of all 32 communities.

Table 3-158
Southeast Alaska Community Statistics

Community	1995 Pop	1990 Pop	1990 % Native	1990 Median Household Income	1990 % of Households Below Poverty Line	1987 Median Subsistence Use[1]
Angoon	601	636	82%	$32,083	22%	242
Coffman Cove	254	156	7%	$44,063	5%	186
Craig	1,948	1,260	23%	$47,250	4%	185
Edna Bay	79	86	0%	$12,250	64%	517
Elfin Cove	48	57	2%	$43,125	7%	264
Gustavus	328	258	4%	$41,538	4%	257
Haines Borough	1,394	1,238	13%	$36,048	9%	104
Hollis	106	111	3%	$31,250	15%	164
Hoonah	902	795	67%	$36,442	4%	404
Hydaburg	406	384	89%	$20,139	26%	337
Hyder	138	99	1%	$23,750	14%	401
Juneau City and Borough	29,755	26,751	13%	$47,924	6%	N/A
Kake	696	700	73%	$35,875	7%	159
Kasaan	41	54	54%	$46,667	0%	186
Ketchikan Gateway Borough	8,957	8,263	14%	$45,172	4%	N/A
Klawock	759	722	54%	$39,583	8%	830[2]
Metlakatla	1,603	1,407	84%	$37,143	10%	71
Meyers Chuck	35	37	11%	$16,250	33%	414
Naukati Bay	147	96	1%	$43,333	5%	NA
Pelican	208	222	29%	$27,083	14%	355
Petersburg	3,350	3,207	10%	$49,318	4%	200
Point Baker	62	39	0%	$12,083	N/A	344
Port Alexander	110	119	3%	$20,625	18%	306
Port Protection	64	62	2%	$10,000	46%	311
Saxman	402	369	77%	$30,481	6%	89
Sitka	9,194	8,588	21%	$43,337	5%	146
Skagway	811	692	6%	$37,500	4%	52
Tenakee Springs	111	94	10%	$18,125	11%	250
Thorne Bay	650	581	1%	$39,688	5%	97
Whale Pass	92	75	3%	$49,583	14%	186
Wrangell	2,758	2,479	20%	$37,538	6%	164
Yakutat	601	534	55%	$36,875	11%	398

Source: AK Dept. of Labor. U.S. Census, 1990. ADF&G TRUCS, 1988.
1 This is the 1987 per capita household subsistence harvest of edible pounds as reported by the ADF&G.
2 This figure represents Klawock's mean household subsistence harvest in edible pounds, per capita harvest information was unavailable.

Each community description includes a summary of the public comments and testimony from community residents received by the Forest Service during the TLMP revision periods. The comments on the 1990 DEIS, the 1991 SDEIS, and the most recent comments on the 1996 Revised Supplement have been combined into a single summary, with changes between the past comment and the most recent comment highlighted for comparison. This allows community residents to see how attitudes and opinions may have changed since the beginning of the TLMP revision process.

Maps depicting the approximate extent of each community's day-to-day use area, or community use area (CUA), are also presented. Southeast Alaska residents value their "community back yards" for a variety of reasons and often, develop deep attachments to places they use and visit regularly. In addition to the CUA maps, tables containing summary information about how the revision alternatives vary within these CUA's are displayed. The CUA maps and tables are intended to help community residents (and other readers) gain a better understanding of what management direction is proposed for their immediate surrounding under each alternative. The information in the tables is based on information already presented in the TLMP revision alternatives, and only provides a localized accounting of how LUD designations vary within each CUA under each alternative. The variations in how much National Forest System land is allocated to each of the LUD groups under each alternative show what land use opportunities would be available during the next 10-15 years within each CUA.

In looking at the tabular information, the reader can compare how each alternative would make the LUD group-related use opportunities available. The variations in how many suitable acres are programmed for timber management under each alternative provide additional information to show how much of the local forest environment (that is allocated to LUD's in the Moderate and Intense Development LUD groups) could potentially be harvested over rotation-length time frames. The sub-category for suitable land shows how much of the CUA's forest land remains available for possible future harvesting. Whether any timber harvesting will actually take place on the suitable lands within the CUA during the life of the selected plan will depend on whether any timber sales are actually carried out during plan implementation.

A detailed description of how the CUA's were mapped and how to understand the tabular information is contained in the Planning Record (Community Use Areas, 1996).

Analyzing Impacts to Communities

Small, rural communities often make more sense as social units because they are seldom self-contained economic units. Although it is possible to describe a community's economic structure, complex social and economic forces have great influence on community economics—many of which are outside the control of community residents. This makes it difficult to precisely predict the effects of forest-wide management alternatives on individual communities. Forest Service activities provide economic opportunities to the private sector; how that sector and various industries respond depends on many variables in addition to Forest Service management.

Forest plans are programmatic, meaning that they establish direction and allowable activities for broad land areas, rather than schedule specific activities on specific patches of land. This also makes it difficult to predict effects on individual communities. This is a common source of frustration to local residents, who want to know exactly how they and the places they care about will be affected. While many outputs of forest management, such as scheduled timber harvest, generally translate into social and economic activity, such as employment in the timber industry, it can still be difficult to predict which communities will benefit the most from that activity. Communities may even compete with each other in many instances. However, communities that rely on a given resource-related industry would be expected to be the first to benefit or lose from significant changes in planned output levels affecting that industry.

Another factor questioning the accuracy of predicting specific impacts at the community scale is that people and businesses have proven themselves highly adaptable. Researchers have used the term community resiliency (Harris et al., 1996) or community capacity (FEMAT, 1993) to describe a community's ability to weather significant changes. Some of the factors judged important for small, rural communities in the Pacific Northwest included community infrastructure, the presence of amenities, social cohesion and effective community leadership, and economic diversity. Some communities will be more effective than others in coping with changes that do result. While information such as population size can be used as a rough proxy for resiliency (generally, larger communities tend to be more resilient than smaller ones), this is not always the case. However, analyses have not been conducted regarding the resiliency of Southeast Alaska communities, and we do not know how well information gained elsewhere applies to understanding Southeast communities.

Given these considerations, it is more accurate to identify areas of concern for which the risks of effects from a given alternative are higher or lower, rather than say, “Here is what we know will happen to each and every community.” To do so would be very presumptuous, as though people are incapable of responding to change. One of the hazards associated with such attempts to assess impacts is that analyses tend to view social and economic conditions as static, failing to consider that economies are dynamic, or that reduced supply in one sector can increase demand in another.

This is supported by studying communities that have already been affected by significant economic change—which questions the ability to predict longer-term effects of forest management activities (often coupled with other economic factors) on specific communities. For example, a sawmill in Haines—which employed 135 people—closed in May, 1991. Following mill closure, sales receipts dropped off, population and school enrollment decreased. However, in subsequent years school enrollment increased (although not quite to pre-mill closure levels), and population levels remained fairly steady, as have housing prices. Haines has many characteristics that contributed to its ability to survive.

Another example is Sitka, which lost its largest employer when the APC pulp mill closed in September, 1993. Many individuals and families suffered greatly during this period, and for some this continues today. This was not just a major loss in employment, but in income; the mill jobs lost paid, on average, 84 percent more than other jobs in Sitka (Trends, March 1994; these figures do not include self-employed incomes such as most fish harvesting and some tourism-related services). Employment in construction, wholesale trade, and transportation industries declined as well when the mill closed. School enrollment showed a decrease in the two subsequent years, as did population, but population has now increased beyond the 1993 level. Housing prices have continued to increase and rental prices, although fluctuating, have not dropped; vacancy rates remain slightly higher than in 1993. The Kendall Foundation report (described in the Regional section of this chapter) noted that, “The city of Sitka has survived the closing of the Alaska Pulp Corporation mill and community indicators, on balance, seem positive...Sitka benefits from having several year-round institutional payrolls.” The pulp mill closure could be described as a down period in an otherwise growing economy.

Another case study is provided by Wrangell, where the APC sawmill, which employed 225 people and accounted for 23 percent of the wage and salary jobs and 30 percent of Wrangell’s payroll wages (Trends, August 1994), closed at the end of 1994. The impact of losing its largest employer spiraled through Wrangell, which showed declines in wholesale trade, transportation, financial/insurance/real estate, and service sectors. City sales tax revenues fell 12 percent from the first quarter of 1994 to the first quarter of 1995, compared to previous annual increases of about four percent (Trends, August 1995). School enrollment decreased and rental vacancy rates have increased substantially. In addition, some types of impacts do not occur for one-two years due to transition programs, payments, unemployment insurance, and other mechanisms, so additional socioeconomic effects may well appear.

It is too soon to tell what the future holds for Wrangell, which does not have the population size or economic diversity of a community like Sitka. However, the city's Overall Economic Development Plan, published in June 1996, contains a number of economic goals—many of which were defined prior to mill closure—that would help to prevent such devastating events from happening again. They include diversifying the economy so it is not dependent on a single employer or industry, encouraging year-round and long-term employment, enhancing the quality of life for existing residents and to encourage new businesses, and strengthening the educational system.

The lessons from these examples show that short-term effects may not be the same as long-term ones, a community's resiliency and leadership can contribute to mitigating the effects of economic blows, that impacts must be viewed in the context of a dynamic economy, and that forecasts of social and economic devastation can be misleading and inaccurate. In summary, brief examination of these examples support the previously described difficulties of assessing the effects of a programmatic plan on individual communities. It is more accurate and less potentially misleading to simply describe the communities, their relationships to forest management alternatives, and the resulting areas of socioeconomic risk that decision makers need to consider.

Potential Socioeconomic and Subsistence Effects

Effects of the original RSDEIS alternatives on communities were estimated with the help of a Socioeconomic Panel and a Subsistence Workshop, each described below.

The Socioeconomic Panel was convened to help estimate effects of the nine pre-RSDEIS alternatives on each of the 32 communities. The panel was comprised of five people working in areas of regional expertise (such as the Alaska Department of Community and Regional Affairs and Alaska Department of Labor). Meeting over a two-day period in November 1995, the five panelists heard a description of each community from a person very familiar with that community, and learned about the nine alternatives. They then individually evaluated likely effects of each alternative on each community, rating the anticipated effects on nine aspects of the community: timber employment; tourism/recreation employment; mining employment (mining jobs were believed to be unaffected by any alternative, so they are omitted from the community by community discussion in the assessment section); economic structure/diversity; community stability; quality of life; recreation opportunities; and access to traditional lifestyles.

When panelists considered how a community might be affected by each alternative, they did not necessarily agree on many ratings; frequently, two members rated effects as neutral and two others rated effects as positive or negative. This likely reflects the difficulties inherent in assigning an overall effect (increase, decrease, no effect) on indicators such as quality of life, which may vary widely among community residents. It is problematic at best to assign a single rating given that effects are likely to be differentially distributed within a community. The same is true for other indicators such as recreation opportunities; some types of recreation access or opportunities may increase and others decrease under a given alternative, making it difficult to assign a single rating. As a result, panel ratings are probably best viewed as relative risks to communities, rather than as absolute projections of effects. Additional information on the panel procedures, the panelists, their ratings, and the nine community characteristics are available in the Planning Record, (Socioeconomic Panel Summary, 1996). The summaries provided in the discussion under each community focus on the primary risks associated with each alternative.

A group of subsistence specialists also met to offer professional judgment regarding the effects of implementing proposed RSDEIS alternatives on 30 selected subsistence communities in Southeast Alaska. The group was provided with verbal, written and graphical information concerning resources and management of the Tongass National Forest and the possible effects to subsistence resources. They were asked to rate the possible impacts each alternative could have on subsistence communities. The impacts that were considered included: new urban access; new rural access; fish stream crossings (road building); and old-growth harvested within a community's "home range."

A variety of maps were available to the group: (1) each of the proposed RSDEIS alternatives; (2) expected timber harvest in 100 years; (3) Forest-wide deer harvest map showing competition between communities (ADF&G data); (4) 30 Community subsistence use area maps; (5) 30 community deer harvest maps (ADF&G data); (6) recreation home range maps; and (7) current and projected roads for Ketchikan Area. Also available were the Standards and Guides from the Revised Draft Forest Plan. The summary of the group's results are included within each subsistence community's section

In addition, the revised Sitka black-tailed deer habitat capability model output was analyzed for the Wildlife Analysis Areas (WAA's) where each community obtained approximately 75 percent of their average annual deer harvest. Assumptions that were made in applying the model results include the following:

- Private land within a WAA contributes no deer habitat. This probably underestimates the habitat capability for those WAA's with private land.
- The model outputs are on a Value Comparison Unit (VCU) basis, but VCU's sometimes span two or more WAA's, so in these cases, all of the habitat capability is assigned to one WAA. This may underestimate and overestimate the capability of individual WAA's.
- The projected deer demand represents an 18 percent increase for each of the first two decades and a 15 percent increase for each of the next three decades.

Appendix H includes maps of communities' subsistence use areas and tabular output from the deer model.

Community Assessments

Angoon

Angoon, located on the west coast of Admiralty Island at the mouth of Kootznahoo Inlet, has been there so long that no precise date can be established for its original occupation. The only permanent community on Admiralty Island, Angoon has a population of about 601(Alaska Dept. of Community and Regional Affairs [ADCRA], *Community Information Summaries*, 1995).. It remains a traditional Tlingit Indian village with 82 percent of the population being Alaska Native (1990 U.S. Census).

Population: Angoon's population increased 37 percent between the 1970 and 1990 census. Over the last five years, the population has shown some fluctuation, declining below the 1990 level.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	400	465	638	666	634	635	609	601

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Industry first developed with establishment of a whaling station on nearby Killisnoo Island. The whaling, a BIA school, and the Russian Orthodox Church attracted many Tlingits to Killisnoo. Killisnoo was destroyed by a fire in 1928 causing many Tlingits to return to Angoon.

In 1947, the Angoon Community Association, a newly-formed Indian Reorganization Act council, bought the nearby Hood Bay Canning Company, and many people from Angoon moved to Hood Bay for the summer canning season. The cannery burned down in 1961 and this source of employment was lost.

The major sectors of Angoon's economy today are educational services, fisheries, construction and retail trade. Employment outside these industries is limited to local government and village corporation positions. Employment in all sectors of Angoon's economy is highly seasonal. Unemployment in Angoon is 10.6 percent, compared to 8.2 percent throughout Southeast (*Alaska Economic Trends* 4:1995). The 1990 median household income was $32,083 (1990 U.S. Census).

Subsistence Use: In 1987, the per capita household subsistence harvest in Angoon was 242 edible pounds. More than 99 percent of households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho, chinook, and sockeye salmon, halibut, herring roe on kelp, deer, dungeness crab, clams and cockles, chitons, berries, and wood (Tongass Resource Use Cooperative Survey (TRUCS), 1989).

Based on edible pounds harvested, deer at 30 percent and salmon at 29 percent are the most important subsistence resources for Angoon households. Angoon hunters travel an average of 13 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Angoon households have ever used to hunt deer. Summarizing, the majority of Angoon households hunt deer in Wildlife Analysis Areas (WAA's) 4042, 4054, and 4055. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 4055 (51 deer), 4054 (46 deer) and 4042 (41 deer) (ADF&G 1995). WAA's 4042 and 4054 are not accessible by existing roads while WAA 4055 is two percent roaded.

Community Comments

A number of Angoon residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written testimony during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Angoon residents expressed a desire to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. Unlike many communities in the Tongass that have expressed the need to reduce logging to maintain tourism and commercial fishing, the people responding from Angoon simply want to maintain its traditional and healthy food supply. They do not want additional roads and Log Transfer Facilities, nor do they want to be connected to other roads. They emphasized the importance of subsistence to the community and pointed out the detrimental changes to their traditions since Caucasians came to the area 250 years ago. They are concerned with the high unemployment rate of Angoon, and stress the need for subsistence resources in this regard.

Community Use Area

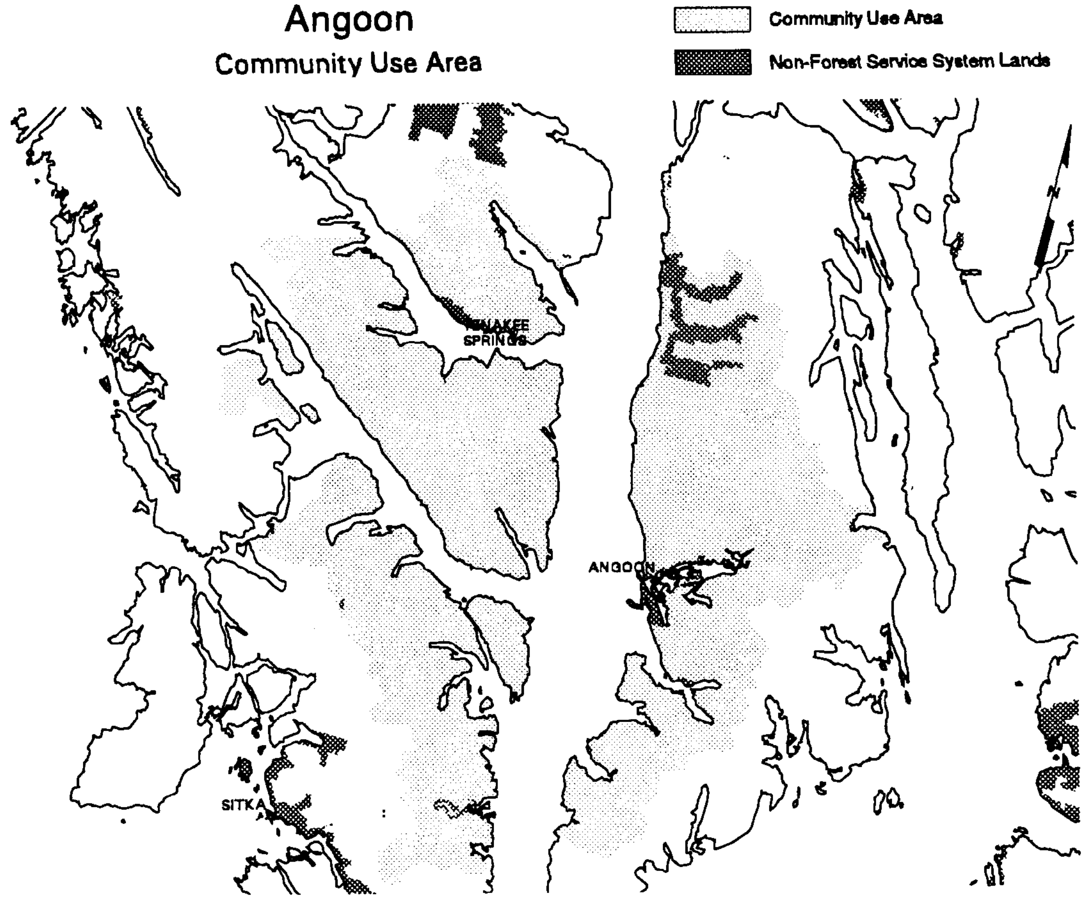
The general area commonly used or related to by many of the residents of Angoon in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 1,091,123 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Angoon's Community Use Area (CUA)

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	436,046	436,046	436,046	436,046	436,046	436,046	436,206	436,046	436,046
Mostly Natural	615,405	183,133	278,931	183,133	214,985	159,254	174,565	278,931	306,283
Moderate Development	0	74,806	47,181	74,806	67,167	0	124,115	47,181	36,629
Intense Development	39,532	397,138	328,965	397,138	372,925	495,823	356,237	328,965	312,165
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	145,849	102,534	139,516	133,216	165,628	158,646	102,534	93,697

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Angoon
Community Use Area



Potential Effects

Angoon is a traditional native community. Commercial fishing and subsistence use are the primary factors influencing Angoon.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Panel Results: The Socioeconomic Panel believed that the effects of the original nine alternatives on Angoon would generally be either neutral or slightly positive. The exceptions were Alternatives 7 and 9, which were considered to pose risks to commercial fishing jobs, community stability, quality of life, recreation opportunities, and access to traditional lifestyles. Alternative 2 was rated as having the least effect (positive or negative), while Alternatives 1,3,4,5, and 6 were viewed as having the greatest potential for positive effects on the community. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

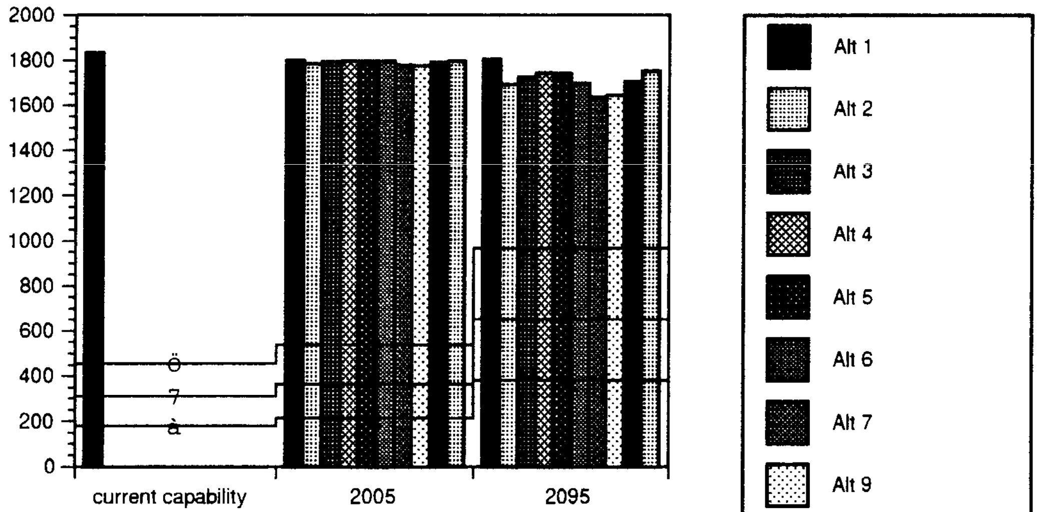
Subsistence: For subsistence use, Admiralty and Catherine Islands are especially important to Angoon. All of the National Forest System lands on Admiralty Island, except Mansfield Peninsula in Alternative 7, would be maintained in their current condition in all alternatives.

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Angoon's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Angoon residents, as well as for all deer hunted within the WAA's. Deer account for 30 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier 1988).

Subsistence use by Angoon households is unlikely to be directly affected by any of the alternatives as their most heavily used areas will be essentially unmodified under any option. Alternative 1 would provide the least effect on Angoon's subsistence resource, with Alternatives 3, 5, 6, and 10 also having less effect than Alternatives 2, 7 and 9 because of the Old-growth Habitat LUD encompassing Catherine Island. In addition Alternative 11 provides Old-growth Habitat LUDs on southeast Chichagof Island, maintaining potential subsistence use areas. Indirectly, alternatives with greater levels of development (i.e., Alternatives 2, 7 and 9) may create increased competition within Angoon's subsistence use areas if hunters from other communities are displaced due to timber harvest activity. But with the limited access around Angoon, the impacts would likely be minor.

Deer Availability and Anticipated Demand in Areas Used by Angoon Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Coffman Cove

Coffman Cove is located on northeast Prince of Wales Island. The population is 254 (ADCRA 1995), with 7 percent Alaska Natives (1990 U.S. Census). Settlement of Coffman Cove began in 1956 with development of a logging camp. A road connecting Coffman Cove to the larger community of Craig was built in the 1980s. Two scheduled airlines serve the community from Ketchikan. The Civic Club maintains a harbor, a community building and other public facilities. The post office opened in 1991 (Alaska Dept. of Fish and Game*, Subsistence Resource Use Patterns in Southeast Alaska: Summaries of 30 Communities*, 1994).

Population: The population of Coffman Cove shows little change between the 1980 and 1990 census. Since 1990, the population has been increasing, with a 26 percent change over the last six years.

Year	1980*	1990*	1991	1992	1993	1994	1995
Population	193	186	195	224	225	231	254

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: The community is economically dependent on logging, which comprised the largest employment sector during the 1980s and 1990s. Coffman Cove is one of the major log transfer sites on Prince of Wales Island. Other employment includes commercial fishing, education, oyster farming, sport fish chartering, and other private business. The 1994 unemployment rate in this census area was 12.5 percent, compared to 8.2 percent throughout Southeast (*Alaska Economic Trends* 4:1995).

An active city council has pursued plans to develop Coffman Cove as a community with a diverse economic base. The economy of Coffman Cove also included active participation in harvest and consumption of wild resources (ADF&G 1994). The 1989 median household income was $44,063 (1990 U.S. Census).

Subsistence Use: In 1987, the per capita household subsistence harvest in Coffman Cove was 186 edible pounds. More than 88 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook salmon, halibut, trout and char, deer, dungeness crab, and berries (TRUCS 1989).

Local hunters report that most Coffman Cove residents hunt in the immediate vicinity of the community and rely heavily on road access. They also say that many non-local hunters use Coffman Cove's local hunting area (Control Lake Draft EIS, p. 3-147).

Appendix H provides detailed maps regarding the areas that Coffman Cove households have ever used to hunt deer. Summarizing, the majority of Coffman Cove households hunt deer in Wildlife Analysis Areas (WAA's) 1420 and 1421. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 1420 (43 deer) and 1421 (64 deer) (ADF&G 1995). These WAA's are 74 and 58 percent accessible by existing roads.

Community Comments

A number of Coffman Cove residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written testimony during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Coffman Cove residents who commented on the issues indicated that the forest should be managed both for scenic quality and timber harvesting. The vast majority of residents commenting on the RSDEIS are in opposition to any plan that would reduce the ASQ from historical levels or add any new scenic or wilderness designations. Community opinion was split on the topic of recreation with about some wanting more emphasis placed on recreation and some being satisfied with the current management emphasis. Regarding fish, wildlife, and subsistence, Coffman Cove residents who responded indicated that current management emphasis was adequate. These individuals want the current level of timber harvest to continue and favor additional roads, transfer facilities and connecting existing roads. They do not want roads to be closed because they provide access to subsistence resources and recreation areas. Residents are split in their opinion about mineral exploration and development with some wanting more emphasis, others less, and still others wanting a mix of emphases. Those who responded indicated that a combination of timber, mining, and other commodity industries with tourism, recreation and fishing would be the most desirable use of Forest resources. Many people expressed the feeling that their government was giving greater priority to fish and wildlife than to its people, fearing for their jobs and the jobs of others supposed by the timber industry.

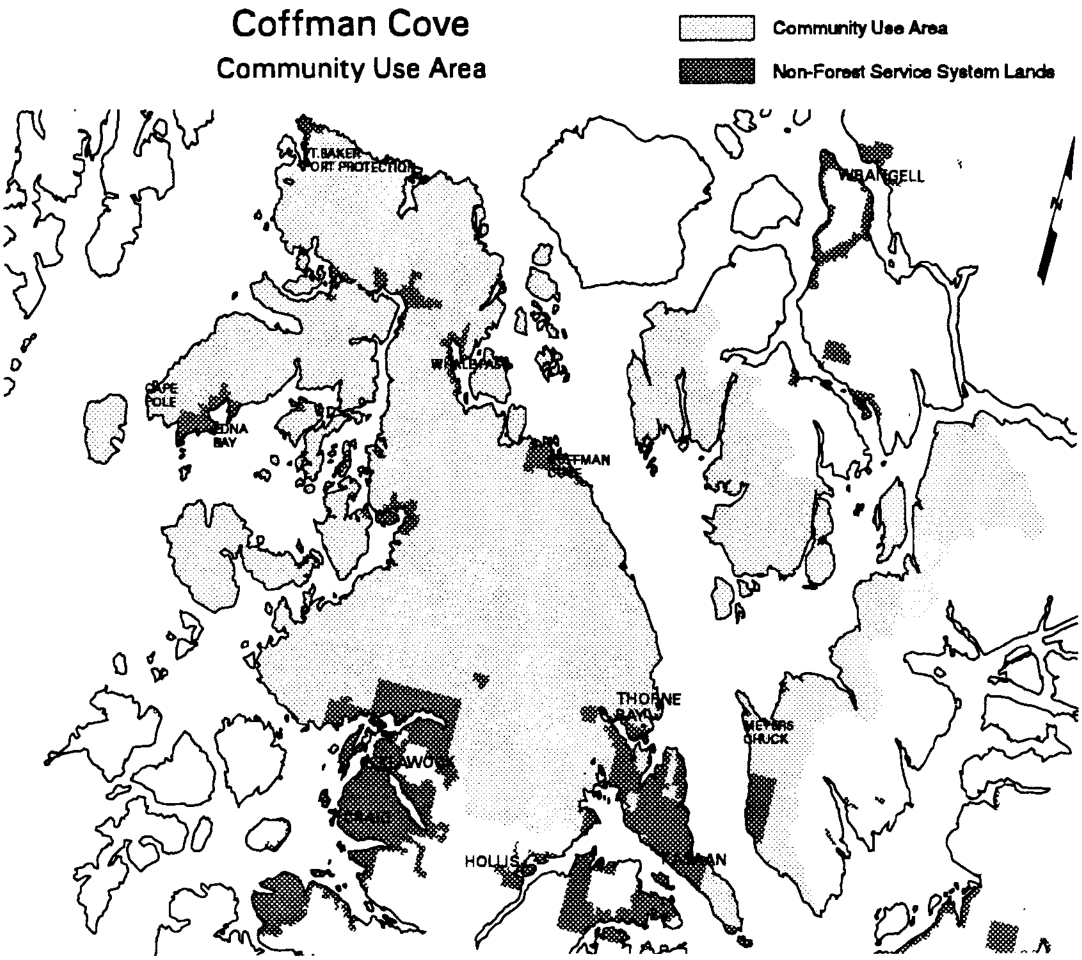
Community Use Area

The general area commonly used or related to by many of the residents of Coffman Cove in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 1,228,835 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Coffman Cove's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	121,620	121,620	121,620	121,620	121,620	121,620	121,620	121,620	121,620
Mostly Natural	1,048,504	196,740	388,686	196,740	365,152	118,754	149,142	388,686	486,198
Moderate Development	0	346,521	238,985	346,521	249,872	0	260,118	238,985	214,472
Intense Development	58,751	563,954	479,544	563,954	492,191	988,501	697,995	479,544	406,705
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	330,586	248,730	320,628	265,929	375,183	368,928	248,730	223,482

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Because Coffman Cove is primarily a logging community it will be directly affected by the amount of logging opportunities on northern Prince of Wales Island.

Alternatives 1, 4, 5 and 6 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities would be available, it would amount to less than 2 MMBF in any alternative, and would most likely be purchased by very small operators for products such as music wood or cedar shakes. Alternative 3, 6, 10 and 11 continue some logging opportunities on the north end of the island, but at a lower quantity compared to the current levels of timber harvesting. The result of the lack of logging opportunities would result in disruption of the community stability. Residents who want to stay associated with the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. If these individuals choose to relocate, the loss of their income would likely affect others in the community.

Alternatives 2, 7, and 9 would continue logging opportunities on the north end of the island. This would allow those individuals associated with the logging industry to maintain their existing lifestyle within the community.

The community could also be affected by the Old-growth Habitat LUD located just south of Ratz Harbor in Alternatives 1, 3, 5, 6, 10 and 11. This LUD could prevent both continued timber harvesting and the possible low elevation road connection to Thorne Bay. This road connection would provide the community with access to the ferry terminal during the winter when other roads are closed due to snowfall. Alternative 11 specifically moves an Old-growth Habitat LUD away from the road. This road would likely be completed under Alternatives 2, 4, 7, 9 and 11.

Panel Results: The Socioeconomic Panel predicted that the alternatives would have mixed effects on Coffman Cove. Alternatives 2, 3, 4, 5 and 6 were rated to have generally positive or neural effects on quality of life, community stability, and economic diversity, despite estimated decreases in timber jobs under Alternatives 3, 4, 5 and 6. Alternative 1 was viewed as posing the greatest risk of all four of these characteristics. Panelists rated Alternative 9 as having a positive effect on timber jobs and community stability, yet predicted decreases in economic diversity and quality of life. Alternative 7 was rated similarly, except for predicted decrease in community stability; panelists did not agree on whether economic diversity and recreation opportunities would increase or decrease. Alternatives 10 and 11 were not rated by the panel, but the effects of alternatives would be similar to Alternative 3 except that Alternative 10 would offer slightly higher opportunities for timber-related employment.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 65 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier 1988).

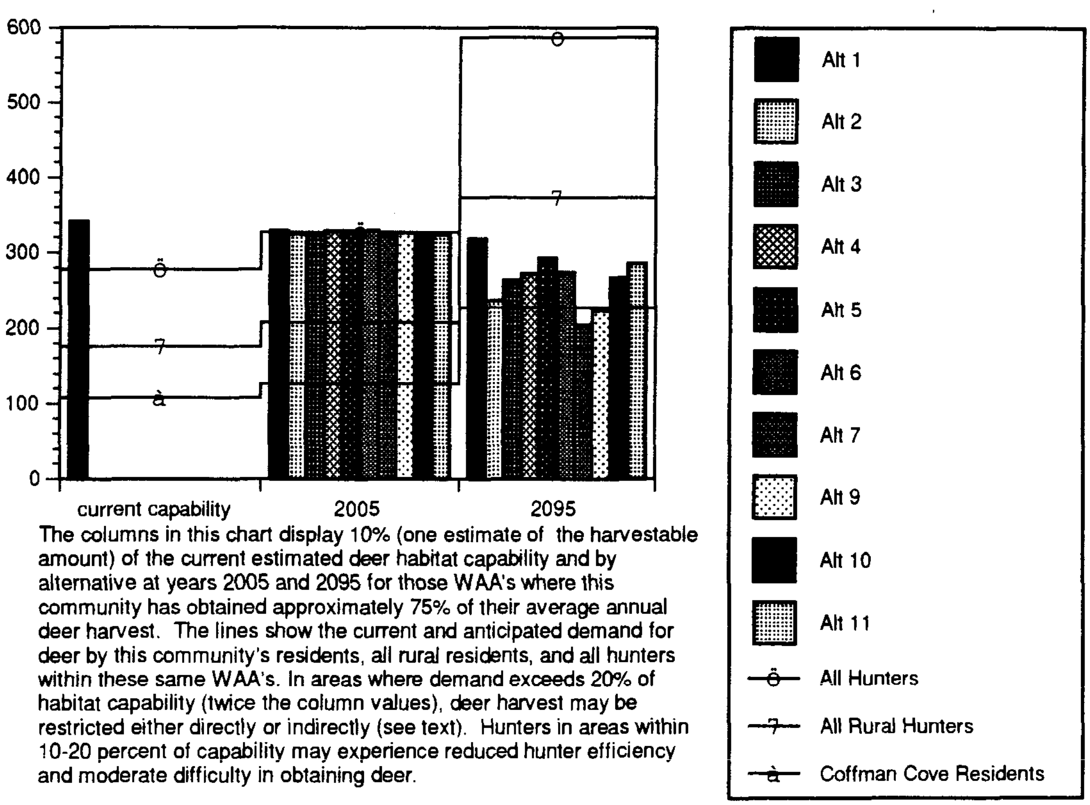
The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Coffman Cove's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Coffman Cove residents. However, projected deer harvest for all hunters in Alternatives 2, 7 and 11 exceeds 10 percent of habitat capability in the short term. In the long term, projected deer harvest for all rural hunters and all hunters exceeds 10 percent of capability. At some point, a restriction in hunting may be necessary. Deer account for 32 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier 1988).

WAA 1420 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5, and 6. Alternatives 1, 3, 4, 5, 6, 10 and 11 are likely to have the least direct effect on Coffman Cove's subsistence resources due to the land allocations of the area surrounding the community. Alternatives 1, 3, 6, and 8 have no harvest or Old-growth Habitat LUD's within much of Coffman Cove's subsistence use areas. Alternatives 4 and 5 have longer rotations to provide a higher level of older forest within their subsistence use areas over time.

Alternatives 3, 6, 10 and 11 may indirectly impact Coffman Cove by displacing hunters from other communities with harvest activities outside of the Old-growth Habitat LUD's. These Old-growth Habitat LUD's may also decrease Coffman Cove's opportunity for additional road access associated with timber harvest activity.

Alternatives 2, 7 and 9 would likely directly impact Coffman Cove's subsistence resources with a continuation, or possible increase in harvest activity. Although deer habitat may be decreased, additional roads would likely increase access to more areas for Coffman Cove hunters. At the same time, these roads may also bring in greater competition from residents of other communities taking advantage of the increased access.

Deer Availability and Anticipated Demand in Areas Used by Coffman Cove Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Craig

Craig is situated on a small island connected to the west coast of Prince of Wales Island by a causeway, approximately 56 air miles northwest of Ketchikan. It is connected by road 6 miles from Klawock and 23 miles from Hydaburg. A floatplane dock and heliport are maintained in Craig, and the State ferry serves Hollis 30 miles away enabling transportation of passengers, cargo and vehicles. Craig's population is 1,946 (ADCRA 1995), with almost 23 percent Alaska Native (1990 U.S. Census).

Tlingit fish camps and seasonal villages originally occupied the present location of Craig (ADF&G 1994). It was named for its contemporary founder, Craig Miller, who in 1907, with the help of local Haidas, established a saltery at Fish Egg Island.

The U.S. Forest established a permanent ranger station there around 1919. The City of Craig was incorporated in 1922 as a second-class city under the laws of the territory of Alaska and became a first-class city in 1973. Shaan-Seet Inc. (the village corporation established under the Alaska Native Claims Settlement Act of 1971) received an interim conveyance of 20,852 acres in 1979 (ADF&G 1994).

Population: The population of Craig more than tripled between the 1970 and 1990 census, and increased by another 55 percent from 1990 - 1995. This trend has earned Craig the title of fastest growing community in Alaska, (Trends, Feb, 1996).

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	272	527	1,260	1,425	1,396	1,688	1,832	1,946

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Craig grew in the early twentieth century with in-migration of Tlingit and Haida families from small regional villages to participate in expanding commercial fishing. Between the early 1900s and 1973, when a timber mill opened, Craig was dependent on commercial fishing through saltery, canning and fish processing operations. After the mill opened, Craig's population more than doubled to 1,182 by 1988 (ADF&G 1994).

The major sectors of Craig's economy are retail trade, fishing, and timber products. Employment is seasonal in fishing and timber. The 1989 median household income was $47,250 (1990 U.S. Census). Unemployment in this census area in 1994 was 12.5 percent, compared to a Southeast rate of 8.2 percent (*Alaska Economic Trends* 4: 1995).

As the most populated town in the Prince of Wales Island Outer Ketchikan Census Area, Craig serves as the primary retail trade center on the Island, and has a high proportion of federal, state, and local government jobs. Although it is the social and economic center of Prince of Wales Island, it appears to have limited attraction for outside recreational tourists making prolonged visits. Craig's economic welfare, therefore, depends primarily on the stability of the direct employment, income, and subsistence that timber harvesting, fishing, and hunting offers (Control Lake DEIS, p. 3-137).

Subsistence Use: In 1987, the per capita subsistence harvest in Craig was 185 edible pounds. More than 91 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho salmon, halibut, rockfish, trout and char, deer, dungeness crab, and wood (TRUCS 1989).

Based on edible pounds harvested, invertebrates at 26 percent and deer, salmon, and finfish other than salmon at 22 percent each are the most important subsistence resources for Craig households. Craig hunters travel an average of 25 miles to their most reliable deer hunting areas (Kruse and Frazier 1988). Craig residents report using both boats and road vehicles for access to deer hunting areas. There is some indication that boat-based hunters are willing to hike farther than road-based hunters. Overall, Craig hunters report using road corridors most heavily (Control Lake DEIS, p. 3-149).

Appendix H provides detailed maps regarding the areas that Craig households have ever used to hunt deer. Summarizing, the majority of Craig households hunt deer in Wildlife Analysis Areas (WAA's) 1318, and 1422. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 1318 (143 deer), 1422 (82 deer), and 1319 (55 deer) (ADF&G 1995). These WAA's are 18, 47, and 66 percent accessible by existing roads.

Community Comments

A number of Craig residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Craig residents who responded to the issues want to be able to harvest timber along the Alaska Marine Highway routes, roads, and streams and around their community. However, they also requested that additional emphasis be placed on recreation, fish, and Old-growth Habitat near their community. While the majority of respondents on the RSDEIS supported an increase in the ASQ, there were some in the community who did not favor such an increase. Opinions were divided on the emphasis to be placed on subsistence; some wanted more, some wanted less. They generally favor the current emphasis on mineral exploration and development. Other residents requested that management emphasize tourism, wildlife, recreation, and subsistence sectors of the economy. Many of the comments on the RSDEIS conveyed that Craig residents feel their welfare has been removed from or reduced in the ecosystem equation; they feel that animals have been given higher priority than their families.

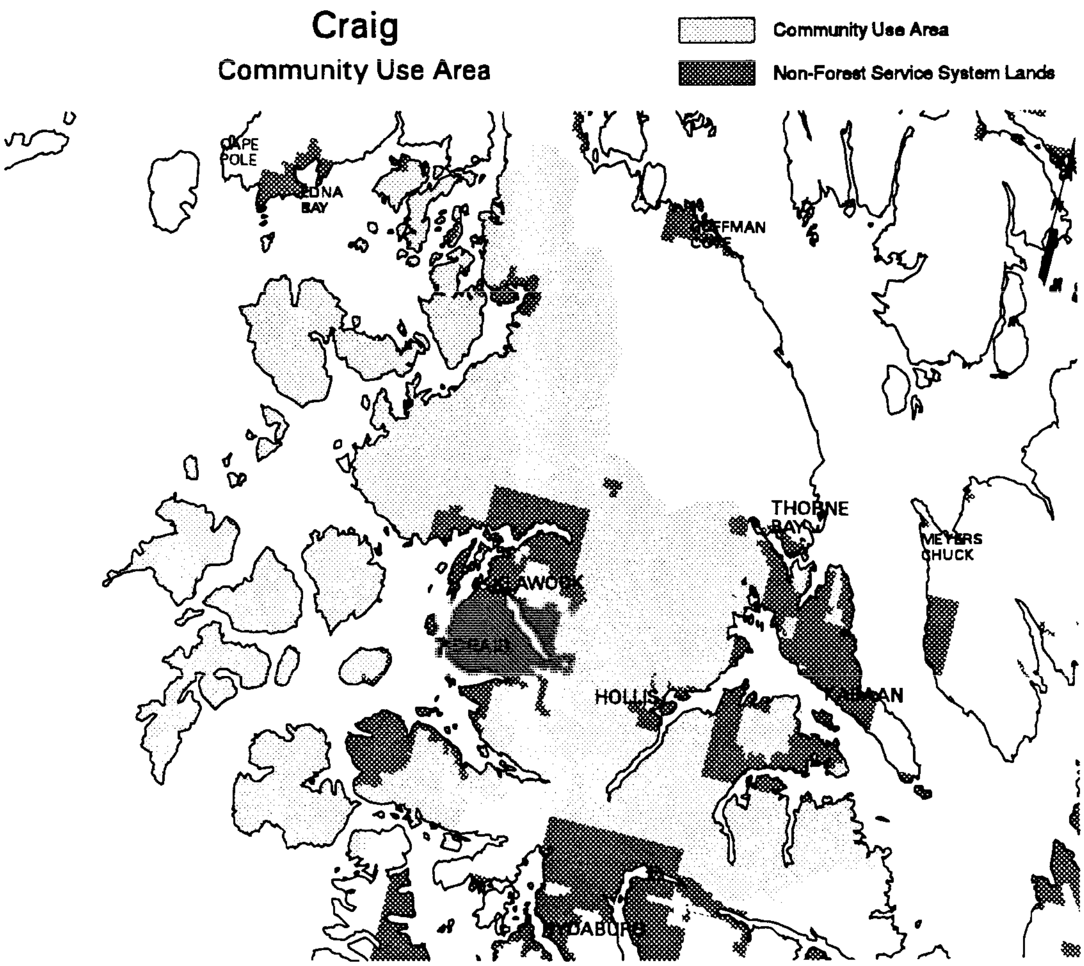
Community Use Area

The general area commonly used or related to by many of the residents of Craig in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 793,580 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Craig's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	43,462	43,462	43,462	43,462	43,462	43,462	43,462	43,462	43,462
Mostly Natural	700,598	167,138	254,573	167,138	230,748	87,439	107,961	254,573	306,897
Moderate Development	10,653	97,734	73,810	97,734	86,163	10,753	12,577	73,810	81,638
Intense Development	38,947	485,246	421,735	485,246	433,206	651,986	629,679	421,735	360,202
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	207,353	168,305	203,488	184,377	239,307	234,993	168,305	152,933

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Craig is primarily a commercial fishing and retail trade community. It is most likely to be affected by changes in commercial fishing, retail services, small timber operators, and overall timber employment. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Retail trade and services have become increasingly important to the economy of Craig. Recreation use is projected to increase roughly to the same degree in all alternatives benefiting retail trade in Craig. However, since Alternatives 1, 4 and 5 essentially halt timber harvest on north Prince of Wales Island, the resulting declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is lower.

Several small timber operators produce value added products in Craig. These value added products include music wood, cabinets and other products. They need relatively low volumes of timber, but of specific species and grades to meet their needs. All alternatives except Alternative 1 would meet their needs.

Lumber employment is another key element for the community of Craig. The Viking Lumber sawmill is located in nearby Klawock. There would likely not be sufficient volume to keep this mill open in Alternatives 1, 4 or 5. This could result in the loss of jobs in Craig. In addition, Alternatives 1, 4, and 5 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities would be available, it amounts to less than 2 MMBF in any alternative and would most likely be purchased by very small operators for products such as music wood or cedar shakes. Residents in the community who wish to remain associated with the logging industry would have to relocate or travel to remote logging camps during the week for employment.

Panel Results: The Socioeconomic Panel was divided on the alternatives' effects on Craig; they did not agree on whether the effects of Alternatives 3, 4, 5, and 9 would promote increases or decreases in community stability, or on the effects of Alternatives 3, 4, and 5 regarding quality of life. Panelists predicted opposite effects more times when rating Craig than for any other community. Only Alternatives 7 and 9 were viewed as increasing timber jobs; Alternative 7 was rated as posing possible risks to economic structure, community stability, quality of life, recreation opportunities, and access to traditional lifestyles, while Alternative 9 was rated as posing fewer risks to economic diversity, community stability, and quality of life. The panel rated Alternative 1 as posing the greatest threats to community stability and quality of life. Alternatives 6 was viewed as having the greatest potential for positive effects (except for the estimated decrease in timber jobs). Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3 except that Alternative 10 would offer slightly higher opportunities for timber-related employment.

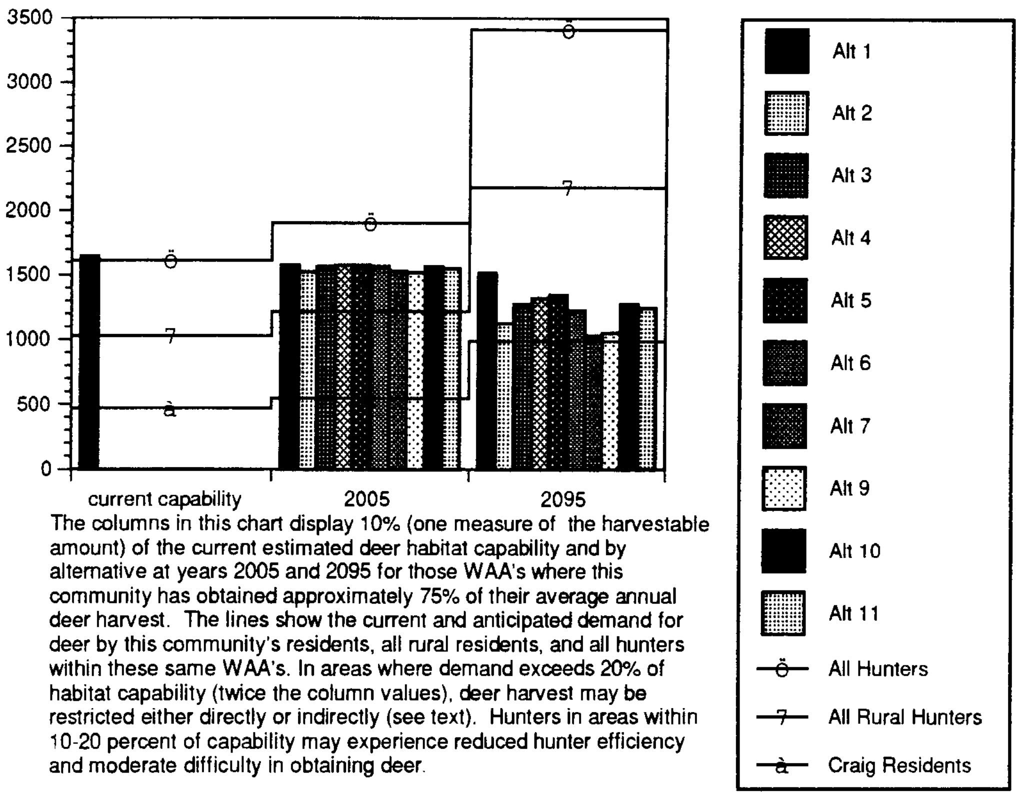
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 70 percent of the total edible pounds of subsistence resources harvest by Craig households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Craig's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Craig residents. However, projected deer harvest for all hunters exceeds 10 percent of habitat capability in the short term, and harvest for all rural hunters and all hunters exceed 10 percent in the long term and all alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in hunting may be necessary. Deer account for 22 percent of the total edible pounds of subsistence resources harvested by Craig households (Kruse and Frazier 1988).

WAA's 1318, 1422, and 1319 will have deer winter range conserved in Alternatives 1, 3, 4, 5, and 6. With little timber harvest activity, Alternative 1 would have the least effect on Craig's subsistence uses. Alternatives 2 - 9 could have a direct effect on Craig's subsistence resources with much of Craig's subsistence use areas within development LUD's. Application of these LUD's could result in continued and possibly increased harvest activity. Alternatives 3, 6, 10 and 11 would result in some habitat not being available for timber harvest (in the Old-growth Habitat LUD), but these cover a small portion of Craig's use area. Alternatives 4 and 5 incorporate longer rotations which would result in greater quantities of older forest within the development LUD's.

Alternatives 3, 6, 10 and 11 may indirectly impact Craig by displacing hunters from other communities with harvest activities outside of the Old-growth Habitat LUD's. Alternatives 2, 7, and 9 would likely increase access opportunities for Craig hunters to other areas. At the same time, these roads may also bring in greater competition from other communities taking advantage of the increased access.

Deer Availability and Anticipated Demand in Areas Used by Craig Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Edna Bay

Edna Bay is located on southeast Kosciusko Island, west of Prince of Wales Island, and north of Sea Otter Sound. Its population is 79 (ADCRA 1995), with no Alaska Native population (1990 U.S. Census).

Originally, Tlingit Indians from West Prince of Wales Island used Edna Bay on a seasonal basis. In 1943, a logging camp was established when the demand for aircraft-quality spruce was high. The camp closed in the late 1960s and the buildings were burned and the site cleaned. In 1977, the State selected part of the Tongass National Forest at Edna Bay, with the U.S. Forest Service reserving two administrative sites. In 1982, the State sold several lots around Edna Bay to private landowners. A small community developed as families, mainly those involved in commercial fishing, moved to Edna Bay. A school was constructed and a road connecting dispersed segments of the community was recently completed (ADF&G 1994).

Edna Bay remains an unincorporated city. Edna Bay has a local Fish and Game Advisory Committee. The community has shown a strong commitment to protecting local commercial fishing and subsistence resources (ADF&G 1994). Edna Bay is accessible by water or by float plane from Ketchikan. Most households own skiffs for transportation around the bay and to other near shore areas not accessible by road (ADF&G 1994).

Population: Edna Bay's population fluctuated a great deal between the 1970 and 1990 census. Over the last five years, the population has been fairly steady with smaller fluctuations in numbers.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	112	6	86	95	84	81	78	79

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Edna Bay has been characterized by a seasonal economy with its peak in the summer/fall fishing season. The majority of the Edna Bay fishers are hand trollers. Besides commercial fishing, other employment is provided by the school, local air carriers, and the local store, which sells groceries and fuel (ADF&G 1994).

Sectors of Edna Bay's economy include fisheries, education services, construction, other small business and repair services. Employment in all these sectors is highly seasonal; 1994 unemployment in this census area was 12.5 percent, compared to a Southeast rate of 8.2 percent (*Alaska Economic Trends* 4:1995). The 1989 median household income was $12,250 (1990 U.S. Census).

Subsistence Use: In 1987, the per capita subsistence harvest in Edna Bay was 517 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook, coho, and pink salmon, cod, halibut, rockfish, trout and char, deer, abalone, dungeness crab, sea cucumber, scallops, migratory birds, wood, berries, and plants/mushrooms (TRUCS 1989).

Based on edible pounds harvested, finfish other than salmon at 26 percent and deer and salmon at 21 and 20 percent, respectively, are the most important subsistence resources for Edna Bay households. Edna Bay hunters travel an average of eight miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Edna Bay households have ever used to hunt deer. Summarizing, the majority of Edna Bay households hunt deer in Wildlife Analysis Areas (WAA's) 1525 and 1526. As displayed on the

Glossary

Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1525 (22 deer) and 1526 (8 deer) (ADF&G 1994). These WAA's are 81 and 11 percent accessible by existing roads.

Community Comments

A number of Edna Bay residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Edna Bay residents who responded to the issues requested that additional emphasis be placed on scenic resources, fish, Old-growth Habitat around their community, and subsistence. Community opinion was split on recreation with some wanting more emphasis and some satisfied with the current recreation emphasis. Similarly, some of the residents were satisfied with the current emphasis on timber harvesting while some wanted less emphasis. Some respondents do not want additional roads, Log Transfer Facilities, or connections to other existing roads, but others would like a road tie to the rest of Prince of Wales Island. Most are opposed to emphasizing access for mineral exploration and development; they want management to emphasize tourism, wildlife, recreation and subsistence economic sectors. Edna Bay residents commenting on the RSDEIS indicated support for bigger industries for the economic well-being of their community. They did not believe that smaller businesses should replace those businesses that support their community. Residents recommended that alternative methods be developed to explore other forms of employment.

Community Use Area

The general area commonly used or related to by many of the residents of Edna Bay in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 684,495 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

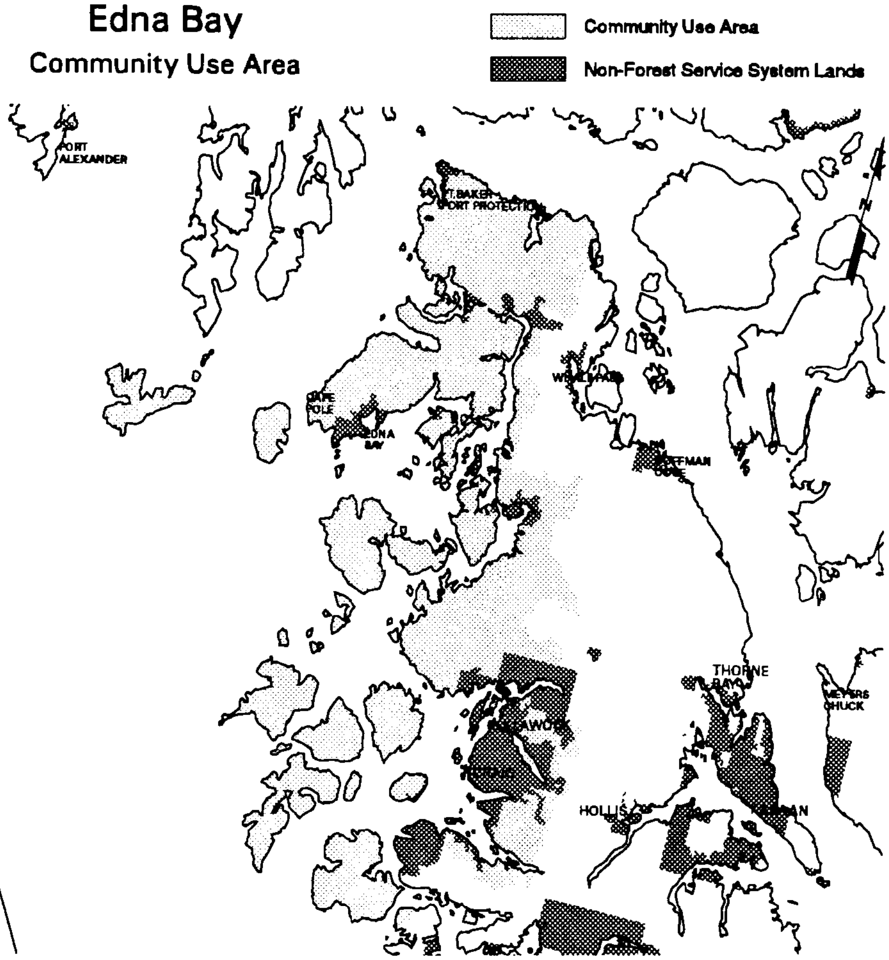
Edna Bay's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	33,597	33,597	33,597	33,597	33,597	33,597	33,597	33,597	33,597
Mostly Natural	622,249	203,208	284,560	203,208	267,690	151,360	150,441	284,560	307,962
Moderate Development	0	97,438	65,545	97,438	76,996	0	47,269	65,545	69,907
Intense Development	28,608	350,252	300,792	350,252	306,211	499,538	453,188	300,792	271,009
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	179,703	136,122	171,047	149,033	207,818	208,117	136,122	130,113

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Edna Bay
Community Use Area



Potential Effects

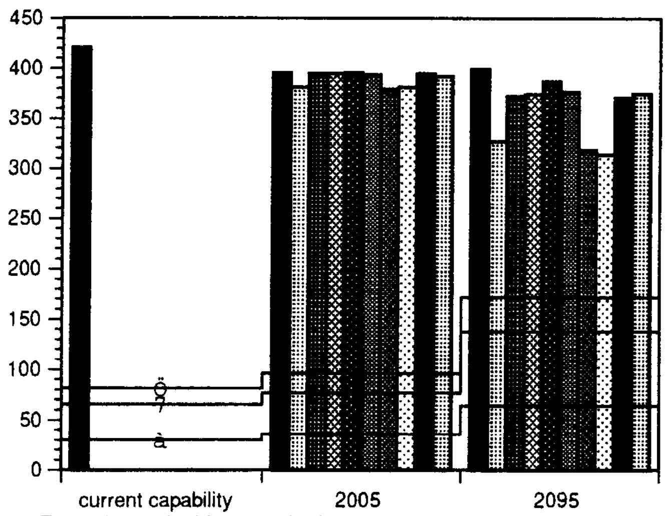
Edna Bay is primarily a commercial fishing and subsistence community. It would not likely be affected differently by any of the alternatives for two reasons. First, commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years. Secondly, Kosciusko Island, where the town is located, will not have additional timber harvest activities during the next ten years which could have an impact on subsistence use. The island will not have additional timber harvest activities due to the cumulative effects of past timber harvesting and the presence of legislated LUD II land allocations.

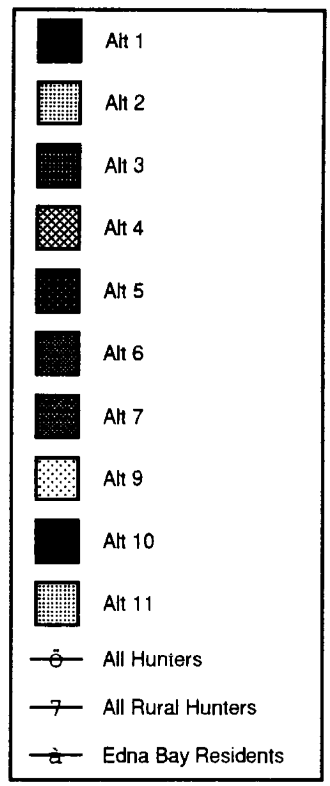
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 59 percent of the total edible pounds of subsistence resources harvested by Edna Bay households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Edna Bay's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Edna Bay residents, as well as for all deer hunted within the WAA's. Deer account for 21 percent of the total edible pounds of subsistence resources harvested by Edna Bay households (Kruse and Frazier 1988).

Competition is likely to indirectly affect Edna Bay hunters in Alternatives 2-11 since their subsistence use areas are accessible by boat and within a legislated LUD II that will not be affected by timber harvest. Displaced hunters from other communities may be willing to travel to the Edna Bay area for access to deer hunting.

Deer Availability and Anticipated Demand in Areas Used by Edna Bay Residents





The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Elfin Cove

Located on northwest Chichagof Island, Elfin Cove is a small fishing town with 48 residents (ADCRA 1995), and about two percent native (1990 U.S. Census).

Prior to its development as a community, Native Tlingit groups, now based largely in Hoonah, had for centuries used the area for hunting, fishing, and gathering, as well as safe harbor.

A fish buyer established a business there in 1927. The opening of a cold storage plant at Pelican, less than 20 miles from Elfin Cove in Lisianski Inlet, meant that fish no longer had to be hauled all the way to Juneau. Today, the cove still serves as a key stopover and supply center for fishermen and the year-round community is also made up largely of fishing households. In the 1980s, a school was completed that also functions as a community center (ADF&G 1994).

Elfin Cove is an unincorporated community. The community has a local Fish and Game Advisory Committee. Elfin Cove is accessible by float plane from Juneau (ADF&G 1994).

Population: Elfin Cove's population has been fairly steady with some minor fluctuations.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	49	28	57	57	57	65	59	48

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Elfin Cove has been characterized by a seasonal economy with its peak during the summer fishing season. The majority of Elfin Cove fishermen are hand trollers. Besides commercial fishing, other employment is provided by the school, local air carriers, communications and utilities services, and other small businesses which serve the fishing community (ADF&G 1994). Tourism has recently become more important to Elfin Cove. There are nine lodges operating out of the community, and a tenth under construction. Unemployment in this census area in 1994 was 10.6 percent, compared to a rate for all Southeast of 8.2 percent (*Alaska Economic Trends* 4:1995). The 1989 median household income was $43,125 (1990 U.S. Census).

Subsistence Use: In 1987, the per capita subsistence harvest in Elfin Cove was 264 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook and coho salmon, halibut, cod, rockfish, deer, dungeness, king and Tanner crab, clams, shrimp, wood, and berries (TRUCS 1989).

Based on edible pounds harvested, salmon at 30 percent and deer and finfish other than salmon at 27 and 23 percent, respectively, are the most important subsistence resources for Elfin Cove households. Elfin Cove hunters travel an average of six miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Elfin Cove households have ever used to hunt deer. Summarizing, the majority of Elfin Cove households hunt deer in Wildlife Analysis Areas (WAA's) 3420, 3421, and 3418. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 3421 (33 deer), and 3418 (4 deer) (ADF&G 1994). These WAA's are virtually roadless.

Community Comments

A number of Elfin Cove residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Elfin Cove residents who responded to the issues requested that the current timber sale program be reduced and that the long-term contract be terminated. Those providing oral testimony do not want logging or roads in the vicinity of Elfin Cove. They want current logging practices changed to selective harvest and logging to continue only in those areas currently roaded and logged. They stated that logging should be the last consideration when looking at economic and lifestyle priorities. Topping the list of concerns for the RSDEIS is the protection of watersheds, special places, wildlife habitat, and viewsheds.

Community Use Area

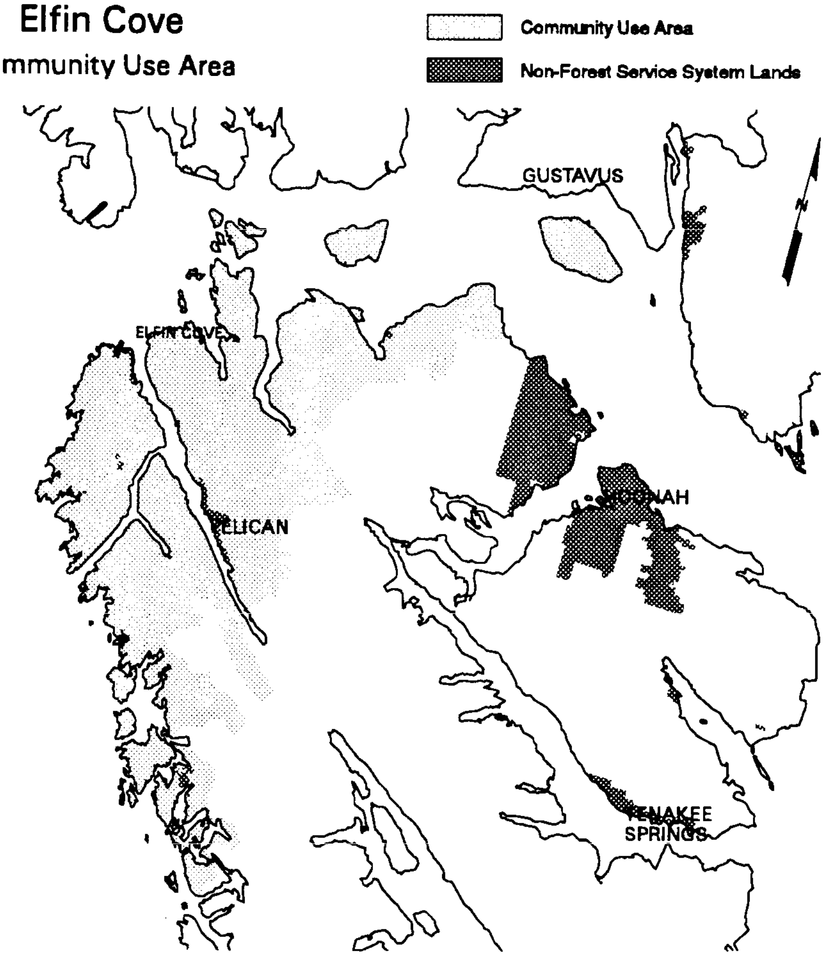
The general area commonly used or related to by many of the residents of Elfin Cove in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 369,356 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Elfin Cove's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	157,828	157,828	157,828	157,828	157,828	157,828	157,828	157,828	157,828
Mostly Natural	211,808	206,120	208,424	206,120	206,541	221,653	173,383	208,424	211,187
Moderate Development	0	340	0	340	340	0	5,524	0	40
Intense Development	0	5,068	3,105	5,068	4,647	5,347	32,800	3,105	220
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	1,983	601	1,802	1,802	2,063	7,921	601	80

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Elfin Cove
Community Use Area



Potential Effects

Commercial fishing, recreation and tourism, and subsistence use are important to Elfin Cove.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Tourism, especially sportfishing, has recently become more important to Elfin Cove. Nine lodges operate out of the community. Recreation and tourism is expected to increase by the same amount in all alternatives, thereby benefiting the retail store and lodges.

Panel Results: The Socioeconomic Panel rated Alternatives 7 and 9 would pose the greatest potential risk to Elfin Cove's economic structure, community stability, quality of life, recreation opportunities and access to traditional lifestyles, while not affecting timber employment within the community. Alternatives 2, 3, 4, 5 and 6 were viewed as having few effects either way, and Alternative 1 was viewed as having neutral to positive effects on most community characteristics. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

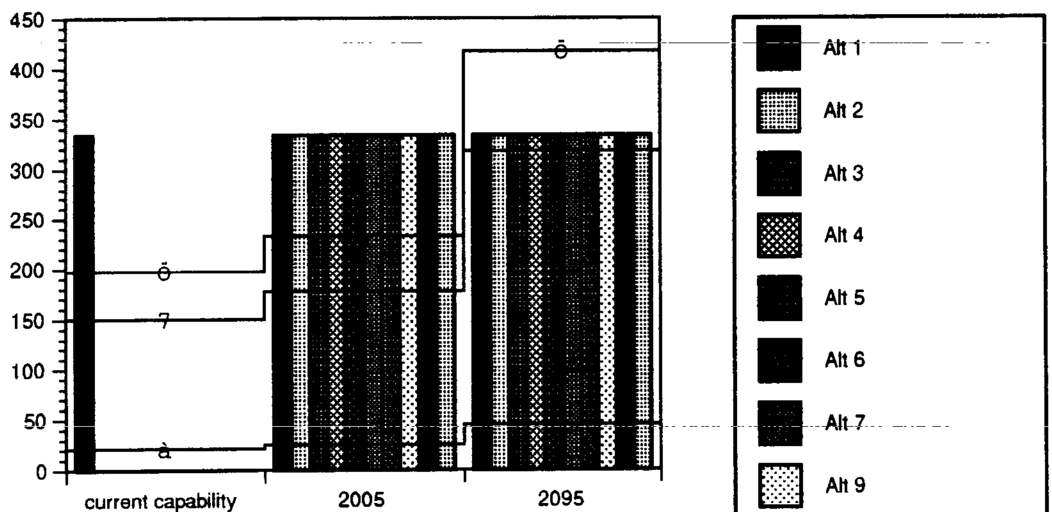
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 63 percent of the

total edible pounds of subsistence resources harvest by Elfin Cove households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Elfin Cove's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Elfin Cove residents, as well as for all deer hunted within the WAA's in the short term. In the long term, projected deer harvest for all hunters exceeds 10 percent of habitat capability. Deer account for 27 percent of the total edible pounds of subsistence resources harvested by Elfin Cove households (Kruse and Frazier 1988).

In terms of subsistence use, Icy Strait, northwest Chichagof Island, and Yakobi Island are the most important areas to Elfin Cove. These areas are legislatively withdrawn from timber harvest as either Wilderness or LUD II or allocated to the Semi-Remote Recreation LUD in all alternatives except 9. Alternative 9 allows timber harvest in the non-legislated areas of Lisianski Inlet and Strait, although opportunities are very limited and no timber harvest is scheduled. Indirectly, it is unlikely that Elfin Cove will be affected by increased competition or access because of the limited area open for development. The current limited access is unlikely to draw additional hunters into the area due to displacement.

Deer Availability and Anticipated Demand in Areas Used by Elfin Cove Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Gustavus

Gustavus is located in northern Southeast Alaska on the north shore of Icy Straits, east of the entrance to Glacier Bay. Its population is 328 (ADCRA 1995), of whom 3.9 percent are Alaska Native (1990 U.S. Census). Prior to the founding of the present community, Huna Tlingit used the land and resources on which Gustavus is now located. Use of a salmon camp near the mouth of the Salmon River was noted by early Gustavus settlers; however, after a short period of settlement by the new community, Natives generally discontinued use of the camp (ADF&G 1994).

Gustavus was settled and named "Strawberry Point" in 1914 by a small group of immigrants from the Lower 48 planning to develop the land as agricultural homesteads. World War II brought development to Gustavus in the form of an airstrip and Federal Aviation Administration communications facilities. Nearby Glacier Bay National Monument was established in 1925 (ADF&G 1994).

Population: The population of Gustavus increased considerably between the 1970 and 1990 census. Growth has continued at a fairly steady rate with a total increase of 27 percent since 1990.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	64	98	258	257	275	287	311	328

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: The commercial fishing industry has provided some employment and income to local families throughout the community's history. Recently, some residents have entered the sport fishing charter business. Small livestock holdings continue to be operated in Gustavus. Self-employment in trapping, construction, and cottage industries have provided income to some residents. The Glacier Bay Lodge, tours and park attract a number of tourists and recreationists during summer months. The growth of services for Park visitors has increased seasonal employment opportunities (ADF&G 1994).

Fisheries, recreation and tourist services are Gustavus' principal economic sectors. The median household income in 1989 was $41,538 (1990 U.S. Census). Unemployment in this census area in 1994 was 10.6 percent, compared to a rate for all Southeast of 8.2 percent (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Gustavus was 257 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho salmon, halibut, Dolly Varden, deer, dungeness crab, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, finfish other than salmon at 31 percent, deer at 26 percent and salmon at 21 percent are the most important subsistence resources for Gustavus households. Gustavus hunters travel an average of eight miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Gustavus households have ever used to hunt deer. Summarizing, the majority of Gustavus households hunt deer in Wildlife Analysis Areas (WAA's) 4222, 4252, and 4256. As displayed on the Deer Harvest by Community map (in the map packet), these areas are relatively close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 4256 (48 deer), and 4222 (15 deer) (ADF&G 1995). These WAA's are virtually roadless.

Glossary

Community Comments

A number of Gustavus residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Gustavus residents who responded to the issues requested that additional emphasis be placed on scenic quality, recreation, fish, Old-growth Habitat around their community, and subsistence. They want the current timber sale program reduced and the long-term contracts terminated; many would like to have clearcut logging stopped Forest-wide. Those who responded do not want additional roads, Log Transfer Facilities, or connection to other existing roads, and favor existing emphasis on mineral exploration and development. Respondents requested that management emphasize tourism, fishing, wildlife, recreation, scenic quality and subsistence in and around their community. They want no more logging on the Chilkat Range. Comments on the RSDEIS indicate there is strong support for the potential of eco-tourism based on the overall perception of the area [Alaska] as one of the last wildernesses on the planet.

Community Use Area

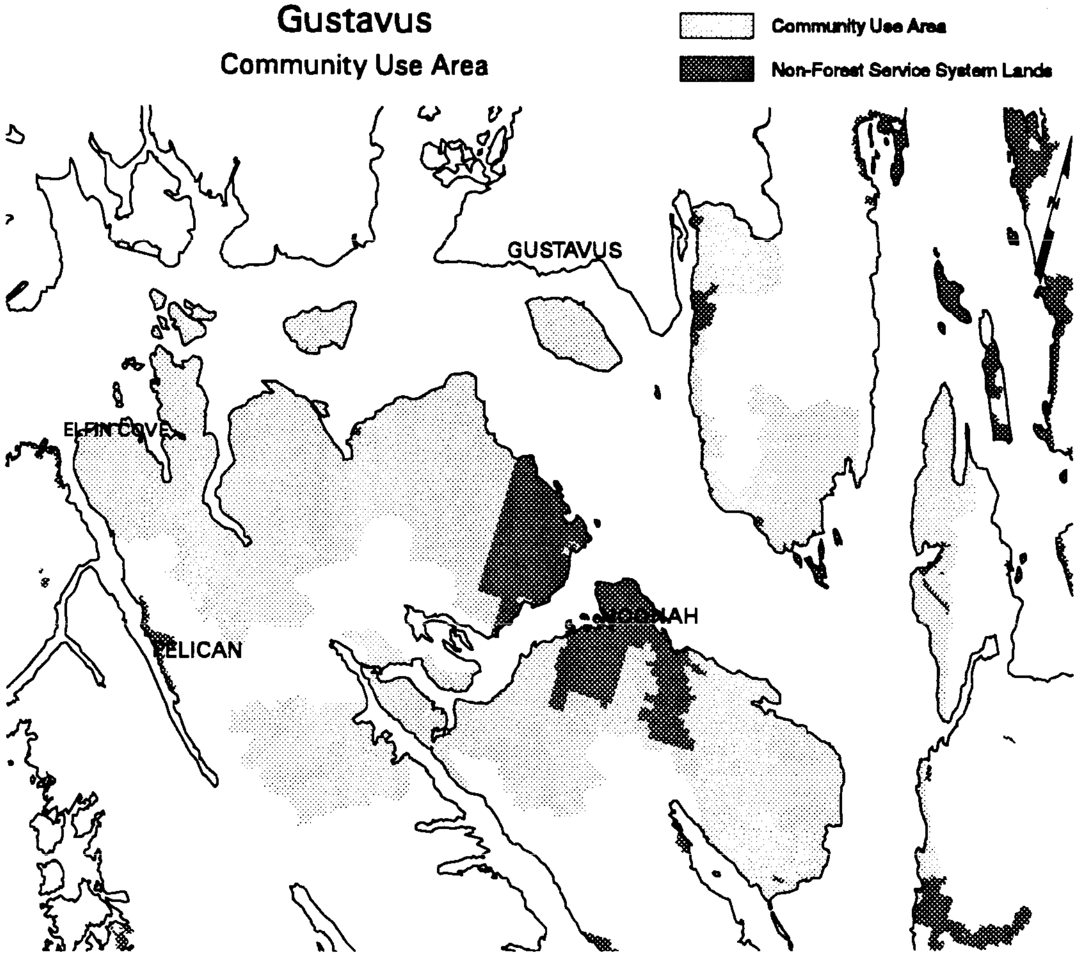
The general area commonly used or related to by many of the residents of Gustavus in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 525,439 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Gustavus' Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	25,156	25,156	25,156	25,156	25,156	25,156	25,156	25,156	25,156
Mostly Natural	500,282	190,655	285,911	190,655	259,038	176,360	139,248	285,911	308,676
Moderate Development	0	45,524	23,925	45,524	36,405	60,306	170,807	23,925	16,940
Intense Development	0	264,104	190,446	264,104	204,839	263,617	190,207	190,446	174,666
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	82,938	48,559	78,956	65,521	89,619	98,509	48,559	38,704

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Gustavus is a small community located near Glacier Bay National Park. Recreation and tourism are important to Gustavus, especially related to use of the National Park. Commercial fishing and subsistence use are also important to the community.

Recreation and tourism use is expected to increase by roughly the same amount in all alternatives. This would benefit the lodge, retail sales, and the various "bed and breakfasts" located in Gustavus.

Commercial fishing is not expected to be significantly affected by Forest Service activities in any alternative.

Logging would be allowed on the Chilkat Range in Alternatives 2, 4, 5, 6, 7, 9 and 11. Much of the area of concern to the community is allocated to the Old-growth Habitat LUD in Alternatives 3, 10.

Panel Results: The Socioeconomic Panel rated Alternatives 2, 7, and 9 as having potential negative effects for Gustavus, with decreases anticipated in most of the indicators. Alternatives 3, 4, 5, and 6 were rated as having few effects either way, and Alternative 1 was rated as having the greatest likelihood of positive effects on the community. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

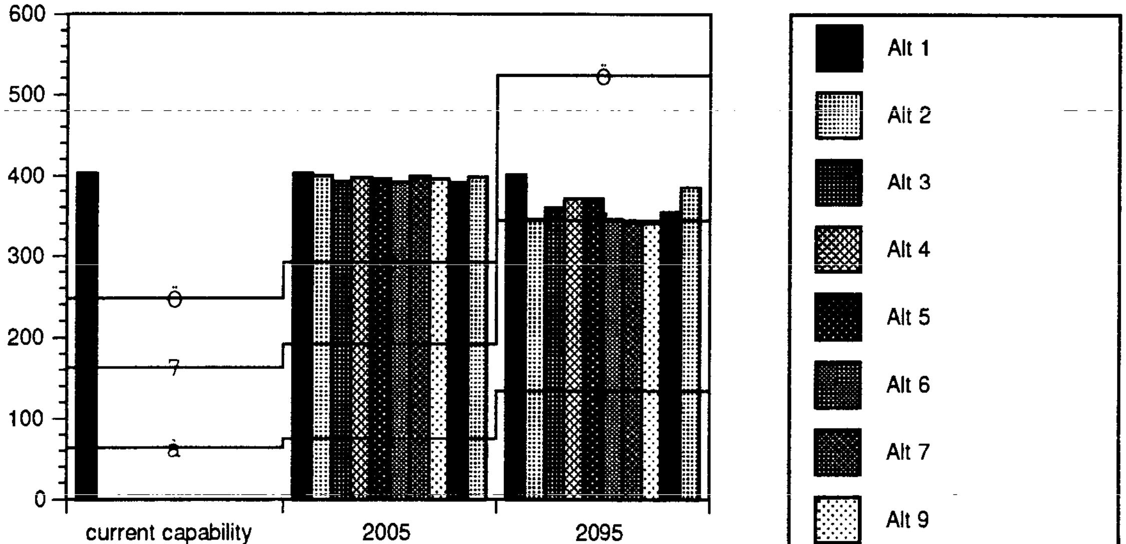
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 63 percent of the

total edible pounds of subsistence resources harvest by Gustavus households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Gustavus' average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Gustavus residents, as well as for all deer hunted within the WAA's in the short term. In the long term, projected deer harvest for all rural hunters in Alternatives 7 and 9, and for all hunters in all alternatives exceeds 10 percent of habitat capability. Deer account for 70 percent of the total edible pounds of subsistence resources harvested by Gustavus households (Kruse and Frazier 1988).

The majority of subsistence use by Gustavus is unlikely to be directly affected by any of the alternatives because of LUD II and Wilderness designations. Outside of these designations, Alternatives 7 and 9 could have direct impacts to the beach zones where much of Gustavus' hunting occurs. Indirectly, it is unlikely that Gustavus will be affected by increased competition or access because access is already limited with few opportunities to expand.

Deer Availability and Anticipated Demand in Areas Used by Gustavus Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Haines

Haines is located in the northern portion of Southeast Alaska, near the north end of Lynn Canal on the Chilkat Peninsula. Haines is one of three Southeast communities connected by road to Canada and the Lower 48. The population of the city is 1,394, with the outer Haines area home to another 947 people (ADCRA 1995). Alaska Natives comprise 13.2 percent of the Haines area population (1990 U.S. Census). Haines has several surrounding communities - Lutak, just north of Haines, with about 50 residents; Mosquito Lake, historically Chilkat Indian territory, is home to about 89 non-Native residents; and Covenant Life, a non-Native religious community.

Originally, the Haines area was settled by the Chilkat Tlingits. These Natives are now considered as two groups: the Chilkats of the Chilkat River, with Klukwan being the major population center, and the Chilkoots living in and near Haines. Haines itself was a trade center and mission site (ADF&G 1994). Klukwan, a Chilkat Indian Village near the Chilkat river and 22 miles north of Haines, has a population of 130. The village is known for its woven artwork of cedar bark and mountain goat hair. The area is host to the largest concentration of bald eagles in the world during the Fall and Winter at the nearby Chilkat Bald Eagle Reserve.

Settlement did not concentrate in Haines until the late 1800s. The commercial fishing industry located several canneries in the Chilkat Inlet near Haines beginning in 1882; the Klondike gold rush brought thousands of prospectors to the town in the late 1890s; and the Dalton Trail was established as an open access route into the interior in the 1890s. Haines incorporated as a city in 1910 and as a third class borough in 1968 (ADF&G 1994).

Haines is a major trans-shipment point because of its ice-free, deep-water port and dock, and year-round road access to Canada and Interior Alaska on the Alaska Highway. It is a northern terminus of the Alaska Marine Highway System, and a hub for transportation to and from Southeast Alaska (ADCRA 1994).

Population: The population of Haines shows a fairly consistent pattern of growth. The population declined between 1991 and 1992, but in total increased by nine percent since 1990.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	1,351	1,680	2,117	2,252	2,216	2,286	2,319	2,308

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Haines' principal economic sectors are retail trade, construction, fisheries, and business. The Chilkoot Lumber Mill, once employing 100 people, closed in 1991. Some logging and milling, mostly associated with State forests, still occurs in the Haines area. Tourism has recently been increasing in importance to Haines. A commercial gillnet fishing fleet operates out of Haines; some of the fishing fleet also participates in salmon troll and crab fisheries in Lynn Canal and farther south.

Unemployment in the Haines Borough in 1994 was 10.7 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995). The 1989 median household income was $36,048 (1990 U.S. Census).

Subsistence Use: In 1984, the per capita household subsistence harvest in Haines was 104 edible pounds. More than 82 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were sockeye salmon, trout, halibut, char, and berries (TRUCS 1989).

Glossary

Based on edible pounds harvested, finfish other than salmon at 36 percent, salmon at 27 percent, and deer at 15 percent are the most important subsistence resources for Haines' households. Haines' hunters travel an average of 120 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Haines' households have ever used to hunt deer. Summarizing, the majority of Haines' households hunt deer in Wildlife Analysis Areas (WAA's) 4222, 3629, and 3420. As displayed on the Deer Harvest by Community map (in the map packet), these areas are quite a distance from the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 4222 (41 deer), 3418 (37 deer), and 3836 (29 deer) (ADF&G 1994). These WAA's are not accessed from the ferry system.

Community Comments

A number of Haines residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Opinion in Haines was split regarding recreation management with some wanting more emphasis on recreation and some satisfied with the current mix of emphasis. Residents who responded to the issues recommended that Old-growth Habitat near their community be maintained and that more emphasis be placed on subsistence. They were divided on timber management with some wanting less emphasis, some wanting the current emphasis, and some wanting more emphasis to support the local mills. Most of those who responded do not want additional roads or additional Log Transfer Facilities. Respondents on the RSDEIS expressed support for a diversified wood value-added products industry. They also asserted that habitat protection is the prevalent attitude within the areas, with protection of fisheries, watersheds, and corridors their main concern.

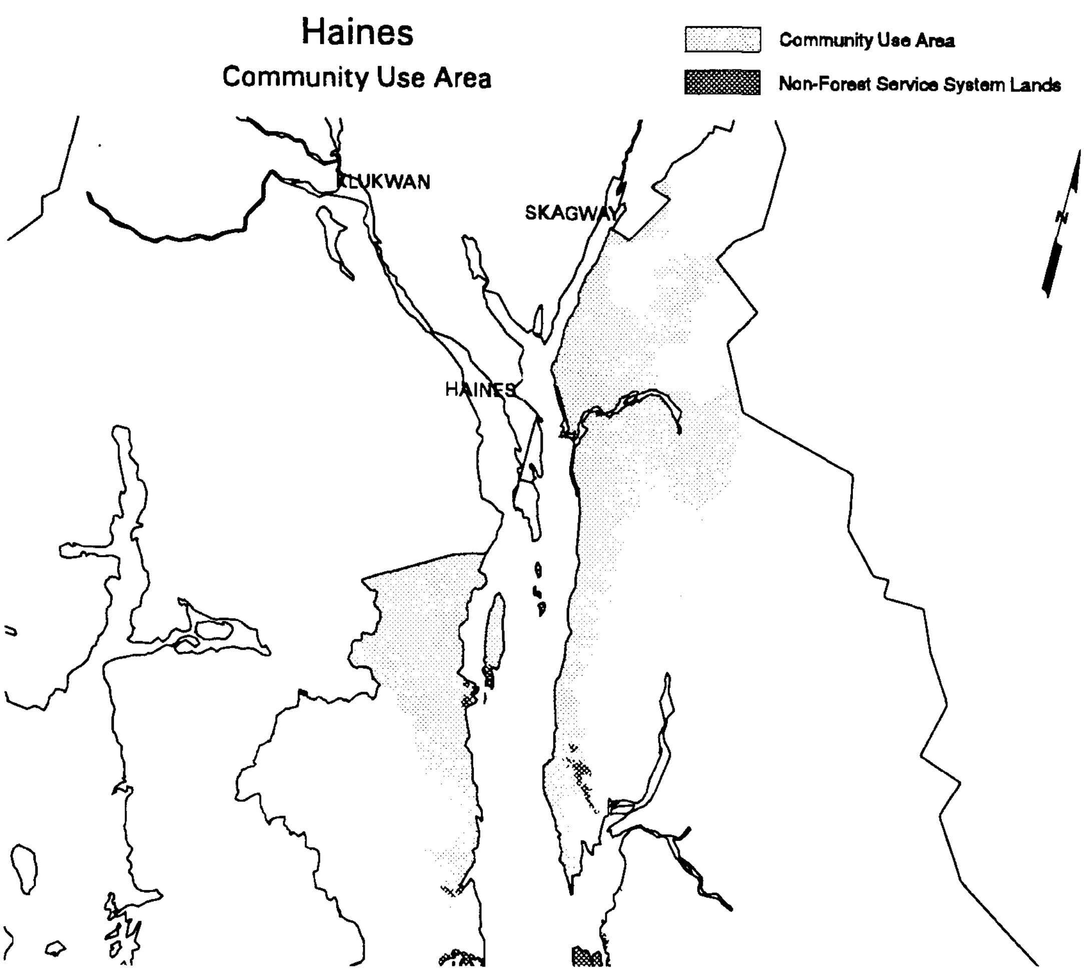
Community Use Area

The general area commonly used or related to by many of the residents of the Haines Borough in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 235,294 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Haines' Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	100	100	100	100	100	100	100	100	100
Mostly Natural	235,295	183,159	192,410	183,159	183,159	91,787	156,225	192,410	198,633
Moderate Development	0	51,975	42,725	51,975	51,975	143,328	79,070	42,725	36,522
Intense Development	0	60	60	60	60	80	0	60	40
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	10,802	8,048	10,662	10,662	15,742	11,638	8,048	6,421

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing, recreation and tourism, and subsistence use are important to Haines. Haines has an Alaska Marine Highway System ferry terminal and provides road access into Interior Alaska. Timber harvest on State lands and wood processing had been a major sector of the Haines economy in past years, but is of lower importance now. Mining at the Kensington Mine southeast of Haines may become a major employer within the planning period. Although the major mine support is anticipated to be located in Juneau, it is likely that some benefits would accrue to Haines.

Recreation and tourism use is expected to increase by roughly the same amount in all alternatives. This would benefit the hotels, retail sales, air taxis, and the various other tourist facilities located in Haines.

Commercial fishing is not expected to be significantly affected by Forest Service activities, with the exception of Alternative 7.

Mining, and the opening of the Kensington Mine, is not anticipated to be affected differently by any alternative.

Panel Results: Panelists agreed that few of the alternatives would affect Haines Borough either way; none of the alternatives were estimated to likely increase or decrease economic structure, community stability, quality of life, or access to traditional lifestyles. Alternative 7 was rated as posing risks to resource jobs in fishing and tourism, as well as to recreation opportunities, but as likely having a positive effect on timber employment. Alternative 9 was rated similarly, while Alternative 1 was viewed as having the greatest likelihood for positive effects. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

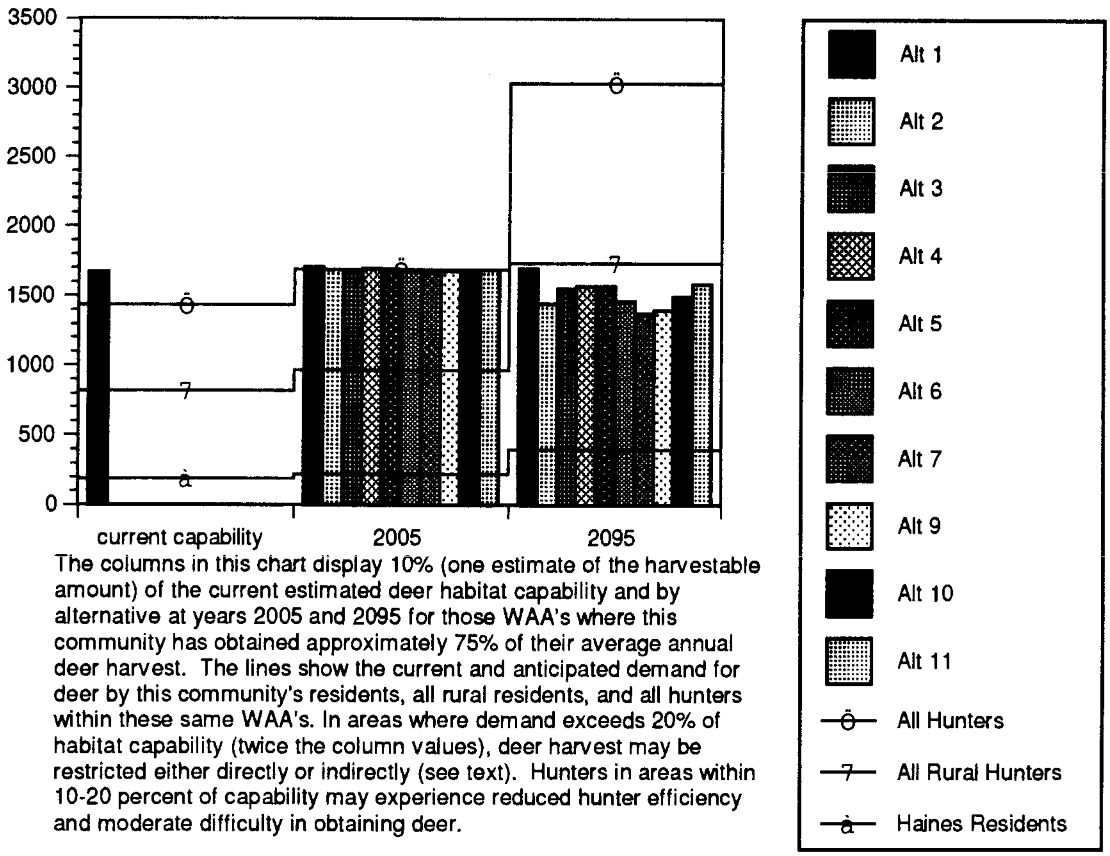
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 68 percent of the total edible pounds of subsistence resources harvest by Haines' households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Haines' average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Haines residents. However, current deer harvest for all hunters exceeds 10 percent of habitat capability in Alternatives 2-11 and these alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in hunting may be necessary. Deer account for 15 percent of the total edible pounds of subsistence resources harvested by Haines households (Kruse and Frazier 1988).

The majority of Haines' subsistence use areas are not on the National Forest, or in legislated LUD II and Wilderness Areas, and will not be impacted by any of the alternatives. Within the National Forest areas used by Haines' residents, WAA's 3836, 3551, and 4252 will have deer winter range conserved in Alternatives 1, 3, 4, 5, 6, 10 and 11. With little timber harvest activity, Alternative 1 would provide the least potential impact on Haines' subsistence uses. Those areas Haines hunters use outside of LUD II and Wilderness are likely to be impacted by timber harvest activity in Alternatives 2, 7, and 9. Alternatives 3, 6, 10 and 11 do not allow timber harvest in a portion of Haines' use area with the allocation to the Old-growth Habitat LUD. Alternatives 4 and 5 have longer rotations which would provide Haines with a higher level of older forest within the development LUD's they use.

As hunters from Haines travel some distance to hunt already, alternatives which may increase access from the ferry system (2-11) may decrease their cost of accessing areas to hunt. But with this additional access would likely come an increase in competition from hunters of other communities. In some cases this competition may cause Haines' hunters to travel even farther. In places where access is likely to remain limited, the increase in competition may not occur.

Deer Availability and Anticipated Demand in Areas Used by Haines Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Hollis

Hollis is located on east Prince of Wales Island, 19 miles east of Craig. The population is 106 (ADCRA 1995), with 3 percent Alaska Native (1990 U.S. Census).

Settlement at Hollis began as a mining camp at the turn of the century, then developed into a logging camp in the mid-1950s. In 1960, when Thorne Bay became center of the logging industry on central Prince of Wales Island, most Hollis residents moved to Thorne Bay. In recent years, Hollis has grown as a community, due in part to an Alaska Marine Highway terminal there. Roads now connect Hollis with most other communities on Prince of Wales Island. A State land sale at Hollis in 1980 led to its present status as a permanent community (ADF&G 1994).

Population: The population of Hollis has been fairly steady since 1990, with some fluctuation, but no consistent growth trend.

Year	1990*	1991	1992	1993	1994	1995
Population	111	102	112	93	106	106

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Hollis' principal economic sectors include timber, transportation services, highway maintenance and schools. The economy is highly seasonal in all sectors except government. The 1989 median household income was $31,250 (1990 U.S. Census). Unemployment in this census area in 1994 was 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Hollis was 164 edible pounds. More than 87 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho and sockeye salmon, halibut, rockfish, deer, clams, dungeness crab, sea cucumber, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 27 percent, deer at 23 percent and finfish other than salmon at 22 percent are the most important subsistence resources for Hollis households. Hollis hunters travel an average of 20 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Hollis households have ever used to hunt deer. Summarizing, the majority of Hollis households hunt deer in Wildlife Analysis Areas (WAA's) 1316, 1317, and 1211. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1317 (9 deer), and 1316 (5 deer) (ADF&G 1995). These WAA's are 41 and 58 percent accessible by existing roads.

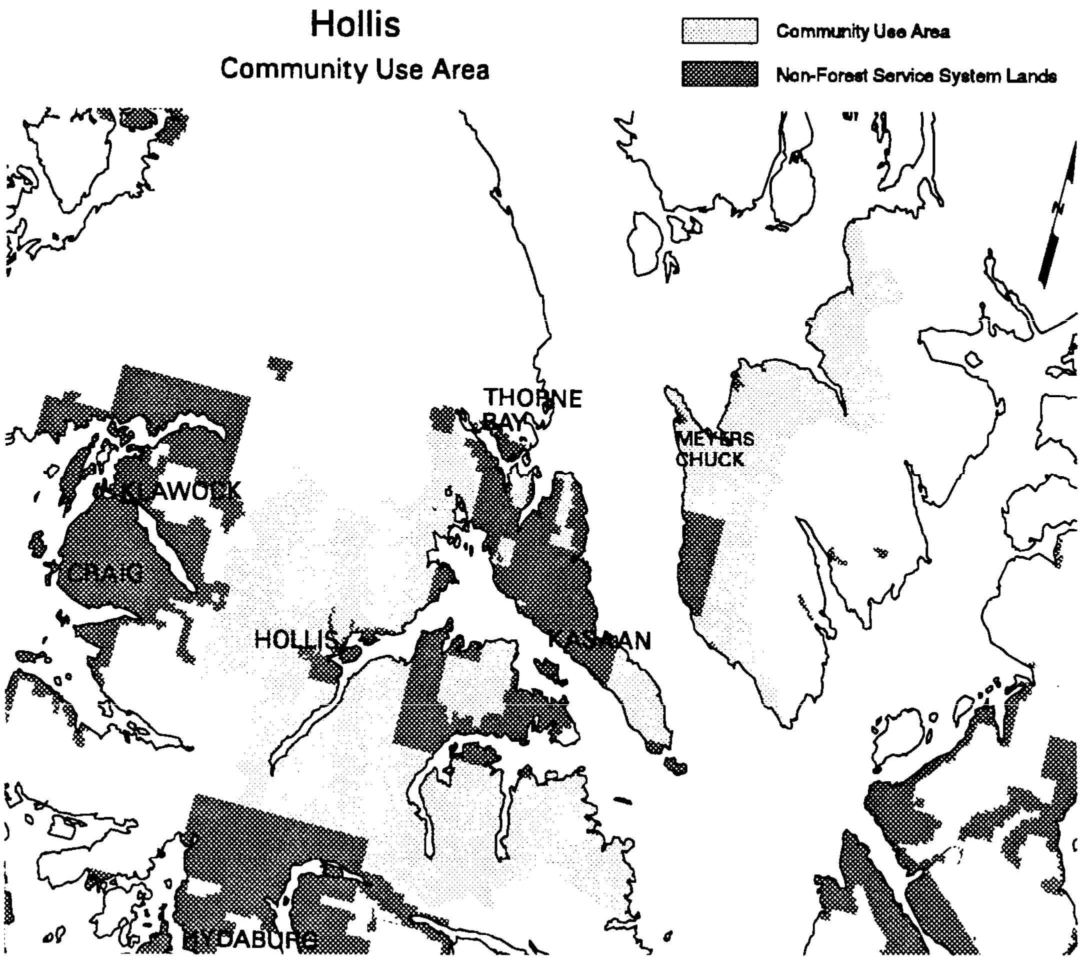
Community Comments

A number of Hollis residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

The Hollis Community Council, Inc. requested that additional emphasis be placed on managing for scenic resources, recreation, and fish. They indicated that current emphasis on subsistence is adequate and express opposition for timber harvest north of their community. The Council requested that the current timber sale program be reduced, and that the long-term contracts be terminated. Hollis residents asked for non-development allocations for specific areas near their community. Respondents on the RSDEIS expressed that quality of life is of great concern in their community. They support the timber industry because it is vital for maintaining their quality of life, however they fear logging will negatively affect their hunting and fishing for subsistence. They feel vital resources such as the karst system need protection to protect the watershed and drinking supply. They do not feel that a transition to tourism will be more positive on the environment if it means scores of people trampling the land, catching fish, and hunting animals.

Community Use Area

The general area commonly used or related to by many of the residents of Hollis in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 294,713 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Hollis' Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	34,270	34,270	34,270	34,270	34,270	34,270	34,270	34,270	34,270
Mostly Natural	249,891	16,165	86,852	16,165	75,128	6,046	1,501	86,852	100,624
Moderate Development	10,653	64,198	39,344	64,198	43,161	10,753	32,557	39,344	37,801
Intense Development	0	180,080	134,247	180,080	142,154	243,705	226,485	134,247	122,198
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	79,984	53,280	79,864	60,313	88,908	88,968	53,280	44,604

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Hollis is the site of the ferry terminal accessing the rest of Prince of Wales Island. As such, transportation is a major component of the community's economy. Subsistence and timber also play important roles.

The ferry terminal would continue to provide important access to Prince of Wales Island in all alternatives. Ferry access has become increasingly important to all of Prince of Wales as the Island's population continues to grow. Recreation use is projected to increase roughly to the same degree in all alternatives, thereby increasing use of the ferry system. However, since Alternatives 1, 4 and 5 essentially halt timber harvest on north Prince of Wales Island, the resulting declines in timber employment could have a ripple effect and reduce use of the ferry system. This would be especially true during September through May when recreation and tourism use is much lower.

Timber employment is another element for the community of Hollis. There would likely be insufficient volume to keep the Klawock mill open in Alternatives 1, 4, or 5. This would result in the loss of jobs on Prince of Wales. In addition, Alternatives 1, 4, and 5 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities would be available it amounts to less than 2 MMBF in any alternative and would most likely be purchased by very small operators for products such as music wood or cedar shakes. Residents who want to stay in the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. Alternative 3, 6, 10 and 11 continue some logging opportunities on the island, but at a lower quantity compared to the current levels of timber harvesting. The result of the lack of logging opportunities would result in disruption of the community stability. Residents who want to stay associated with the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. If these individuals choose to relocate, the loss of their income would likely affect others in the community.

Alternatives 2, 7, and 9 would continue logging opportunities on the island. This would allow those individuals associated with the logging industry to maintain their existing lifestyle within the community.

Panel Results: The Socioeconomic Panel rated Alternatives 2, 7 and 9 as posing relatively greater risk to quality of life, recreation opportunities, and access to traditional lifestyles in Hollis, while increasing (Alternatives 7 and 9) or not affecting (Alternative 2) timber employment. Alternatives 2 and 9 rated as having little effect on economic structure or community stability. Alternatives 1, 3, 4, 5, and 6 were believed to have the potential to increase (or at least not decrease) key indicators such as quality of life, community stability, and economic structure. Alternatives 10 and 11 were not rated by the panel, but the affects of these alternatives would be similar to Alternative 3.

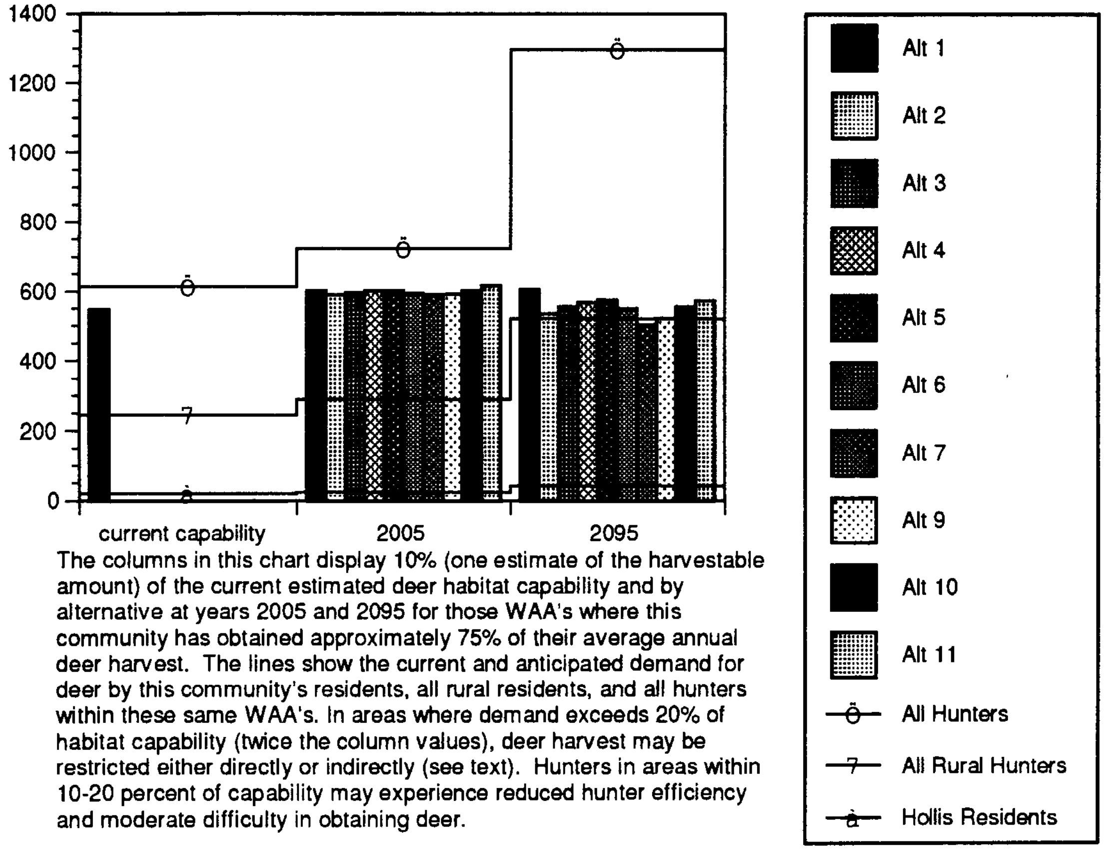
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the Fish Section of this chapter). These resources account for 65 percent of the total edible pounds of subsistence resources harvest by Hollis households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Hollis' average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. The average number of deer harvested is assumed to be constant throughout the analysis. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for the effort may decrease, and if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Hollis residents and all rural hunters. However, projected deer harvest for all hunters exceeds 10 percent of habitat capability for all alternatives. At some point, a restriction in hunting may be necessary. Deer account for 23 percent of the total edible pounds of subsistence resources harvested by Hollis households (Kruse and Frazier 1988).

Alternative 1 is unlikely to have direct impacts on Hollis' subsistence use since little timber harvest activity would occur. Alternatives 2-11 may directly impact Hollis' subsistence use areas through allocation of Development LUD's. Alternatives 3, 6, 10 and 11 maintain Old-growth Habitat LUD's within a major portion of Hollis' subsistence use areas. This may decrease the impacts of continued harvesting on Hollis' subsistence use. Alternatives 4 and 5 also are beneficial to Hollis' subsistence use areas because of the longer timber rotation which better maintains habitat over time.

Hollis is currently competing with other communities in their subsistence use areas and under all alternatives that is likely to continue. Alternatives increasing access by roads due to timber harvest activity may increase competition from other communities on Prince of Wales Island and, because Hollis is on the ferry system, hunters from other islands and the mainland would be able to access the road systems through Hollis. This increase in people may be beneficial to Hollis' economy, but may cause hunters in Hollis to travel farther for deer and compete with hunters from more communities.

Deer Availability and Anticipated Demand in Areas Used by Hollis Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Hoonah

Hoonah is located in Port Frederick, along Icy Strait on the northeast shore of Chichagof Island, 40 air miles west of Juneau. Hoonah is predominantly a Native community and has been the principal village for the Hoonah Tlingit Clans since the late 1800s. Its population is 903 (ADCRA, 1995), with 68 percent Native (1990 U.S. Census). Whitestone Logging Camp, with a population of 170, is adjacent to Hoonah. Children from the camp attend school in Hoonah (ADCRA 1996). The community of Game Creek, a religious ministry, is located 2.6 miles southwest of Hoonah.

The village of Hoonah has been occupied since prehistoric times by the Tlingit people. Groups of *Huna* Tlingit lived all or part of the year at seasonal camps and small winter settlements throughout the Huna territory. Dozens of camps and settlements have been documented through archaeological surveys. The Hoonah Tlingit have very close ties to the Glacier Bay area across Icy Strait.

In 1880, the Northwest Trading Company built a store in Hoonah. The following year, missionaries settled in the town and established the Presbyterian Home Mission church and school. By 1887, about 500 people were wintering in the village. When the post office was established in 1901, the village was officially named Hoonah which means "village by the cliff" in Tlingit. In 1944, fire burned many homes in Hoonah and destroyed the traditional ceremonial costumes and keepsakes of the villagers. The town has since been rebuilt and has become a center for logging operations on northern Chichagof Island (ADF&G 1994). A sort yard and Log Transfer Facility are located at Long Island.

The community has a local Fish and Game Advisory Committee (ADF&G 1994).

Population: The population of Hoonah shows a steady trend of growth, with a 14 percent total increase since 1990.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	748	680	795	801	838	868	890	903

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Major fisheries and canneries were established in the area between 1880 and 1910. Hoonah residents adopted the new commercial fisheries into their local economy, and developed a strong commercial fishing fleet which continues to play an important role in Hoonah's economy and way of life. In 1982, Huna Totem Corporation entered into a timber contract with Timber Pacific of Washington to harvest its 22,000 acres of timber. A total of 3,075 acres were logged through 1985. The timber industry developed rapidly in the area near Hoonah, while the commercial fishing fleet remained relatively strong (ADF&G 1994).

Hoonah's principal economic sectors are fish and fish processing, retail trade, and timber. Its economy is highly seasonal in all sectors. The 1989 median household income was $36,442 (1990 U.S. Census). Unemployment in this census area in 1994 was 10.6 percent, compared to 8.2 percent in all Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: Hoonah residents harvest many subsistence resources including deer, furbearers, seals, salmon, marine fish, waterfowl, other birds, shellfish, berries and seaweed. The 1987 harvest of these resources was 404 pounds per capita, with subsistence providing 50 percent of the household meat supply (Eight Fathom DEIS, p. 3-95). Ninety-five percent of the households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook, pink and coho salmon, halibut, Dolly Varden, herring roe on kelp, deer, seal, clams and cockles, dungeness crab, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 26 percent, deer at 23 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Hoonah households. Hoonah hunters travel an average of 15 miles to their most reliable deer hunting areas (Kruse and Frazier 1988). Principal deer use areas identified by Hoonah residents extend from Seal Bay to Trap Bay (in Tenakee Inlet). The beach fringe in Basket Bay extending over to Finger Creek in Peril Strait is also an important deer hunting area (Southeast Chichagof FEIS, p. 3-86).

Appendix H provides detailed maps regarding the areas that Hoonah households have ever used to hunt deer. Summarizing, the majority of Hoonah households hunt deer in Wildlife Analysis Areas (WAA's) 3524, 3551, and 4253. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 4253 (106 deer) and 3523 (100 deer) (ADF&G 1995).

Community Comments

A number of Hoonah residents provided written comments on the issues for the Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of the non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Some Hoonah residents who commented on the issues responded favorably to harvesting timber along Alaska Marine Highway routes, roads, streams, and around their community. Opinion regarding recreation was split with some wanting more emphasis on recreation and some satisfied with the current mix of emphasis. Respondents want additional emphasis placed on fish and on Old-growth Habitat near their community. Hoonah City Council requested that subsistence resources be emphasized. Some individual respondents want the current timber sale program to continue and believe the Forest Service has an obligation to maintain local and regional economies. Others said they want the current amount of logging reduced. Some people questioned the emphasis given to the long-term sales. They want more provisions for short-term small business administration sales, stating that these are better for the future of the industry. Some favor additional roads, transfer facilities and encourage connecting existing roads; they want the tourism, recreation, and fishing economic sectors emphasized. Huna Tribal Council, Hoonah Indian Association, and other Native Alaskan's are concerned with the effects of additional logging on wildlife and subsistence uses, and on traditional use areas. Residents of Hoonah commenting on the RSDEIS indicated that protecting resources to maintain traditional subsistence lifestyles is of highest priority to them. They are concerned that the promises of Alaska National Interest Lands Conservation Act will be forgotten and their customs will suffer at the cost of quick timber dollars. Of greatest concern is the designation of more land for the protection of wildlife and unique vegetation. They recommend that the Forest Service consider humans and human lifestyles into the ecosystem equation. Nearly all Hoonah residents opposed the preferred Alternative in the RSDEIS, but for different reasons. The majority found it too restrictive for logging-based activities, while the rest felt it did not limit it enough.

Community Use Area

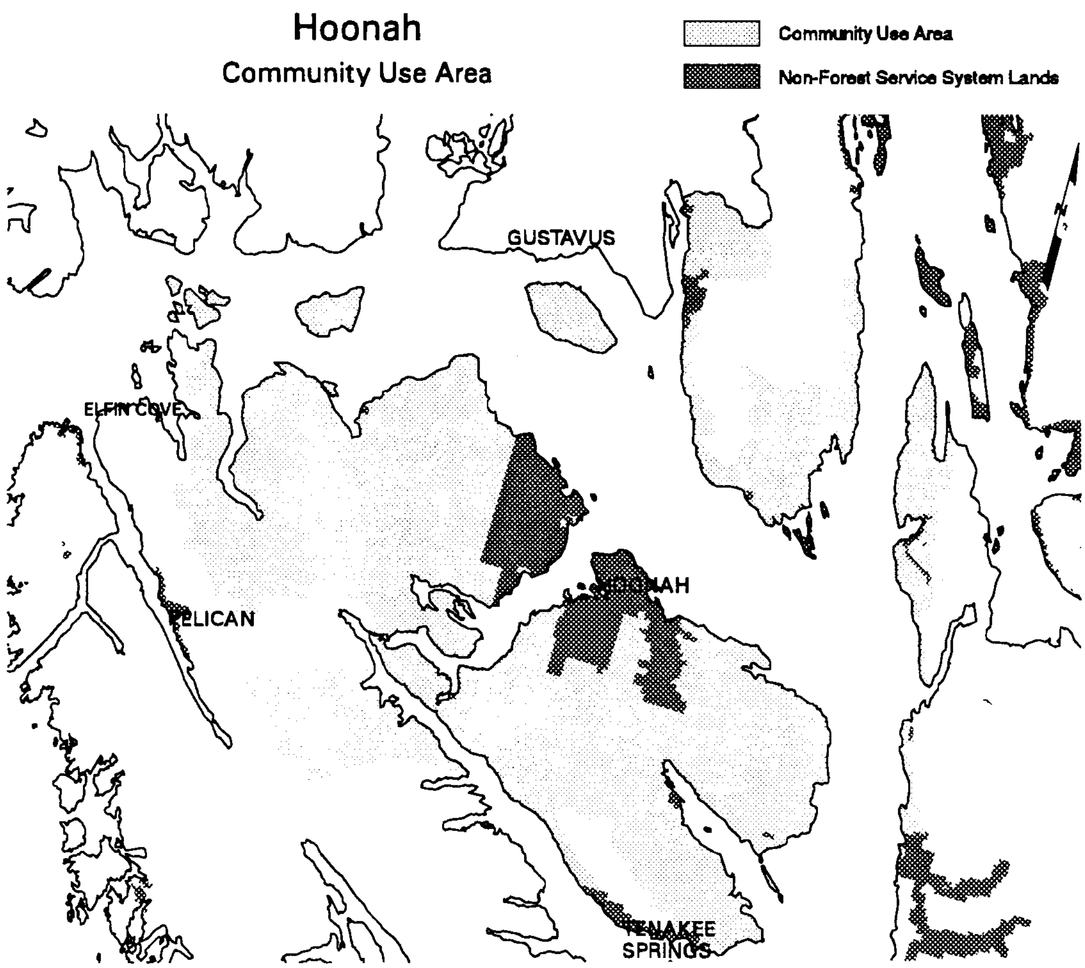
The general area commonly used or related to by many of the residents of Hoonah in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 629,818 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Hoonah's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	25,156	25,156	25,156	25,156	25,156	25,156	25,176	25,156	25,156
Mostly Natural	604,662	149,890	271,335	149,890	237,015	133,857	104,906	271,335	307,093
Moderate Development	0	69,204	35,083	69,204	55,865	69,379	247,889	35,083	21,640
Intense Development	0	385,568	298,244	385,568	311,781	401,426	251,847	298,244	275,928
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	123,806	77,025	116,504	99,888	134,588	142,379	77,025	63,191

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing, logging, and subsistence use are important to Hoonah. Most residents who are dependent on the logging industry live at the nearby Whitestone Logging Camp.

Commercial fishing is not expected to be significantly affected by Forest Service activities in any alternative.

Logging employment will have the greatest variation among the alternatives. Alternative 1 would essentially eliminate logging opportunities for Hoonah, except on private lands. Alternatives 3, 4, 5, 6, 10 and 11 significantly reduce logging opportunities on National Forest lands over the next ten years. Individuals who want to remain associated with the logging industry may have to relocate, find other employment or commute long distances to remote logging camps during the week. This could affect community stability. Loss of their income could also have a ripple effect on the retail and services industry. Alternatives 2, 7 and 9 should continue to provide opportunities for logging employment.

Panel Results: The Socioeconomic Panel predicted that Alternatives 2, 7, and 9 would pose the greatest risk to the quality of life and access to traditional lifestyles in Hoonah, although having positive effects on timber industry employment. The alternatives were viewed as having little overall effect on economic structure and diversity, except for potential increases under Alternative 5 and possible decreases under Alternative 9. Alternative 5 was viewed as having the greatest potential for positive effects, while Alternative 6 was believed to have the least effects in either direction. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

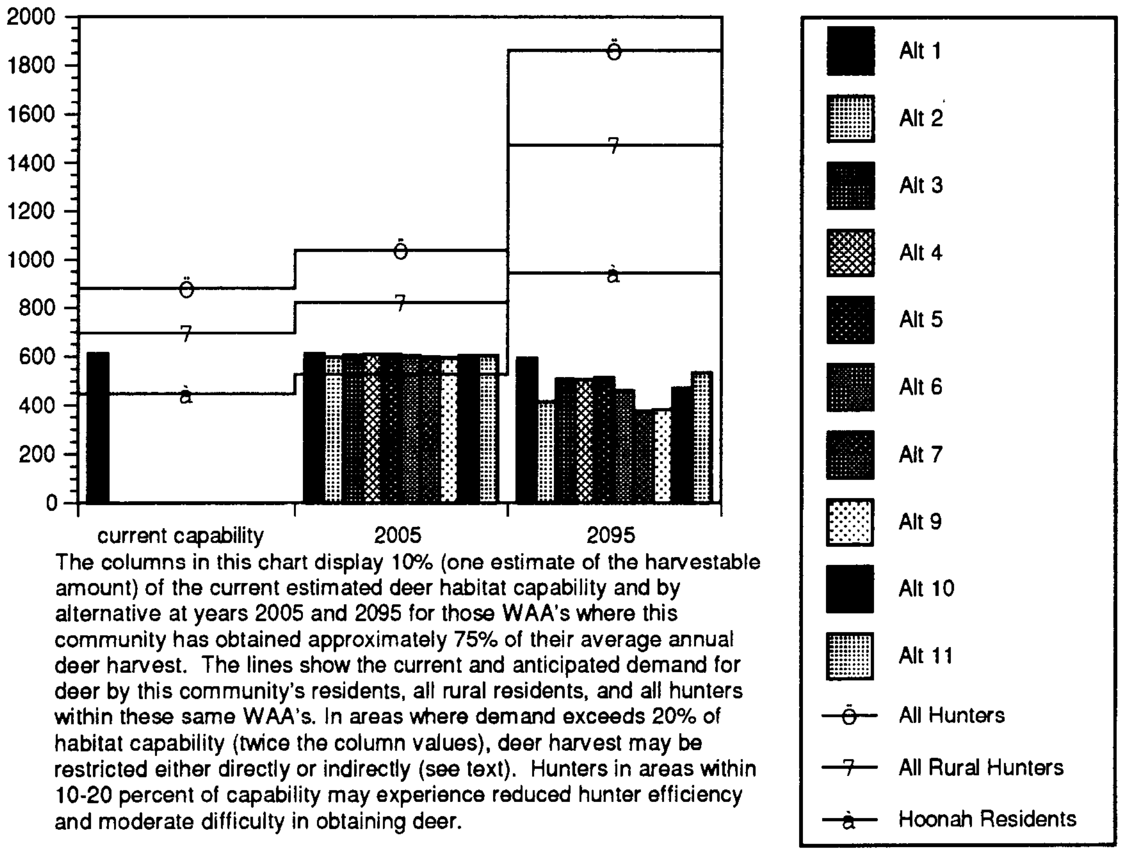
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 59 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Hoonah's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Hoonah residents in the short term. However, projected deer harvest for both all rural and all hunters in the short term and Hoonah residents also in the long term exceeds 10 percent of habitat capability in Hoonah's WAAs. At some point, a restriction in hunting may be necessary. Deer account for 23 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier 1988).

WAA's 4252, 3551, 3524, and 4253 will have deer winter range conserved in Alternatives 1, 3, 4, 5, and 6.

All the alternatives, except 7 and 9, do not allow timber harvest in the beach fringe, decreasing the direct impact to Hoonah's hunting along the shoreline. The Old-growth Habitat LUD in Alternatives 3, 6, 10 and 11 include locations within Hoonah's subsistence use areas; this LUD allows no timber harvest and would likely benefit Hoonah subsistence users. A large portion of Hoonah's subsistence use areas are likely to be harvested and roaded under Alternatives 2-11. The impacts on the habitat may directly affect Hoonah's hunting. Indirectly, these alternatives are likely to increase competition as hunters from outside the community are able to gain greater access from the ferry system and take advantage of the increase in roads.

Deer Availability and Anticipated Demand in Areas Used by Hoonah Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Hydaburg

Hydaburg is located on the southwest side of Prince of Wales Island, 45 air miles northwest of Ketchikan. Hydaburg has a population of 406 (ADCRA 1995), with 89 percent Alaska Native (1990 U.S. Census).

The Haida Indians migrated to Prince of Wales Island, a predominantly Tlingit area, from Graham Island, Canada. After combining three villages, the present site was chosen initially as the Hydaburg Indian Reservation in 1912. It became a fishing village with the first fish processing plant opening in 1927, and three other canneries operating through the 1930s. Seafood processing was active until 1984 when a fire destroyed the cannery (ADF&G 1994). Hydaburg is connected by road to Craig, Klawock, Hollis and northern parts of the Island.

In 1936, Hydaburg became the first Alaskan Native village to form an Indian Reorganization Act Council. In 1972, Hydaburg incorporated as a first class city. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

Population: Hydaburg's population almost doubled between 1970 and 1990 census, but has shown a decreasing trend in the last few years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	214	298	384	411	415	426	406	406

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Hydaburg's current employment is highly seasonal in all sectors. This census area had an unemployment rate in 1994 of 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995). Hydaburg has a fisheries-based economy, with timber and educational services also playing a role in the economy. The 1989 median household in Hydaburg was $20,139 (1990 U.S. Census).

Subsistence Use: In 1987, the per capita household subsistence harvest in Hydaburg was 337 edible pounds. Ninety-one percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho, chinook, and sockeye salmon, rockfish, halibut, herring roe on kelp, hooligan, dungeness crab, clams and cockles, shrimp, abalone, seaweed and kelp, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 40 percent, finfish other than salmon at 16 percent and deer at 13 percent are the most important subsistence resources for Hydaburg households. Hydaburg hunters travel an average of 18 miles to their most reliable deer hunting areas (Kruse and Frazier 1988). To some degree, all Hydaburg household rely on subsistence resources for daily food. Hydaburg residents share substantial amounts of subsistence foods with friends and relatives in other communities (Control Lake DEIS, p. 3-149).

Appendix H provides detailed maps regarding the areas that Hydaburg households have ever used to hunt deer. Summarizing, the majority of Hydaburg households hunt deer in Wildlife Analysis Areas (WAA's) 901, 1107, and 1332. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1107 (16 deer) and 1332 (12 deer) (ADF&G 1995).

Community Comments

A number of Hydaburg residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Hydaburg residents who responded to the issues indicated the current mix of management for fish, wildlife and timber harvesting is appropriate and want to see the current timber sale program continued. Similarly, they believe the Forest Service has an obligation to maintain local and regional economies by continuing the long-term timber sale contracts. They are generally satisfied with existing road management and emphasis on mineral exploration and development. Respondents to the DEIS were dissatisfied with the land allocations in the Hydaburg area, wanting more emphasis on recreation and tourism, and less on timber harvesting. Some respondents on the RSDEIS are concerned for the customary and traditional subsistence use of fish, wildlife, and other resources, and feel that only Native villages should be considered as rural. They are also against additional habitat conservation areas and designation of wild, scenic, and recreation rivers, which would decrease timber harvest.

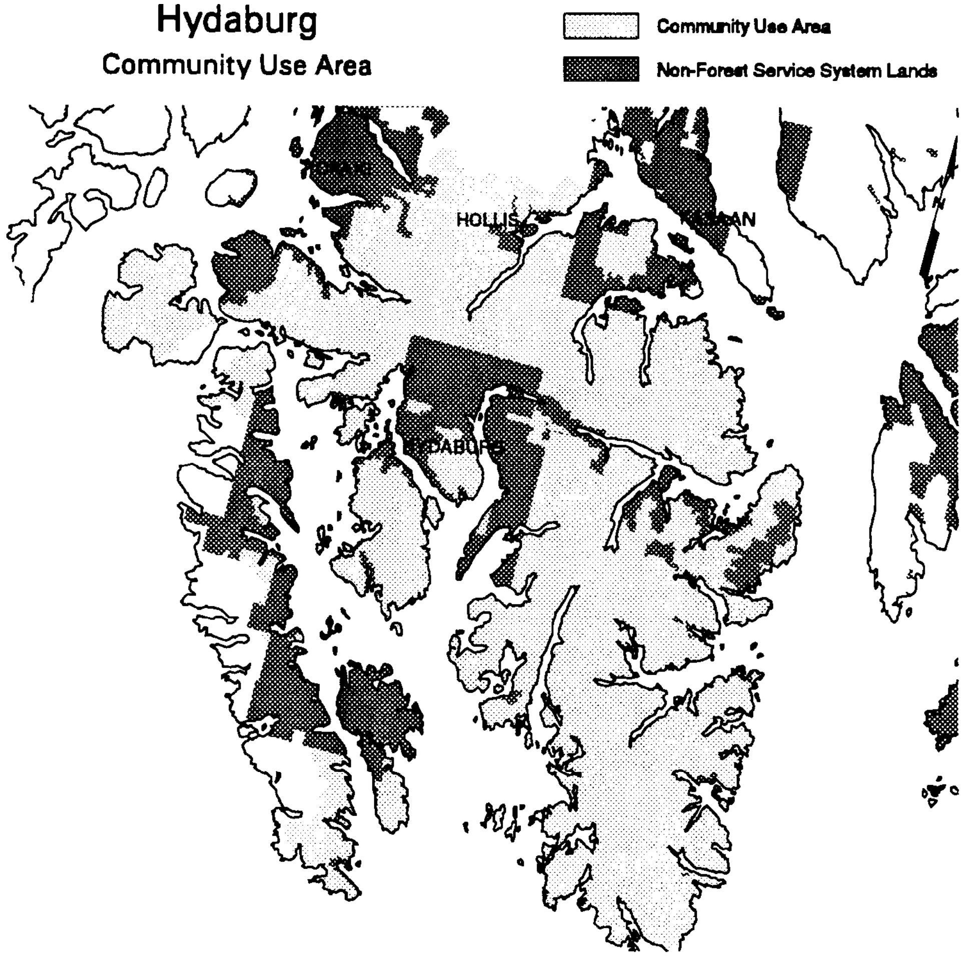
Community Use Area

The general area commonly used or related to by many of the residents of Hydaburg in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 805,526 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Hydaburg's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	85,331	85,331	85,331	85,331	85,331	85,331	85,331	85,331	85,331
Mostly Natural	709,322	233,047	319,744	233,047	279,853	39,702	74,643	319,744	342,919
Moderate Development	10,653	124,186	110,146	124,186	117,089	10,753	102,588	110,146	71,971
Intense Development	0	362,962	290,306	362,962	323,253	669,761	542,865	290,306	304,047
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	144,767	110,302	144,027	129,936	205,056	200,290	110,302	97,997

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Subsistence use and commercial fishing are the primary elements of Hydaburg's economy. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Panel Results: The Socioeconomic Panel rated Hydaburg as most likely to be positively affected by Alternatives 1 and 5, the only two under which quality of life, access to traditional lifestyles, and economic diversity were believed to increase. The other alternatives (especially 7 and 9) were judged as likely to lead to decreases in these community characteristics. Alternative 4 was perceived as having the least effects on existing conditions. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

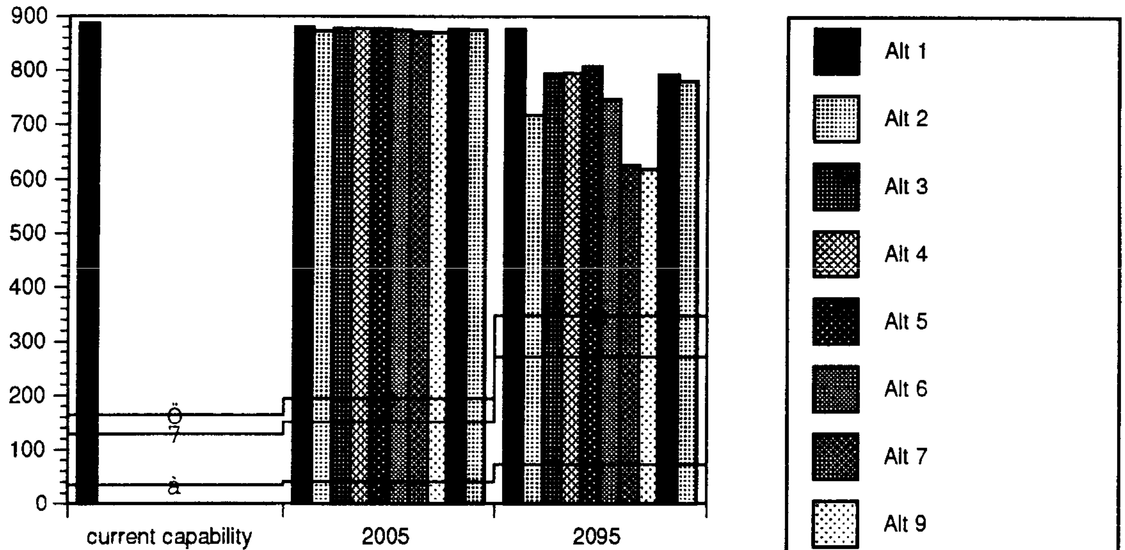
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 80 percent of the total edible pounds of subsistence resources harvest by Hydaburg households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Hydaburg's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Hydaburg residents, as well as for all deer hunted within the WAA's. Deer account for 13 percent of the total edible pounds of subsistence resources harvested by Hydaburg households (Kruse and Frazier 1988).

Alternative 1 is unlikely to have direct impacts on Hydaburg' subsistence use with little timber harvest activity occurring. In Alternatives 2-11, the majority of WAA's where Hydaburg households hunt deer are allocated to development LUD's. Timber harvesting of these areas will likely have direct impacts on Hydaburg's subsistence use. Alternatives 3, 6, 10 and 11, with lands allocated to the Old-growth Habitat LUD, would include some areas not available for timber harvest within Hydaburg's use area. This may decrease the impacts of continued harvesting on Hydaburg's subsistence use. Alternatives 4 and 5 with a longer rotation would likely maintain the habitat around Hydaburg over time.

All of the alternatives, except 7 and 9, offer no timber harvest for the beach fringe areas which are some of Hydaburg's more successful hunting areas. Alternatives 3, 6, 10 and 11 may indirectly impact Hydaburg by displacing hunters from other communities with timber harvest activities outside of the Old-growth Habitat LUD's. Alternatives 2, 7, and 9 would likely increase access opportunities for Hydaburg hunters as timber harvesting activities continue. At the same time, the increased access may also bring in greater competition from other hunters taking advantage of the increased access.

Deer Availability and Anticipated Demand in Areas Used by Hydaburg Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Hyder

Hyder is a small community nestled at the head of Portland Canal, a 70-mile-long fjord which forms a portion of the U.S./Canadian border. Hyder is just 2 miles from Stewart, British Columbia, and 75 air miles from Ketchikan. Hyder is one of three Alaskan communities connected by road to Canada. Hyder has a population of 138 (ADCRA 1995), with 1 percent of its population Alaska Native (1990 U.S. Census).

Nass River Tsimshians inhabited the area, which they called Skam-a-Kounst, "a safe place," prior to the coming of white prospectors in the late 1890s. The first official exploration and building at the town site occurred in 1896 by the U.S. Army Corps of Engineers. Stewart also became settled at this time, as gold, silver, and other mineral mining operations developed. The two towns grew together with an initial economic base in mining (ADF&G 1994).

Population: The population of Hyder almost doubled between the 1970 and 1990 census. The community has continued to grow since 1990, increasing by 39 percent in the last six years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	49	77	99	113	127	121	126	138

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Hyder, now billed as the "Friendliest Ghost Town in Alaska," began as a mining town before the turn of the century. It developed as a supply point for the Canadian mining district with a small amount of mining also done in the Hyder area. Most mining ended in the late 1950s. Today, tourism is the town's main industry (ADF&G 1994).

Since 1985 the Alaska Marine Highway has run weekly ferries to Hyder during the summer, increasing the local tourist trade. Tourism has become an economic mainstay for Hyder in recent years; it supports a handful of gift shops, two bars, and a gas station. Hyder's children attend schools in Stewart. Hyder has a local Fish and Game Advisory Committee; Hyder is unincorporated (ADF&G 1994).

Hyder's economy is based primarily on tourism, construction and commercial fishing and is highly seasonal. The 1989 median household income was $23,750 (1990 U.S. Census). This census area had an unemployment rate in 1994 of 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Hyder was 401 edible pounds. Ninety-one percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho salmon, halibut, trout and char, dungeness crab, shrimp, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 30 percent, finfish other than salmon at 22 percent, and other mammals such as moose and bear at 16 percent are the most important subsistence resources for Hyder. Hyder hunters travel an average of 118 miles to their most reliable deer hunting area (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Hyder households have ever used to hunt deer. Summarizing, the majority of Hyder households hunt deer in Wildlife Analysis Areas (WAA's) 1003, 1323, and 1422. As displayed on the Deer Harvest by Community map (in the map packet), these areas are quite a distance from the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1003 (1 deer), and 1422 (1 deer) (ADF&G 1995). This WAA is 70 percent accessible by existing roads.

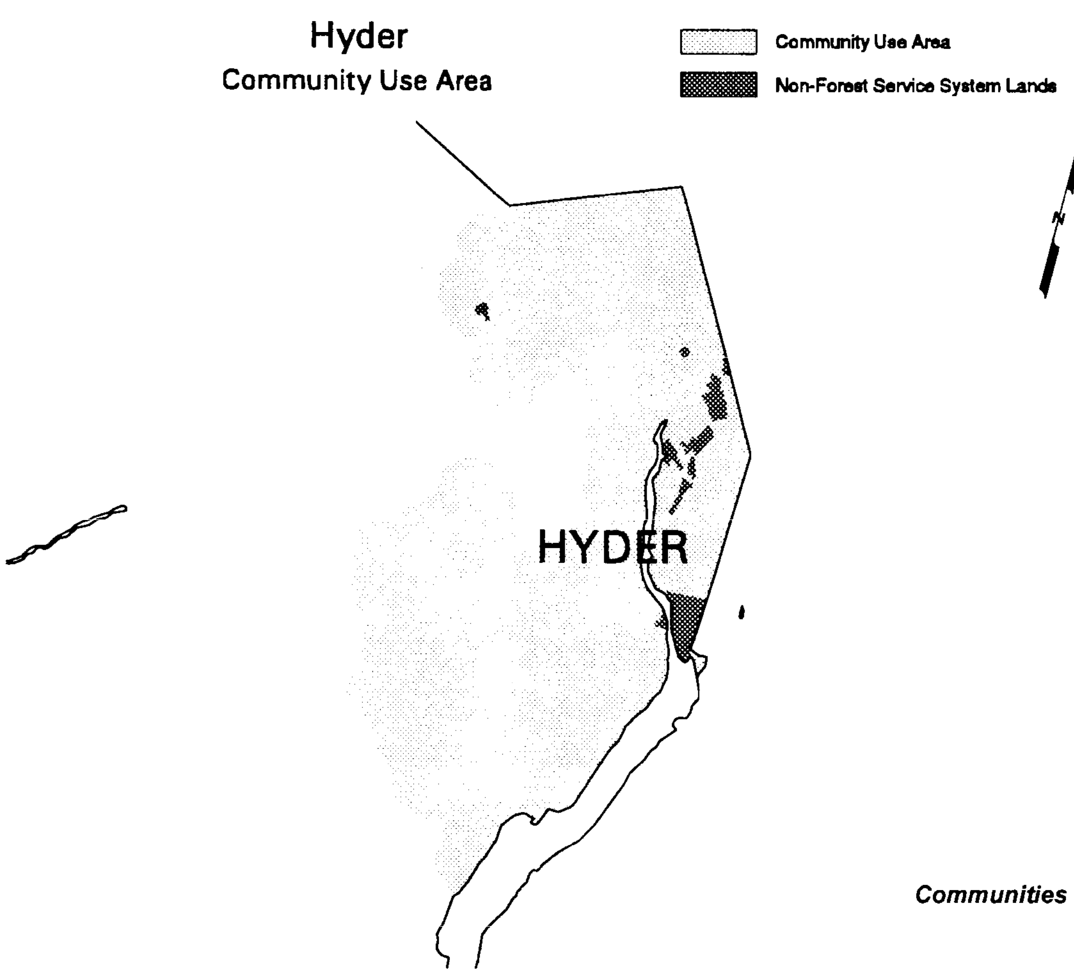
Community Comments

A number of Hyder residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

The Hyder Community Association, Inc. requested that more emphasis be placed on managing for recreation and that additional road access to recreation areas be provided. They also want additional emphasis on fish and recommend that Old-growth Habitat near communities be maintained for wildlife. The Association indicated that the current emphasis on subsistence is adequate. They responded favorably to additional roads, transfer facilities, connecting existing roads, and placing more emphasis on mineral exploration and development. Other residents favored non-timber management and land allocations for the Hyder area.

Community Use Area

The general area commonly used or related to by many of the residents of Hyder in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 108,743 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Hyder's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups (1)	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	60	60	60	60	60	60	60	60	60
Mostly Natural	108,742	76,236	76,236	76,236	76,236	108,742	48,807	76,236	99,100
Moderate Development	0	32,447	32,447	32,447	32,447	0	32,427	32,447	9,642
Intense Development	0	0	0	0	0	0	27,508	0	0
Suitable National Forest System Acres for Timber Management (2)									
Total Suitable Acres	0	4,061	4,061	4,061	4,061	0	4,281	4,061	2,220

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Hyder is a small former mining town which now relies upon tourism and commercial fishing for the majority of its income. No timber development activities are planned in the vicinity of Hyder in any of the alternatives. Although some of the lands along the Salmon River are allocated to LUD's which allow timber harvest in Alternatives 2, 3, 4, 5, 6, 10 and 11, there is no commercial timber harvest currently scheduled. The Scenic Viewshed LUD does allow for fuel wood use.

Tourism (especially bear viewing) has become increasingly important to the economy of Hyder. Recreation use is projected to increase roughly to the same degree in all alternatives, benefiting retail trade in Hyder.

Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Panel Results: The Socioeconomic Panel predicted that the alternatives would generally either have little effect or be slightly positive for Hyder. Within this fairly narrow range, Alternative 7 was rated as more likely to cause increases in quality of life and access to traditional lifestyles. Alternatives 1 and 9 were rated as the only alternatives that could pose risks to access to alternative lifestyles. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

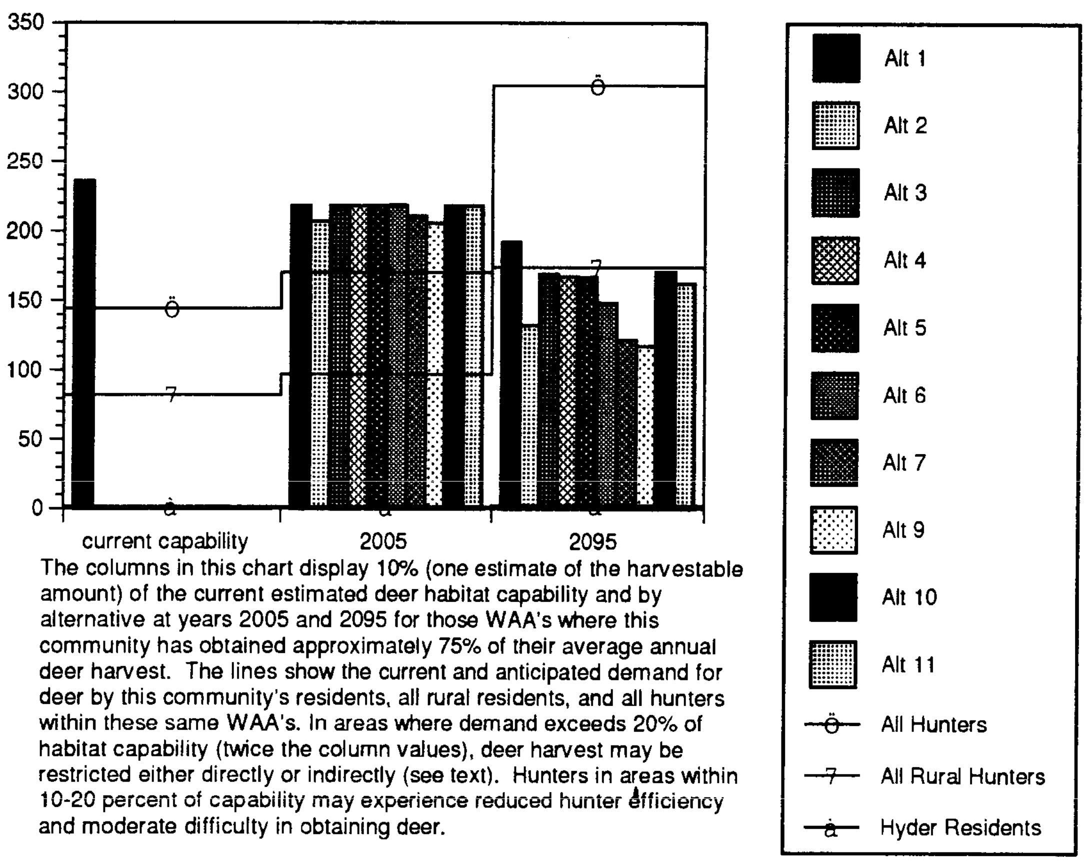
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 80 percent of the total edible pounds of subsistence resources harvest by Hyder households (Kruse and Frazier 1988).

Deer account for only a fraction of the total edible pounds of subsistence resources harvested by Hyder households (Kruse and Frazier 1988). The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Hyder's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Hyder residents, all rural hunters, and all hunters after the first decade.

Alternative 1 is unlikely to have direct impacts on Hyder's subsistence use with little timber harvest activity occurring. In Alternatives 2-11 the majority of WAA's where Hyder households hunt deer are allocated to development LUD's and timber harvesting may impact Hyder's subsistence use. Alternatives 3, 6, 10 and 11, which include allocations of the Old-growth Habitat LUD's, have reduced potential for timber harvest in a small area of Hyder's use area. Alternative 4 and 5 with a longer rotation would likely maintain the habitat within Hyder's use area over time. Overall, because deer do not account for much of Hyder's subsistence use, all alternatives are unlikely to significantly affect Hyder hunters.

The displacement of hunters that may occur in Alternative 2-11 with continued or increased timber harvesting would likely increase competition for subsistence resources. Impacts of increases in competition may not greatly affect Hyder hunters who are already traveling long distances for hunting. Indirectly, alternatives with opportunities for expanding access may benefit Hyder hunters with lower costs of access.

Deer Availability and Anticipated Demand in Areas Used by Hyder Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Juneau and Vicinity

The City and Borough of Juneau surrounds the Gastineau Channel in Southeast Alaska. It lies 900 air miles northwest of Seattle and 600 air miles southeast of Anchorage. The City and Borough are comprised of three communities: Juneau, Auke Bay and Douglas. The population is 29,755 (ADCRA 1995), making it the most populated community in Southeast Alaska. Almost 13 percent of this population is Alaska Native (1990 U.S. Census).

Originally, Tlingit Indians made seasonal and permanent villages along the north and south coast near the present site of Juneau. Gold discovered in the Juneau area started the mining town in 1880 and the settlement grew rapidly. Two of the world's largest lode gold mines produced over $180 million in gold before finally closing in 1944. The state capital was moved from Sitka to Juneau in 1906 while Alaska was still a territory. Alaska became the 49th State in 1959. Juneau has developed as a government and regional services center, with added economic contributions from fishing and tourism.

Population: The population of Juneau shows a trend of steady growth, the population almost doubled between the 1970 and 1990 census. Since 1990, the population has continued to grow by nine percent.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	13,556	19,528	26,751	27,688	28,038	28,361	28,519	29,228

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: As state capital, Juneau's economy is overwhelmingly supported by government and administration, with tourism another significant contributor during the summer months. Approximately 373,000 visitors arrive each year on cruise ships, with the Mendenhall Glacier being the premier attraction. Other major sectors include mining and fishing; minor economic sectors include retail trade, education services, other professional services, construction, and transportation. The 1989 median household income was $47,924 (1990 U.S. Census). Unemployment in 1994 in the Juneau Borough was 6 percent, compared to a Southeast rate of 8.2 percent (*Alaska Economic Trends* 4:1995).

Recreation and Hunting Use Areas: The Tongass is primarily used for recreation by Juneau residents and visitors. Some 61,655 visitors took helicopter tours into the ice field above the town in 1995. Another 182,000 took bus tours to the Mendenhall Glacier Visitor Center. The four Forest Service cabins that are off the Juneau road system, as well as the 24 in the area, have regular use. The local cabins are used year-round.

Juneau residents also use the Tongass for hunting, fishing and hiking, although the community is not a subsistence community. There are an estimated 100 miles of hiking trails in the Tongass National Forest off the Juneau road system.

In recent years, there has been growing interest in ecotourism in the area. Outfitter guides take small groups on hikes or boat trips, with the goal of leaving as little mark on the environment as possible. Tourism involving the forest is expected to continue to increase.

Appendix H provides a detailed map regarding the areas that Juneau households have used to hunt deer. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 2722 (351 deer), 3835 (267 deer), and 3836 (251 deer) (ADF&G 1995). As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community.

Glossary

Community Comments

A number of Juneau residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Juneau residents who responded to the issues requested that additional emphasis be placed on scenic resources, recreation, fish, wildlife, and subsistence. Written and oral comments offered by Juneau residents reflected considerable differences of opinion. Some believe that timber harvest on the Tongass is occurring at too fast a rate, that subsistence effects are being ignored, and that watershed protection is inadequate. Others believe that an inadequate amount of timber is currently offered and that the Forest Service should provide for the expansion of the timber industry. Many residents expressed dissatisfaction with the application of the Minerals LUD to the Juneau area. Many also requested non-timber management for specific areas, especially Mansfield Peninsula.

The community agreed on its comments to the RSDEIS that the Tongass should be managed for multiple use and that resources such as water, wildlife, fish, old-growth, and "special places" need to be protected. They also believe that the subsistence lifestyle of Alaska people must be protected. Residents were split in their opinion of managing the Forest to emphasize timber harvest. Some want the same mix of emphasis, some want less timber harvest. Those who responded favor additional roads and connecting existing roads also expressed support for additional emphasis on access for mineral exploration and development.

Community Use Area

The general area commonly used or related to by many of the residents of Juneau in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 2,043,937 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Glossary

Juneau's Community Use Area

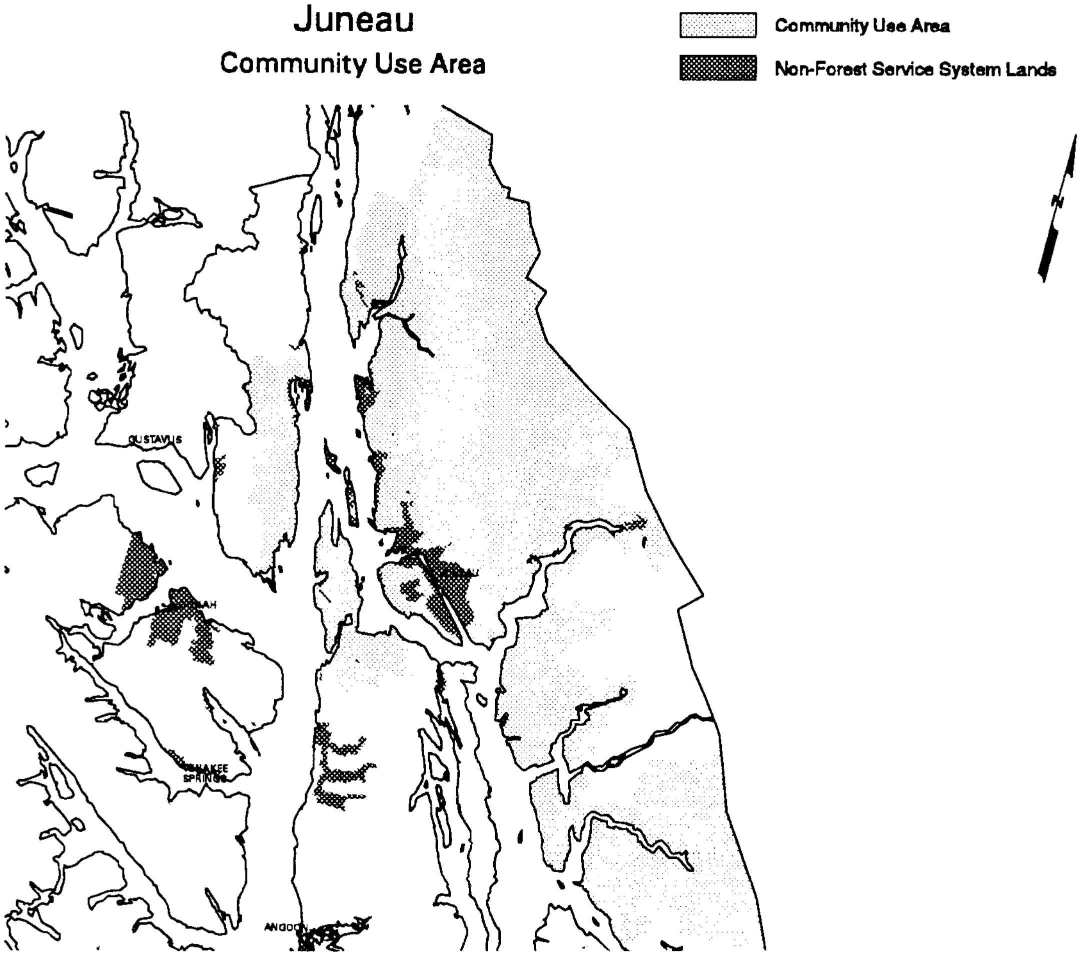
	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	389,482	389,482	389,482	389,482	389,482	389,482	389,482	389,482	389,482
Mostly Natural	1,646,88 9	1,430,79 2	1,511,65 9	1,430,79 2	1,431,82 5	1,019,66 3	1,278,14 4	1,511,65 9	1,494,80 1
Moderate Development	7,446	187,144	120,640	187,144	186,130	442,665	349,974	120,640	136,816
Intense Development	0	36,519	22,156	36,519	36,500	192,128	26,217	22,156	22,838
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	49,249	25,294	48,110	48,110	103,326	72,053	25,294	28,706

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Juneau

Community Use Area



Potential Effects

As the state capital, government is important to Juneau. Besides changes in government employment, Juneau is most likely to be affected by changes in mining, recreation and tourism, and commercial fishing.

Mining has again become important to the community of Juneau. Greens Creek Mine restarted operations in 1996 and the Kensington Mine is expected to open while this plan is in effect. These developments would not be affected by any of the alternatives.

Recreation and tourism use is expected to increase by roughly the same amount in all alternatives. This should benefit retail and services sectors in Juneau.

Commercial fishing is not expected to be significantly affected by Forest Service activities in any alternative.

Local recreation activities (Juneau is not a rural community with subsistence priority) are centered around the Juneau roaded area, Admiralty Island, Taku Inlet and Lynn Canal (and the islands near Juneau). The recreation opportunities on National Forest lands should not be affected by timber harvest in any alternative. Although some lands are available for timber harvest in some alternatives, no harvest is scheduled.

Panel Results: The Socioeconomic Panel rated Alternative 1 as having the greatest potential for positive effects on Juneau, despite decreasing employment in timber. Alternatives 3, 4, 5, 6, 10 and 11 were viewed as having little effect either way, while Alternatives 7 and 9 were judged as most likely to cause decreases in non-timber resource jobs, quality of life, recreation opportunities, and access to traditional lifestyles. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

Hunting: The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Juneau's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by all rural residents, this community's residents and all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should provide enough deer for all rural in the short term. The projected deer harvest for Juneau residents and all rural, and all hunters exceeds 10 percent of habitat capability in the short term and long term and a restriction may become necessary. If a restriction were necessary, sport hunting by urban residents would be restricted before subsistence hunting by rural residents.

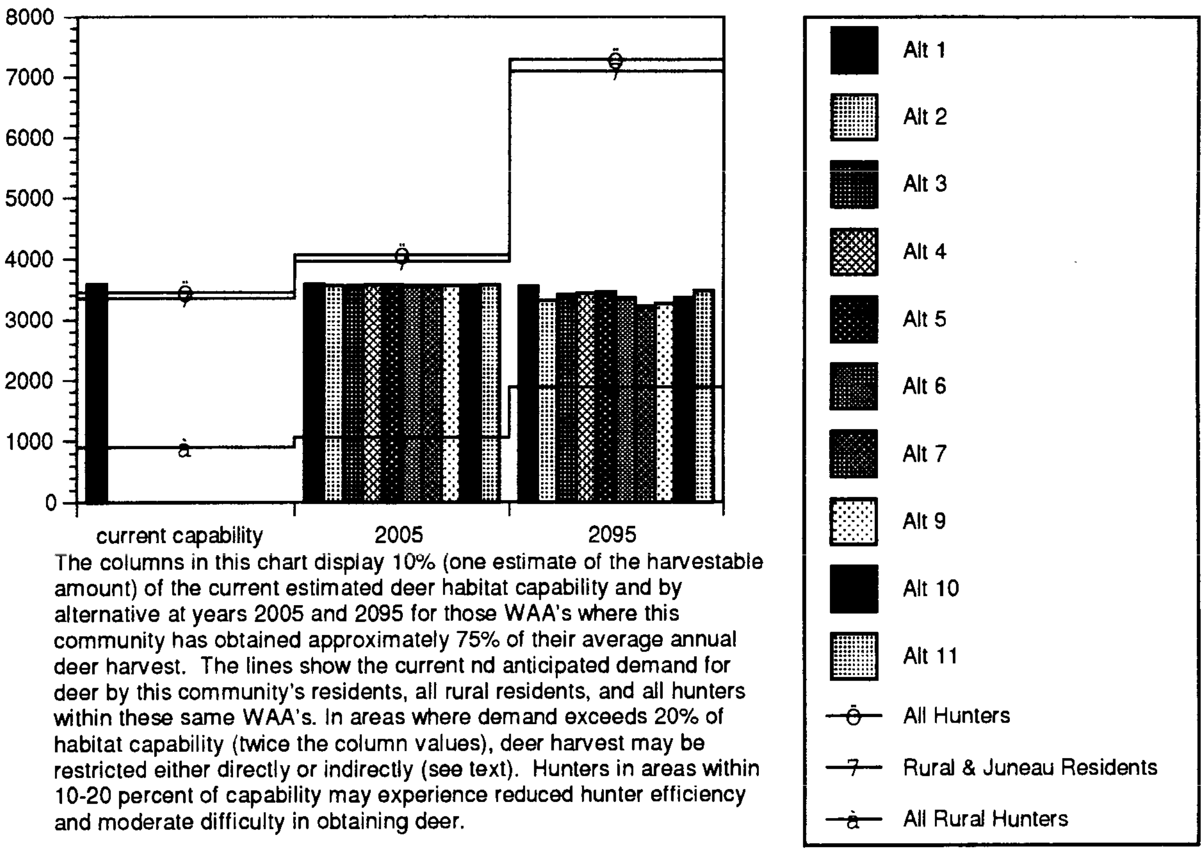
Juneau is not classified as a subsistence community, however many residents use the surrounding Tongass for sport hunting and fishing.

WAA's 3835, 2722, 3526, 4150, 3536, 4146, 4044, 3551, and 2621 will have deer winter range conserved in Alternatives 1, 3, 4, 5, 6, 10 and 11. Alternative 1 is unlikely to have direct impacts on Juneau's hunter use with little timber harvest activity occurring. In all alternatives, the majority of the area used by Juneau hunters is within Wilderness and will not be affected by any option. Alternatives 3, 6, 10 and

11 allocate Old-growth Habitat LUD's within non-Wilderness areas hunted by Juneau residents, providing greater benefit to wildlife in these use areas. Alternatives 4 and 5 with their longer rotation would likely maintain the habitat within these same use areas over time.

The displacement of hunters that may occur in Alternatives 2-11 with continued or increased timber harvesting would likely increase competition for deer. The impact of increased competition may not greatly affect Juneau hunters who already hunt in areas of limited access without opportunities to expand. Also, they are traveling long distances for hunting and may indirectly benefit with lower costs of access from alternatives that have opportunities for expanding access.

Deer Availability and Anticipated Demand in Areas Used by Juneau Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current nd anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Kake

Kake is located on west Kupreanof Island, along Keku Strait, 38 air miles northwest of Petersburg. Kake's population is 696 (ADCRA 1995), with 74 percent of the residents are Alaska Natives (1990 U.S. Census).

Tlingit Indians built villages and fishing camps in the Kake area in the early 1700s. During the 1800s these villages were consolidated at the present site of Kake. In the years following the American purchase of Alaska from Russia in 1867, there were several confrontations between the ***Keex'*** Tlingit and the Russian and American military administrations culminating in the destruction of three Kake villages. For many years, the ***Keex'*** people did not rebuild their villages. Eventually, they concentrated on Kupreanof Island at the present townsite along Keku Strait (ADF&G 1994).

The period of 1880-1915 brought a territorial government, missionary activity, economic innovations and a larger white population into ***Keex'*** Tlingit territory. By the 1920s, Kake had become self-governing, with a mayor and police chief. In 1949, Kake formed an IRA Council under the Indian Reorganization Act of 1936. In 1952, Kake became incorporated as a first class city. In 1971, the passage of ANCSA resulted in the incorporation of the village and the selection of corporation lands (ADF&G 1994).

Population: The population of Kake increased by 56 percent between the 1970 and 1990 census. The population continued to increase through 1993, then declined in 1994 to below the 1990 level. The population increased some in 1995 but the population is still slightly below the 1990 census.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	448	555	700	713	724	725	684	696

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Economic changes increased in the early 1900s as commercial development in the area began to expand and opportunities for wage earning increased. Commercial fishing, fur farming, trapping, and logging became the primary means of adding cash to the subsistence economy (ADF&G 1994).

The timber industry in the Kake area began in 1968, when the Soderberg Logging Company established a camp in Kake. In the early 1980s, as the market for timber declined and harvesting from public lands became less profitable, Soderberg Logging Company ceased its timber harvesting and began to build roads for Kake Tribal Corporation, which was beginning to log corporation lands on northern Kupreanof Island (ADF&G 1994).

Kake's major economic sectors are fishing and fish processing, and government services. Employment is highly seasonal. The 1989 median household income was $35,875 (1990 U.S. Census). Unemployment in this census area in 1994 was 9.2 percent, compared to a Southeast rate of 8.2 percent (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Kake was 159 edible pounds. About 91 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho, chinook and sockeye salmon, halibut, herring roe on kelp, deer, seal, dungeness crab, clams and cockles, chitons, berries, seaweed and wood (TRUCS 1989).

Based on edible pounds harvested, deer at 24 percent, salmon at 22 percent and finfish other than salmon at 21 percent are the most important subsistence resources for Kake households (Kruse and Frazier 1988). Kake hunters travel an average of 28 miles to their most reliable deer hunting. A study of harvest and use of fish and wildlife by Kake residents indicates a high degree of conformity between contemporary use area and traditional deer hunting territories of the Kake Tlingit (Firman and Bosworth, 1990, *in* Shamrock Timber Sale EIS , p. 3-50). The majority of Kake's deer harvest comes from Wildlife Analysis Areas 3939 and 3940 at the southern portion of Admiralty Island.

Appendix H provides detailed maps regarding the areas that Kake households have ever used to hunt deer. Summarizing, the majority of Kake households hunt deer in Wildlife Analysis Areas (WAA's) 3938, 3939, and 3940. As displayed on the Deer Harvest by Community map (in the map packet), these areas are moderately close to the community. In terms of the 1993 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 3940 (99 deer) and 3939 (41 deer) (ADF&G 1995). These WAA's are essentially roadless.

Community Comments

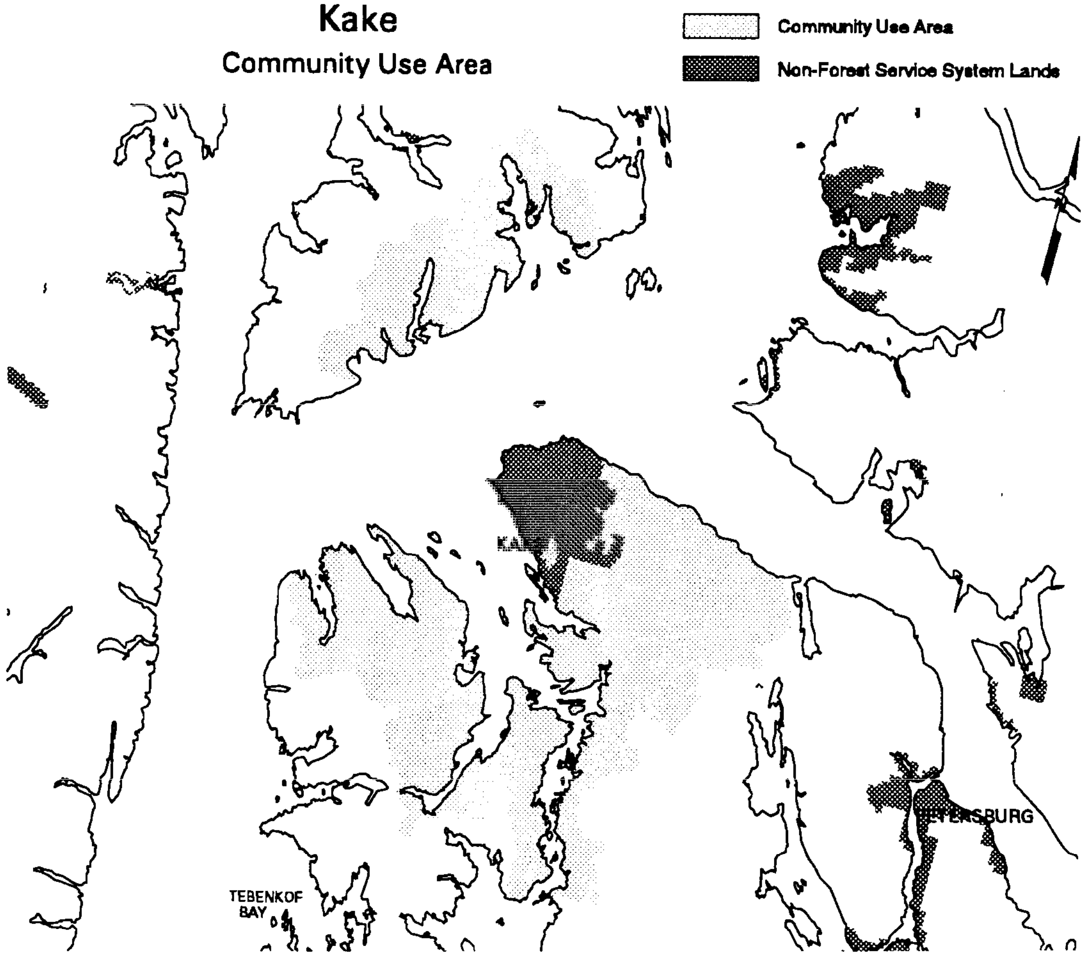
A number of Kake residents offered oral and/or written testimony during the TLMP revision DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Kake Tribal Corporation, the City of Kake, and the Kake District Commissioner for Subsistence expressed concern for Security, Rowan, Pillar, Tebenkof and Kadake Bays, indicating these are important subsistence use areas particularly for salmon. They do not want logging in these areas. Others made similar comments, with all wanting no or reduced logging on north Kuiu Island. Those who commented from Kake on the RSDEIS want to ensure that future generations who harvest timber take care of the land. They place tremendous value in the traditions and values passed down from their ancestors and see the trees as providing both spiritual and physical needs.

Community Use Area

The general area commonly used or related to by many of the residents of Kake in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 456,325 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Kake
Community Use Area



Kake's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	105,228	105,228	105,228	105,228	105,228	105,228	105,228	105,228	105,228
Mostly Natural	271,354	92,742	114,766	92,742	112,287	3,679	77,701	114,766	153,224
Moderate Development	0	23,715	17,509	23,715	18,689	0	7,637	17,509	13,824
Intense Development	79,743	234,641	218,823	234,641	220,122	347,419	265,759	218,823	184,049
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	82,509	75,481	81,508	78,161	116,744	96,929	75,481	70,968

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Kake is a traditional native community where commercial fishing, timber harvesting, and subsistence use are important. For subsistence use, west Kupreanof and north Kuiu Islands are some of the most important areas.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Timber harvest has been an important contributor to the Kake economy for approximately twenty years. During that period, both private and National Forest system lands have been harvested. Recently, timber harvest has diminished on both ownerships. Lands near Kake are available for timber harvest in all alternatives. Alternative 1, with no timber harvest scheduled, would result in the least amount of harvest. Alternatives 2, 7, and 9 could result in the highest amount of harvest and therefore largest contribution to Kake's economy. Other alternatives also allow for timber harvest, but would likely result in less of a contribution to the Kake economy.

Panel Results: The Socioeconomic Panel predicted that residents of Kake would be most likely to benefit from Alternative 1, followed in order by Alternatives 5, 6, 3, and 4. Panelists were divided on whether these latter four alternatives would be neutral or positive. There was greater agreement that Alternative 7, followed by Alternatives 2 and 9, would pose the greatest risks of decreases in characteristics of the community that people care about, including quality of life, community stability, economic diversity, and access to traditional lifestyles. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

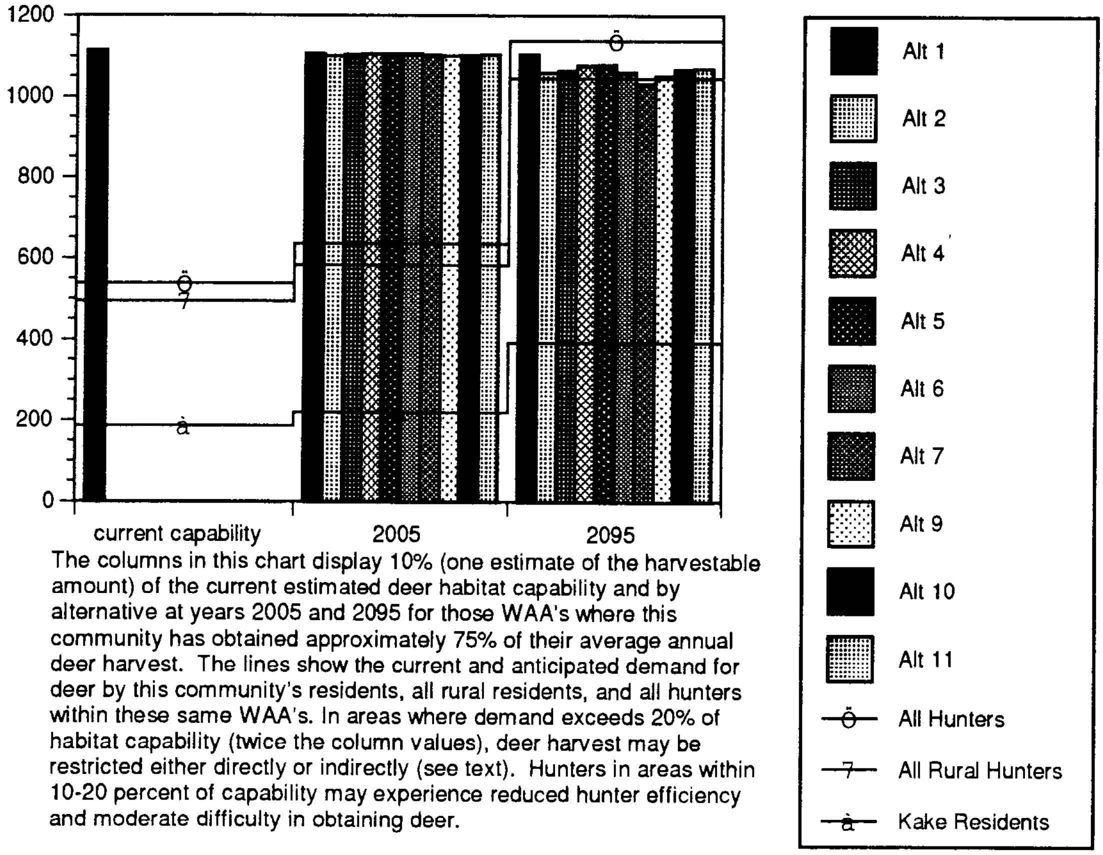
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 52 percent of the total edible pounds of subsistence resources harvest by Kake households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated level of deer habitat capability within the WAA's where 75 percent of Kake's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Kake residents, as well as for all deer hunted within the WAA's in the short term. In the long term, projected deer harvest exceeds 10 percent of the habitat capability in Alternative 7 for all rural harvest and in all alternatives for total harvest.. Deer account for 24 percent of the total edible pounds of subsistence resources harvested by Kake households (Kruse and Frazier 1988).

Alternative 1 is unlikely to have direct impacts on Kake' subsistence use with little timber harvest activity occurring. The majority of WAA's where Kake households hunt are within Wilderness which will not change by alternative. A portion of Kake's use area is within a development LUD in Alternatives 2-11 which may be impacted by timber harvesting. In these same areas, Alternatives 3, 6, 10 and 11 will provide some habitat maintenance with Old-growth Habitat LUD's. Alternatives 2, 4 and 5 also provide some wildlife habitat maintenance with recreation LUD's, with 4 and 5 also increasing habitat with longer rotations. Only Alternative 1 restricts all of Kake's use area from possible timber activity.

Indirectly, Alternatives 2, 7 and 9 which may offer opportunities for expanding access may increase competition if hunters from other communities come to Kake's use area due to the increase in access linked to the ferry system. But because much of Kake's hunting already occurs in Wilderness areas with limited access, it is unlikely that competition in these areas would affect them.

Deer Availability and Anticipated Demand in Areas Used by Kake Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Kasaan

Kasaan is a small village located on the eastern side of Prince of Wales Island 30 miles northwest of Ketchikan. Its population is 41 (ADCRA 1995), with 54 percent Alaska Native (1990 U.S. Census).

Originally Tlingit territory, Kasaan gets its name from the Tlingit word meaning “pretty town.” Haidas migrated north from the Queen Charlotte Islands in the early 1700s to the Island and established the village known as “Old Kasaan.” In 1898 the Copper Queen mine, camp, sawmill, post office and store were built on Kasaan Bay, and the Haida people relocated to this new village (ADCRA 1994). The Haida village of Kasaan was settled at its present site in 1904 (ADF&G 1994).

Population: Kasaan’s population fluctuates slightly, without indicating a strong trend. Population numbers were highest in the early 1990’s, but recent years show a slight decline.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	30	25	54	52	64	43	41	41

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Several canneries operated sporadically in the Kasaan area through the 1950s. Mining was another economic impetus for the community. In 1867, Baranovich discovered copper near New Kasaan and opened the Kasaan Bay Mining Company, offering new employment to the residents. However, lack of employment opportunities caused a steady decline in the population during the 20th century from 1900 to 1970 (ADF&G 1994).

Fisheries is the main economic source today. Kasaan’s 1989 median household income was $46,667 (1990 U.S. Census). The unemployment rate in this census area in 1994 was 12.5 percent, compared to a Southeast rate of 8.2 percent (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Kasaan was 186 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook and sockeye salmon, cod, halibut, herring roe on kelp, deer, dungeness crab, clams and cockles, shrimp, berries, seaweed, and wood (TRUCS 1989).

Based on edible pounds harvested, invertebrates at 40 percent, deer at 22 percent and salmon and finfish other than salmon at 17 percent are the most important subsistence resources for Kasaan households. Kasaan hunters travel an average of seven miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Kasaan households have ever used to hunt deer. Summarizing, the majority of Kasaan households hunt deer in Wildlife Analysis Areas (WAA’s) 1316, 1315, and 1214. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA 1315 (7 deer) (ADF&G 1995). This WAA is 57 percent accessible by existing roads.

Community Comments

A number of Kasaan residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

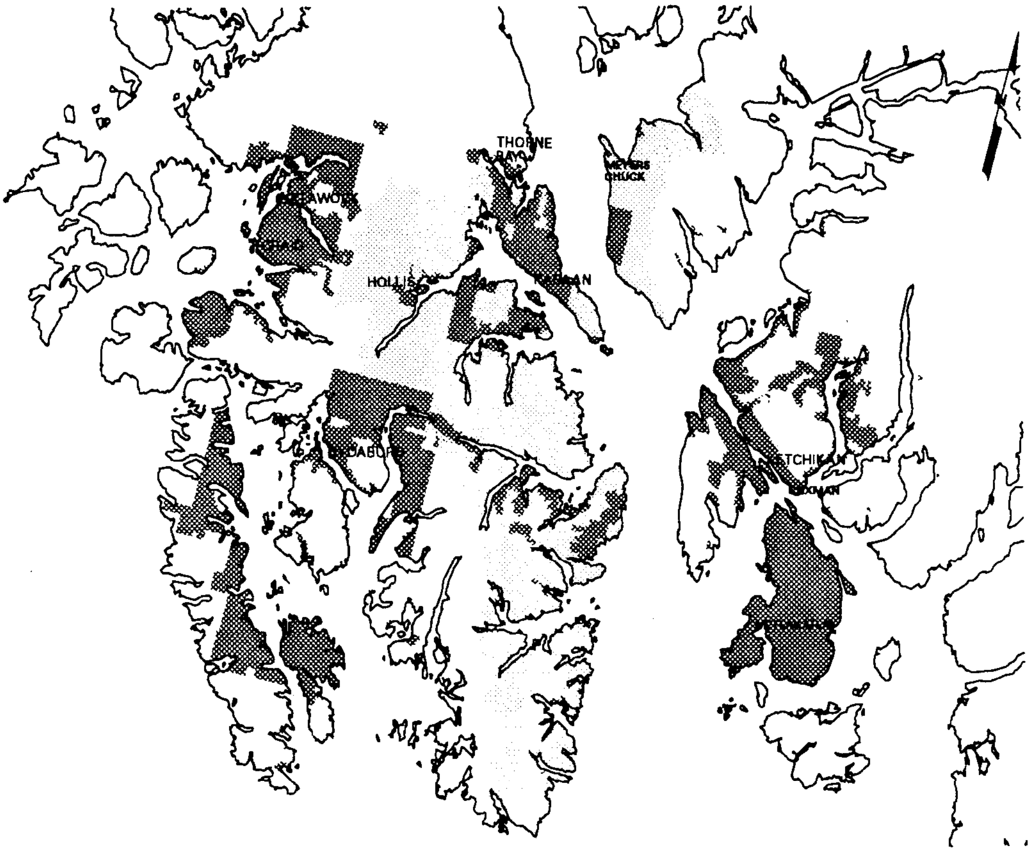
Kasaan residents expressed a desire to reduce the current timber sale program and requested emphasis on access for mineral exploration and development. They favored a road connection to Thorne Bay and other communities. Logging is acceptable, but should not be done at the expense of other resources.

Community Use Area

The general area commonly used or related to by many of the residents of Kasaan in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 542,164 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Kasaan
Community Use Area

Community Use Area
Non-Forest Service System Lands



Kasaan's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	42,209	42,209	42,209	42,209	42,209	42,209	42,209	42,209	42,209
Mostly Natural	489,421	104,899	196,945	104,899	165,782	10,093	39,472	196,945	235,643
Moderate Development	10,653	109,754	79,874	109,754	86,796	10,753	92,964	79,874	55,922
Intense Development	0	285,302	223,135	285,302	247,376	479,169	367,758	223,135	208,728
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	119,230	83,551	118,590	99,038	152,679	147,712	83,551	68,076

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Subsistence use and commercial fishing are the primary elements of Kasaan's economy. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

A road is currently planned for construction which would link the community with the rest of the Prince of Wales Island road system. This road system will give the community road access to the ferry terminal in Hollis. None of the alternatives would affect this planned road connection.

Most timber harvest in the vicinity is on private land owned by the Kasaan native corporation. Nearby National Forest System lands are not currently scheduled for harvest in all alternatives.

The community's domestic watershed on National Forest System land has been allocated on the Municipal Watershed LUD.

Panel Results: The Socioeconomic Panel believed that Kasaan residents would benefit most under Alternatives 1, 5, and 4. Alternatives 2, 3, and 6 were seen as having little effect either way, while 7 and 9 were judged to have the greatest risk of negative socioeconomic impacts. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

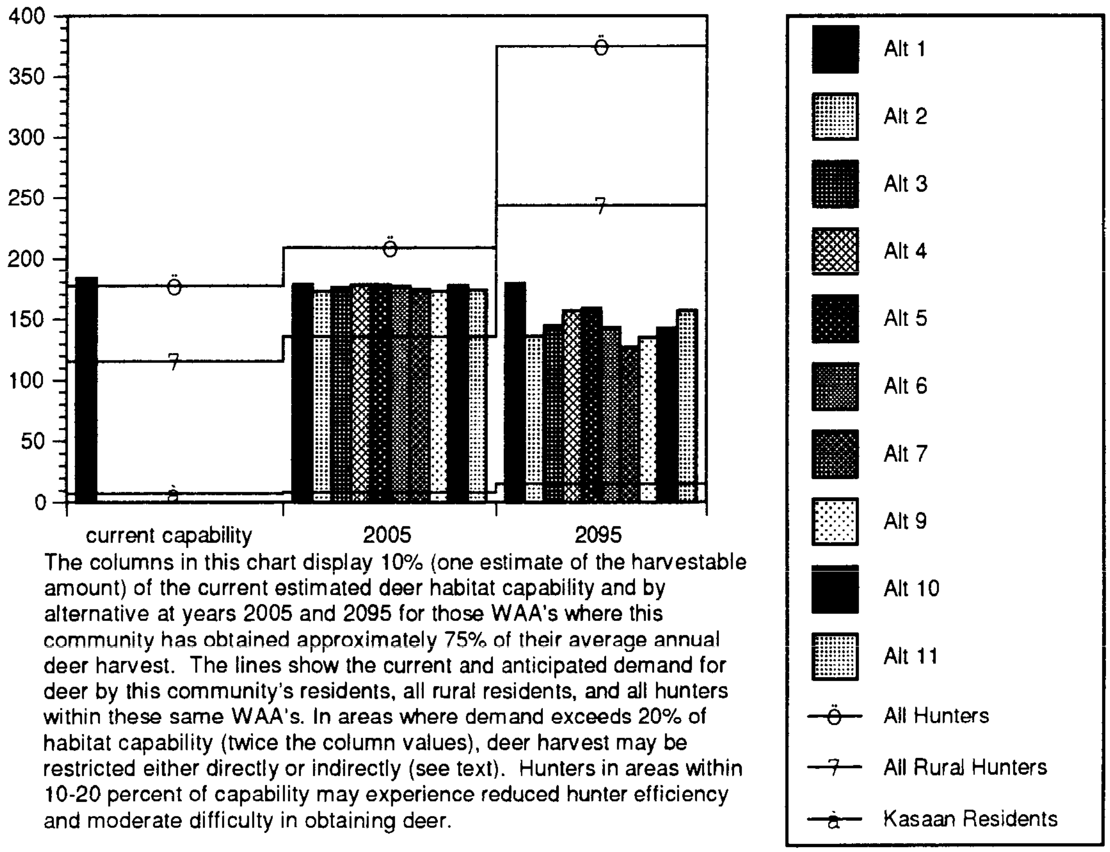
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 74 percent of the total edible pounds of subsistence resources harvest by Kasaan households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Kasaan's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Kasaan residents in both the short and long term. Projected total deer harvest in all alternatives in both the short and long term and all rural deer harvest in the long term exceeds 10 percent of habitat capability and may have future inadequate habitat capability for the total deer hunted within the WAA's. Deer account for 22 percent of the total edible pounds of subsistence resources harvested by Kasaan households (Kruse and Frazier 1988).

As a large portion of Kasaan households' use area is on non-National Forest System Lands, none of the alternatives will affect the habitat in that area. Alternative 1 is unlikely to have direct impacts on Kasaan's subsistence use with little timber harvest activity occurring. Alternative 2, 7 and 9 allocate much of Kasaan's use area to a development LUD. This may directly impact Kasaan's subsistence resource with the timber harvest activity likely to occur there. Alternatives 3, 6, 10 and 11 maintain Old-growth Habitat LUD's within a major portion of Kasaan's use area. This may decrease the impacts of continued harvesting on Kasaan's subsistence use. Alternatives 4 and 5 also limit timber harvest in Kasaan's subsistence use areas with a longer rotation to maintain habitat over time.

Kasaan is currently competing with other communities in their subsistence use areas and this is likely to continue under all alternatives. Alternatives increasing access by roads due to harvest activity may increase competition from other communities on Prince of Wales Island indirectly impacting Kasaan's use. An increase in access may also allow Kasaan households to increase the range of their use.

Deer Availability and Anticipated Demand in Areas Used by Kasaan Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Ketchikan & Vicinity

Ketchikan is located on Revillagigedo Island near the southernmost boundary of Alaska. It lies 679 miles north of Seattle and 235 miles south of Juneau. It is the first Alaska port-of-call for northbound ships. Ketchikan and its vicinity include Ketchikan, Saxman, Mountain Point, Clover Pass, Ward Cove and Herring Cove, which are located on the Ketchikan road system, and Pennock Island. The population of Ketchikan and vicinity is 15,082. Native populations vary from a high of 80 percent in Saxman to a low of less than 8 percent in the Ketchikan suburbs. Ketchikan itself has a population of 8,557 (ADCRA 1995), with a native population of 15.7 percent (1990 U.S. Census). Refer to the section on Saxman for information directly relating to that community.

The Ketchikan area was a summer fishing camp for the Tlingit Indians. Their name for the area, “kitschk-him,” meant “thundering wings of an eagle.” Its abundant fish and timber resources eventually attracted non-Natives, with its first cannery opening in 1886 and four more by 1912. Nearby gold and copper discoveries briefly brought activity to Ketchikan during the late 1890s, but timber and fishing became the chief economic forces at the turn of the century and have remained important. The 1954 construction of a pulp mill in Ward Cove continued a tradition begun by the 1903 opening of Ketchikan Spruce Mills which operated for more than 70 years. It has also remained an important hub for fishing, both for fish processing and as home to those with fishing permits.

Population: Ketchikan’s population increased by 37 percent between the 1970 and 1990 census. Since 1990, the population has continued to grow with a nine percent total increase.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	10,041	11,316	13,828	14,321	14,510	14,665	14,745	15,082

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Ketchikan is an industrial center and a major port of entry in Southeast Alaska. It has a large fishing fleet, fish processing facilities, timber and wood products manufacturing and tourism. The State operates a hatchery which contributes to the local salmon population. Cruise ships dock in the summer bringing in more than 300,000 tourists each season. The economy, in general, is diverse enough to provide stability in the professional, technical, and service sectors (ADF&G 1994).

Unemployment in this census area in 1994 was 8.3 percent, compared to 8.2 for the Southeast region (*Alaska Economic Trends* 4:1995). Average per capita income in 1992 was $27,761 (Ketchikan Gateway Borough (KGB), *Overall Economic Development Program,* 1994*).*

The KGB is now considering ways to diversify its economy further. These plans include improving fisheries services, such as building a cold storage, building an aquarium to enhance tourism, and constructing a bridge between Ketchikan and its airport (KGB 1994; ADCRA 1995).

Hunting and Recreation Use: Because Ketchikan is not a rural community, and therefore not classified as a subsistence community, it was not included in TRUCS. Ketchikan residents do use the Tongass for hunting and fishing.

Appendix H provides a detailed map regarding the areas that Ketchikan households have used to hunt deer. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA’s 101 (121 deer), 613 (99 deer), and 406 (90 deer) (ADF&G 1995). As displayed on the Deer Harvest by

Glossary

Community map (in the map packet), some of these areas are close to, and some are quite a distance, from the community.

Community Comments

A number of Ketchikan residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Comments received during the DEIS and SDEIS comment period are reflected first below, followed by RSDEIS comments. There is a difference in the flavor of the comments due to the potential change in circumstances in Ketchikan.

Individual respondents to the issues expressed an interest in being able to harvest timber along Alaska Marine Highway routes, roads, and streams, and around their community. However, the Ketchikan Chamber of Commerce recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality and to display a multiple-use forest.

The Ketchikan State Parks Advisory Board recommended additional road access to recreation areas and the Chamber recommended developed recreation sites. Ketchikan residents also generally favor roaded recreation opportunities and roaded access to the rest of Revilla Island.

Some respondents requested that greater emphasis be placed on fish, and maintenance of Old-growth Habitat near their community for wildlife. The Chamber of Commerce indicated that the current management emphasis for wildlife and timber harvesting is adequate. Individuals who responded to the issues along with the Chamber agree that current management emphasis on subsistence is adequate and that timber harvest and road construction have a positive effect on subsistence opportunities. Many other respondents want the current timber sale program and the long-term contracts to continue, and many requested an increase in the Allowable Sale Quantity (ASQ).

Individual Ketchikan respondents want less Wilderness as does the Chamber. The Ketchikan State Parks Advisory Board recommended that portions of existing Wilderness be made available for timber harvest in exchange for other Wilderness-like areas. The Chamber supports additional emphasis on timber and mining. However, the State Parks Advisory Board wants emphasis on tourism, wildlife, recreation and subsistence. Individuals commented that a balanced combination of timber, mining and other commodity industries with tourism, recreation and fishing would be most desirable.

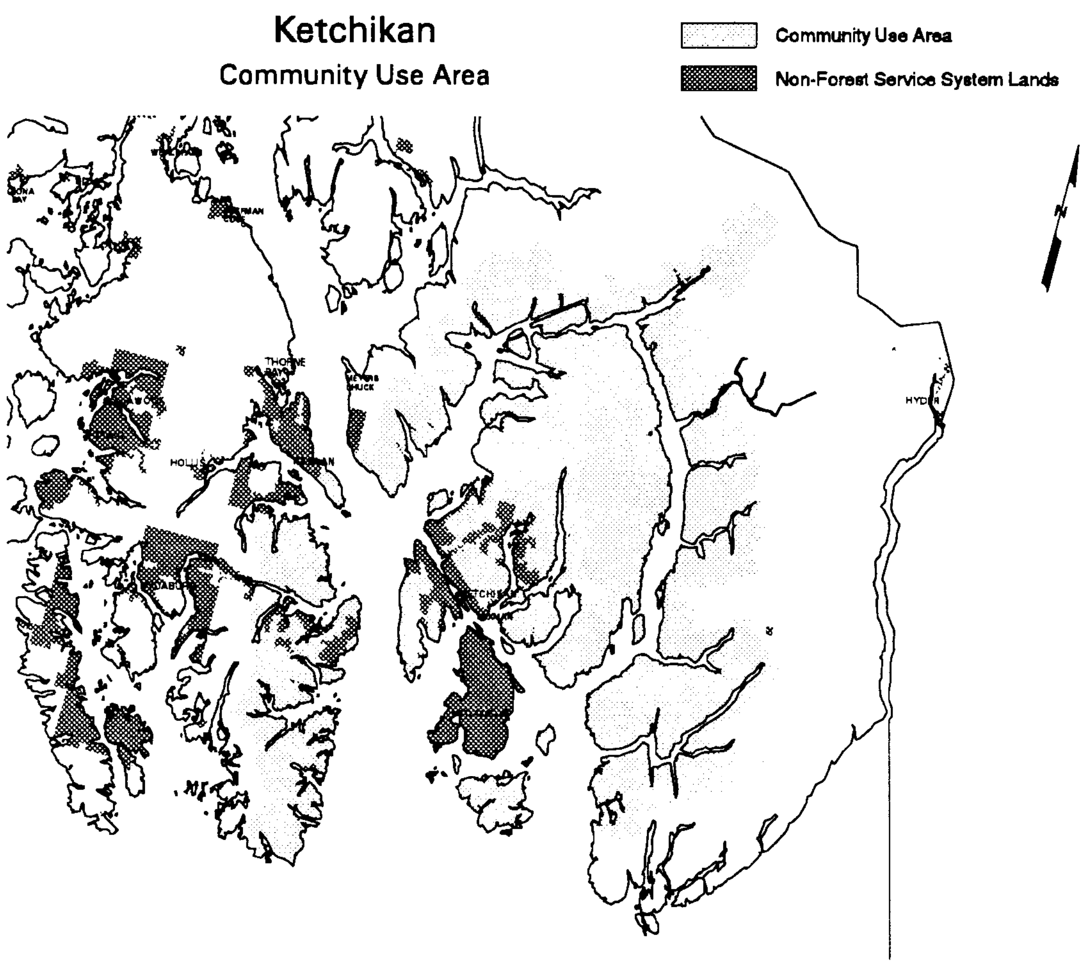
Those offering oral or written testimony expressed considerable differences of opinion. The Ketchikan Chamber of Commerce, Alaska Women in Timber, and many individuals pointed out the importance of the timber industry to the economy of Southeast Alaska. They want a higher ASQ than currently exists and believe that roads created for logging can provide more recreation opportunities. The Tongass Conservation Society and many individuals do not want high-volume old-growth harvested, particularly on Cleveland Peninsula, Honker Divide, Salmon Bay, and

Orchard Lake and Creek. They would like more emphasis on recreation and subsistence in these areas.

The following is a summary of the major comments and concerns during the RSDEIS comment period. Many residents stressed the importance of maintaining clean water for the purpose of sustaining the salmon population. Opinion was split on whether or not there was adequate protection for the fisheries. The majority of the people responding did not support the Preferred Alternative because they believe it would not provide enough timber to keep the area thriving economically. Others felt it did not provide enough protection for fish, wildlife, and old-growth resources. People strongly support sustainability and many believe that timber production and other lands uses can co-exist harmoniously. Many residents are concerned about the unemployment in the area. People want to work and not rely on the government for handouts. They support value-added wood products industry as a complement to existing manufacturing facilities. They want scientific studies that will result in a plan to meet all the needs of the community.

Community Use Area

The general area commonly used or related to by many of the residents of Ketchikan in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 2,062,784 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Ketchikan's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	962,350	964,412	964,412	964,412	964,412	952,604	965,032	964,412	968,572
Mostly Natural	1,100,434	460,083	575,944	460,083	480,111	102,142	362,162	575,944	646,543
Moderate Development	0	195,229	141,345	195,229	184,180	0	276,394	141,345	109,389
Intense Development	0	443,060	381,082	443,060	434,081	1,008,038	459,196	381,082	338,280
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	190,926	141,671	188,706	184,046	293,191	231,688	141,671	123,124

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Ketchikan would be primarily influenced by changes in recreation and tourism use, commercial fishing, timber processing, and recreation opportunities.

The timber industry would be subject to the largest amount of variation among the alternatives. KPC has announced the closure of the pulp mill effective March, 199. This closure will affect the community under all alternatives, resulting in the loss of approximately 500 direct wood product jobs within the community. Alternative 1 would likely result in the closure of the Ketchikan Pulp Company (KPC) Sawmill and Seaborne Lumber. This would significantly reduce the employment level, tax base, and income level within the community. Alternatives 4 and 5 would likely result in the closure of either Seaborne Lumber or one of KPC's sawmills if timber prices increase. If timber prices remain constant, Alternatives 4 and 5 would likely close Seaborne Lumber and one of KPC's sawmills. Alternative 6 should supply enough timber to operate both sawmills at full capacity if prices increase, and enough timber for at least one shift if prices remain constant. Alternative 6 should yield enough chipped wood for the pulp mill to operate at full capacity if KPC is able to purchase all the pulp grade logs from independent operators. Alternatives 3, 10 and 11 would provide enough timber supply to operate both the KPC sawmills and Seaborne Lumber operating at one shift. In addition, there would be enough timber supply to operate one of these mills at full capacity if timber prices increase. Alternatives 2, 7 and 9 should provide enough timber to operate both sawmills at full capacity.

Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Recreation and tourism have become increasingly important to the economy of Ketchikan. The downtown dock has been expanded to accommodate additional cruise ships and a new waterfront development is under construction. Ketchikan is also the stop-over point for visitors traveling to Misty Fiords and Prince of Wales Island. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives, benefiting retail trade in Ketchikan. However, since the closure of the pulp mill, the resulting declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is much lower. This impact of declining timber employment will be increased in Alternatives 1, 4, and 5 due to the potential closure of some or all of the sawmills.

The most important recreational area for Ketchikan residents include Cleveland Peninsula, Revilla Island, Gravina Island, and Misty Fiords. Alternative 1 maintains all of these areas in essentially their current condition. This would provide for Remote and Semi-Remote Recreational opportunities but would preclude road access for residents to the northern end of Revilla Island via Carrol River. Alternatives 2 and 9 would allow some timber harvest on Cleveland Peninsula and Revilla Island including a potential road connection out of town to the northern part of Revilla. Gravina Island and Misty Fiords would remain in their current condition. Alternative 3 would allow some timber harvesting on Cleveland Peninsula but avoid Union Bay. The visual quality would be maintained in Helm Bay. Some timber harvesting would be permitted on Revilla Island, but key recreation and wildlife areas would be avoided. Misty Fiords and Gravina Island would be maintained in the current condition. Alternative 10 will allow some timber harvesting on Cleveland Peninsula but avoid the high use areas of Helm Bay, Union Bay and the entire southern end of the peninsula. Alternative 4 would maintain Revilla Island, Gravina Island, and Misty Fiords in their current condition. Alternatives 3 and 11 would permit some timber harvesting on Cleveland Peninsula but would be mitigated to maintain important recreation places. Alternatives 5 and 6 would maintain Revilla Island, Gravina and Misty Fiords in their current condition. Some timber harvesting would be permitted on Cleveland Peninsula but would be mitigated to maintain important wildlife and recreation places. Alternative 7 would allow intensive timber harvest on Cleveland Peninsula, Gravina, and Revilla Island. Misty Fiords would be maintained in its current condition.

Panel Results: The Socioeconomic Panel ratings of effects on Ketchikan suggested that effects would be complex and somewhat difficult to predict. Alternative 6 was judged to have the greatest potential to positively affect Ketchikan, followed by Alternative 5, although raters disagreed on whether 5's effects on economic structure and quality of life would be positive or negative. Alternative 1 was viewed as decreasing economic diversity, community stability, and the overall quality of life. Alternative 7 and 9 also were seen as having potential for negative effects. Panelists differed on whether Alternative 4's effects on these variables would be negative or would have little potential for change either way. Alternative 2 was viewed as the most likely to maintain the status quo. Alternative 3 was viewed as increasing employment in tourism and increasing recreational opportunities, but was seen as a potential risk to community stability and quality of life. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

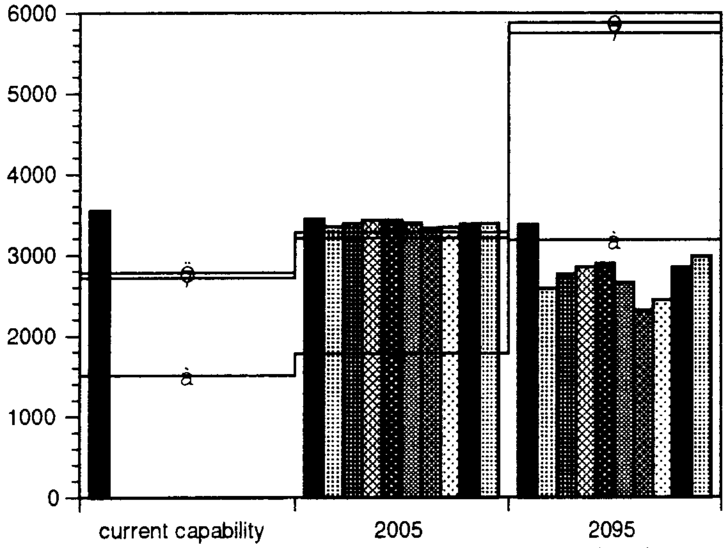
Hunting: The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Ketchikan's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future timber harvest activity. The lines show the current and anticipated demand for deer by all rural residents, this community's residents and all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by all hunters in the short term. In the long-term, Alternatives 2-11 exceed 10 percent of habitat capability for all rural harvest, and all alternatives exceed 10 percent for Ketchikan and rural harvest. If a restriction were necessary, sport hunting by Ketchikan residents would be restricted before subsistence hunting by rural residents is restricted.

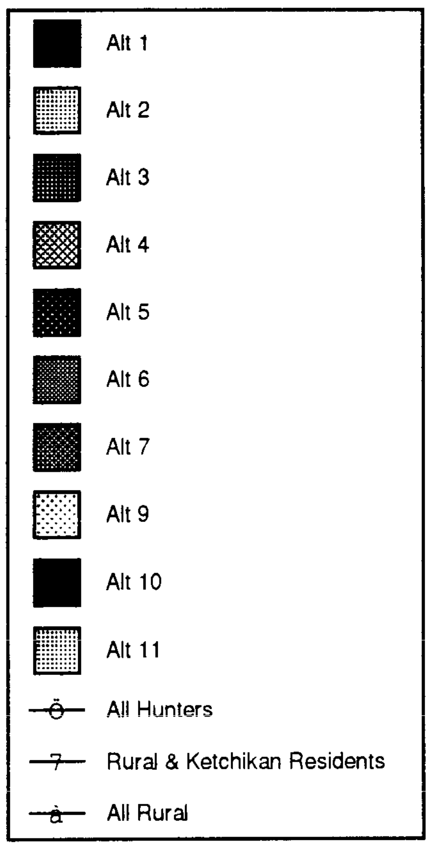
Ketchikan is not classified as a subsistence community, however many residents use the surrounding Tongass for hunting and fishing.

WAA's 101,1422, 1319, 1530, 1323, 1106, 1318, and will have deer winter range conserved in Alternatives 1, 3, 4, 5, and 6. Alternative 1 is unlikely to have direct impacts on Ketchikan's hunting use with little timber harvest activity occurring. In Alternatives 2-11 the majority of the area used by Ketchikan hunters is within development LUD's and would likely be impacted by timber harvest activity. Alternatives 3, 6, 10 and 11 allocate Old-growth Habitat LUD's which would maintain wildlife habitat in some of Ketchikan's use areas, including the Cleveland Peninsula. Alternatives 4 and 5 with a longer rotation would likely maintain the habitat within all of Ketchikan's use areas over time.

The displacement of hunters that may occur in Alternative 2-11 with continued or increased timber harvesting would likely increase competition for deer. The impact of increased competition may affect Ketchikan hunters because Ketchikan is not a rural community, and sport hunting would be restricted before subsistence hunting. An increase in access opportunities may create lower cost access for Ketchikan hunters.

Deer Availability and Anticipated Demand in Areas Used by Ketchikan Residents





The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Klawock

Klawock is located on the west coast of Prince of Wales Island, across from Klawock Island, approximately 56 air miles from Ketchikan. It is connected by road to Craig and to other communities on the Prince of Wales Island road system. Its population is 759 (ADCRA 1995), 54 percent of whom are Alaska Natives (1990 U.S. Census).

The mouth of the Klawock River, where the village of Klawock is now located, has been the site of Tlingit occupation for at least the past 600 years. According to oral history, some members of the Kuiu *kwaan* of Kuiu Island moved to Klawock as well (ADF&G 1994). Klawock is now the center of the Tlingit population on west Prince of Wales Island.

The history of Klawock is closely tied to the fishing industry. A trading post and salmon saltery were established in 1868, and the first cannery in Alaska was built here by a San Francisco firm in 1878. A hatchery for red salmon operated at Klawock Lake between 1897 and 1917 (ADCRA 1994). In 1929, Klawock incorporated as a first class city. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

Population: Klawock's population increased by 509 people between the 1970 and 1990 census. Since 1990, the population shown some growth, increasing by a total of 37 people, with some decline in 1992, and 1993.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	213	318	722	779	775	724	738	759

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: The community's cash economy has been heavily dependent on commercial fishing and canning and, as a result, has fluctuated with the economic conditions of the area's fisheries. The years from 1921 to 1940 were the "boom period" of the commercial fishing industry and Klawock became the site of the first Native-owned canneries in the Prince of Wales Archipelago. In the 1980s, Klawock-Heenya, the Alaska Native Claims Settlement Act (ANCSA) village corporation, entered the timber market with harvest on corporation lands in the vicinity of Klawock, and has constructed docking and log trans-shipment facilities near the city. The primary use of these facilities has been the export of timber in the round from Native-owned land to Japan (ADF&G 1994).

Timber and fishing are chief economic factors, however it is becoming more of a retail and service center, and maintains a growing recreation-based industry including lodges and fishing guides. A new mall with a supermarket, restaurant and liquor store was recently built, offering new retail jobs. The 1989 median household income was $39,583 (1990 U.S. Census). Unemployment in 1994 in this census area was 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the mean household subsistence harvest in Klawock was 830 edible pounds (per capita harvest information was unavailable). About 96 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho and sockeye salmon, halibut, dungeness crab, deer, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 32 percent, finfish other than salmon at 29 percent and deer at 19 percent are the most important subsistence resources for Klawock households. Klawock hunters travel an average of 35 miles to their most reliable deer hunting areas (Kruse and Frazier 1988). Subsistence harvest methods within the community of Klawock have been changing since the road connection with Hollis was made in the 1960s. Prior to that time, subsistence harvest was mostly tied to boating activities. Since road access to the rest of the island has been available to the residents of Klawock, there has been a shift from using boats to harvest subsistence materials to using trucks and cars (Ellanna and Sherrod 1987, *in* Control Lake DEIS, p. 3-164).

Appendix H provides detailed maps regarding the areas that Klawock households have ever used to hunt deer. Summarizing, the majority of Klawock households hunt deer in Wildlife Analysis Areas (WAA's) 1318, and 1422. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1318 (107 deer), 1422 (79 deer), and 1323 (44 deer) (ADF&G 1995). These WAA's are 18, 66, and 9 percent accessible by existing roads.

Community Comments

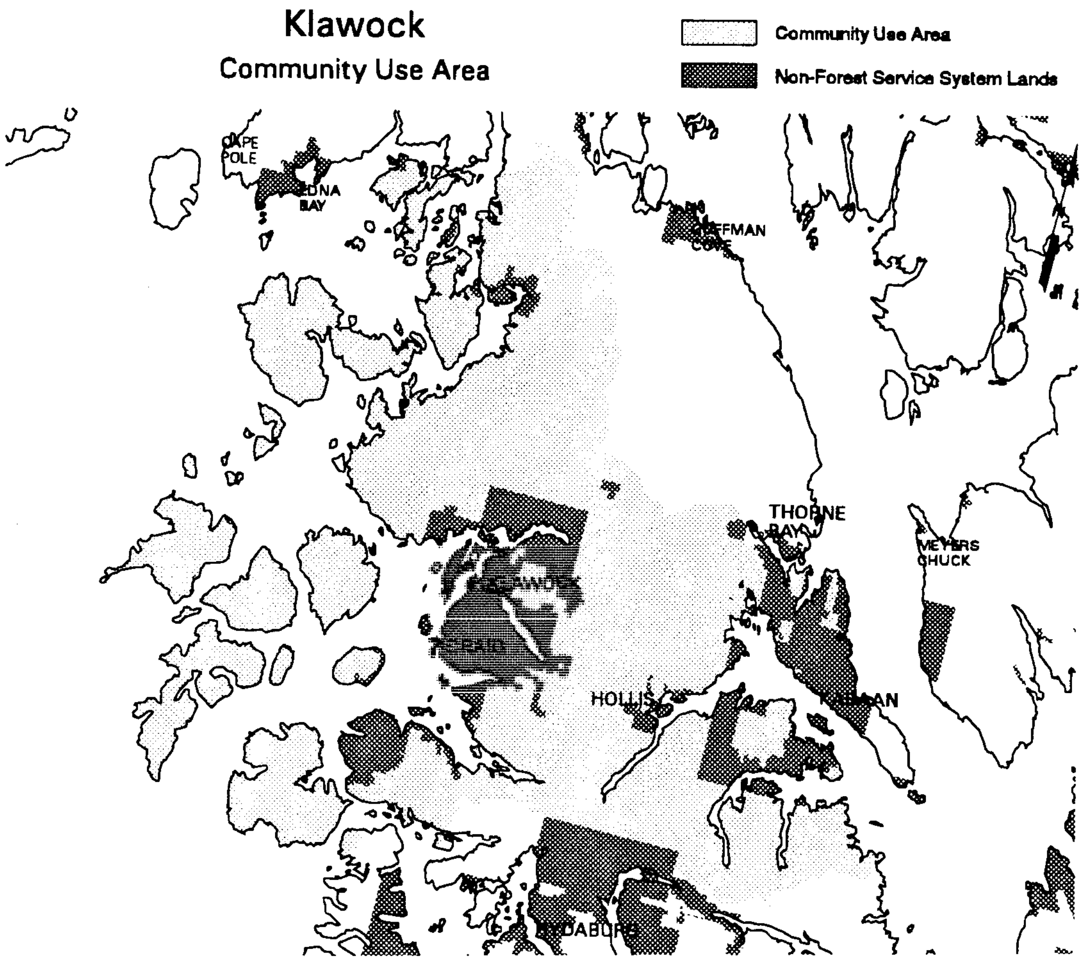
A number of Klawock residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Klawock respondents to the issues indicated a desire to see more emphasis placed on managing for scenic resources, recreation, and wildlife. The Klawock Cooperative Association recommended that additional management emphasis be placed on subsistence. Individual respondents and the Association want the current timber sale program reduced and the long-term contracts terminated. Individuals want a balance between timber, mining, tourism, recreation and fishing.

Those offering oral or written comments expressed considerably different opinions. Some individuals want the current timber sale program increased both for jobs and the continued viability of small business. The Klawock Cooperative Association indicated that a timber sale program of more than 400 million board feet would be bad for subsistence. Of special concern are roads which increase competition for deer. Klawock Tribal Elders are opposed to any timber harvesting on Prince of Wales Island stating that the land belongs to the Klawock Tlingit people. The Alaska Native Brotherhood does not want log transfer sites built at Kelly Cove, Nail Point or Cape Elika. Klawock residents who commented on the RSDEIS generally support an increase in the ASQ. Those in favor of the Preferred Alternative felt it would be sustainable, while others felt it protected the animals more than people. They would like to see more economic studies related to job changes. Several commented that Native Corporation harvesting operations should be thoroughly considered when analyzing the cumulative effects of Forest Service sales on the landscape.

Community Use Area

The general area commonly used or related to by many of the residents of Klawock in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 793,580 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Klawock's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	43,462	43,462	43,462	43,462	43,462	43,462	43,462	43,462	43,462
Mostly Natural	700,598	167,138	254,573	167.138	230,748	87,439	107,961	254,573	306,897
Moderate Development	10,653	97,734	73,810	97,734	86,163	10,753	12,577	73,810	81,378
Intense Development	38,947	485,246	421,735	485,246	433,206	651,986	629,679	421,735	360,202
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	207,353	168,305	203,488	184,377	239,307	234,993	168,305	152,933

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Klawock is a traditional native community. Subsistence use, retail services, and timber employment are most likely to affect the community.

Timber-related employment is a major employment sector in Klawock. The Viking Lumber sawmill is located in Klawock. There would likely not be sufficient volume to keep this mill open in Alternatives 1, 4 or 5. This would result in the loss of jobs in

Klawock. In addition, Alternatives 1, 4, 5, and 6 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities would be available, it amounts to less than 2 MMBF in any alternative and would most likely be purchased by very small operators for products such as music wood or cedar shakes. Residents who want to stay associated with the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment.

Retail trade and services have become increasingly important to the economy of Klawock. A new shopping center has recently opened and many communities on northern Prince Wales as well as recreation users and tourists do their shopping there. Recreation use is projected to increase roughly to the same degree in all alternatives, benefiting retail trade in Klawock. However since Alternatives 1, 4 and 5 essentially halt timber harvest on north Prince of Wales Island, the resulting declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is much lower.

Panel Results: The Socioeconomic Panel rated Alternative 1 as the only alternative likely to increase access to traditional lifestyles for Klawock residents, and believed its other effects would be positive except for the decrease in timber employment and related decrease in economic diversity. The effects of Alternatives 7 and 9 were expected to mostly negative except for timber industry employment. Alternatives 4, 5 and 6 were predicted to decrease timber employment as well as access to traditional lifestyles, although having potential to increase recreational opportunities and employment in related tourism fields. Alternatives 2 and 3 were believed to have little effect on economic structure or community stability, with 3 judged as posing a greater risk to quality of life. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3 except that Alternative 10 would offer slightly higher opportunities for timber-related employment.

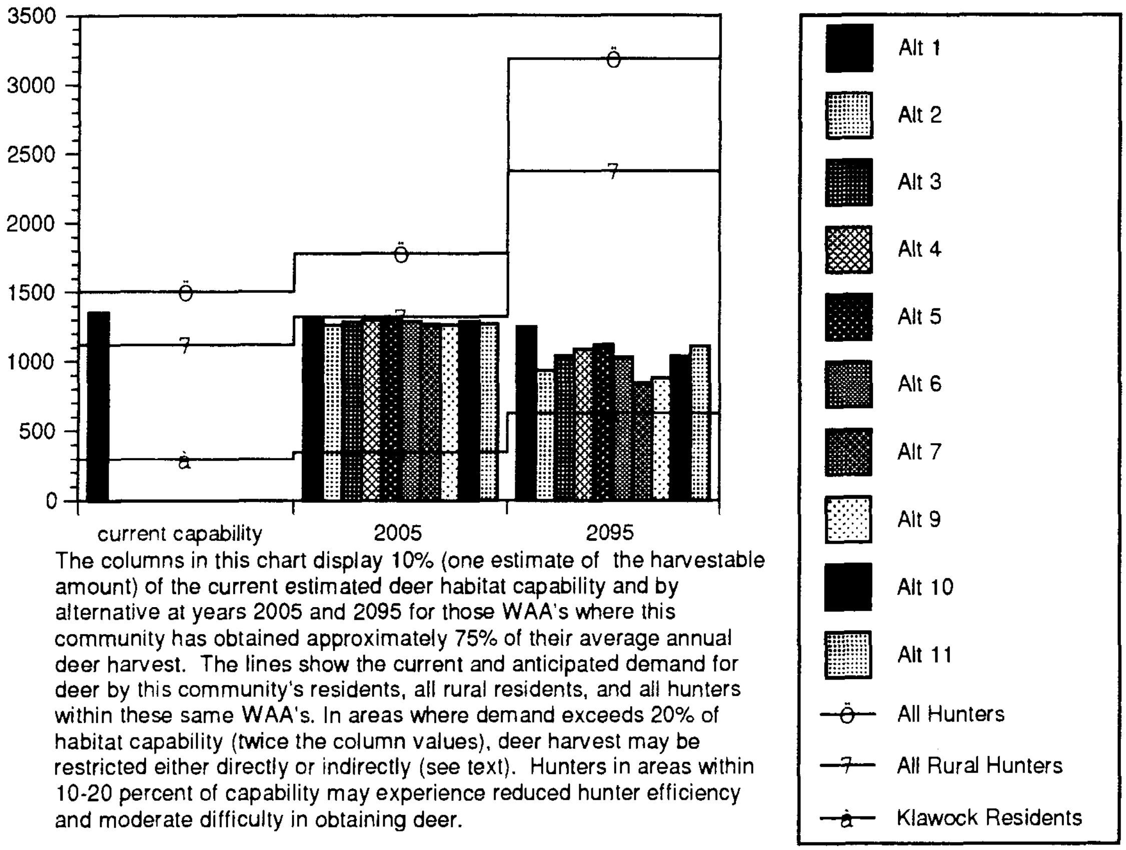
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 75 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Klawock's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Klawock residents. However, current deer harvest for all hunters and projected deer harvest for all rural and all hunters exceeds 10 percent of habitat capability and all alternatives may have future inadequate habitat capability for the total deer hunted. Deer account for 19 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier 1988).

WAA's 1318, and 1319 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5, and 6. With little timber harvest activity, Alternative 1 would have the least effect on Klawock's subsistence uses. Alternatives 2-11 would likely have a direct effect on Klawock's subsistence resources with much of Klawock's subsistence use areas within a development LUD. This LUD prescription indicates continued and possibly increased timber harvest activity. Alternatives 3 6, 10 and 11 maintain some specific areas with Old-growth Habitat LUD's, but these cover a small portion of Klawock's use area. One of the most important subsistence use areas for the community is the Eleven Mile area. This area is specifically exculded from timber harvest in Alterantive 11. Alternatives 4 and 5 have longer rotations which would provide Klawock with a higher level of older forest within the development LUD's they use. Although subsistence resources may be best provided for in Alternatives 1, 4 and 5, some of them may result in loss of jobs and therefore community emigration.

Alternatives 3, 6, 10 and 11 may indirectly impact Klawock by displacing hunters from other communities with timber harvest activities outside of the Old-growth Habitat LUD's. Alternatives 2, 7, and 9 would likely increase access opportunities for Klawock hunters. At the same time, these roads may also bring in greater competition from other communities taking advantage of the increased access.

Deer Availability and Anticipated Demand in Areas Used by Klawock Residents



The columns in this chart display 10% (one estimate of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Metlakatla

Metlakatla is located on Annette Island in southern Southeast Alaska, 15 miles south of Ketchikan. Its population of 1,603 (ADCRA 1995) includes 84 percent Alaska Native (1990 U.S. Census).

Although Metlakatla is believed to have been occupied at one time by Tlingit Indians, it was settled in 1887 by Church of England minister William Duncan and about 830 Tsimshian followers from northern British Columbia. In 1891, an Act of Congress declared Annette Island an Indian Reservation (the Annette Island Reserve), the only one in Alaska. This action set aside the reservation for the exclusive use and occupancy by "Metlakatla Indians and such other Natives of Alaska who might join them" (ADF&G 1994).

Metlakatla is a traditional Tsimshian community with an active economy and subsistence lifestyle. The community was not part of ANCSA, rather, the 86,000-acre Island reservation and surrounding 3,000 feet of coastal waters are not subject to State jurisdiction. It regulates commercial fishing in these waters, and operates its own tribal court system (ADCRA 1994). The community participates in regional fish and game management issues (ADF&G 1994).

Population: The population of Metlakatla increased by 357 between the 1970 and 1990 census, The population has continued to show some growth over the last six years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	1,050	1,056	1,407	1,497	1,526	1,518	1,583	1,540

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: The community of Metlakatla has prospered in part due to its successful involvement in commercial fishing and lumber industries. Metlakatla's economy is structured around fishing and wood products industries, and because it is an Indian Reservation, there can be no local tax base (ADCRA 1994). The first developments included a community retail outlet, sawmill, and salmon cannery. KPC owns the primary sawmill in Metlakatla. Subsequent developments included continuous upgrading of the cannery, fish traps, fishing fleet, sawmill, hydroelectric and diesel generation plants, and constructing a cold storage operation. In 1977, the Tamgass Creek Hatchery opened. The community-owned and operated salmon cannery, including an egg house, is the center of activity from mid-June through November each year. The Annette Island Packing Company contracted with a Japanese firm to sell salmon eggs and herring roe to Japan (ADF&G 1994).

Timber and fishing are key economic sectors, however the largest employer is the Metlakatla Indian Community. Its 1989 median household income was $37,143 (1990 U.S. Census). Unemployment in this census area is 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Metlakatla was 71 edible pounds. Seventy-seven percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho and chinook salmon, halibut, deer, clams, dungeness crab, and berries (TRUCS 1989).

Based on edible pounds harvested, salmon at 28 percent, finfish other than salmon at 23 percent, invertebrates at 23 percent and deer at 15 percent are the most important subsistence resources for Metlakatla households. Metlakatla hunters travel an average of 12 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Glossary

Appendix H provides detailed maps regarding the areas that Metlakatla households have ever used to hunt deer. Summarizing, the majority of Metlakatla households hunt deer in Wildlife Analysis Areas (WAA's) 1210, 303, and 202. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 3101 (10 deer), 303 (4 deer), and 1210 (3 deer) (ADF&G 1995)..

Community Comments

A number of Metlakatla residents provided oral and/or written comments on the TLMP revision DEIS or Supplement. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

The Annette Natural Resources Center wants subsistence emphasized. Others indicated that both timber harvesting and subsistence are important to the community and can exist together. Concern about the impacts to small mills if harvest is reduced was expressed. Many expressed concerns about their own employment in the timber industry. Metlakatla residents who commented on the RSDEIS expressed concern for both the timber industry and potential unemployment, and for the protection of their traditional use of the land, sea, and air for cultural activities. They reminded the Forest Service that Annette Island Reserve is not just a community, but their ancestral home which must remain for future generations. These residents feel that the Forest Service should develop mitigating measures to protect traditional use of the land, se, and air, such as use of various plants and plant parts for basketry, cedar bark gathering, wood for carving, harvest of marine and wildlife for use in traditional manners and in cultural activities.

Community Use Area

The general area commonly used or related to by many of the residents of Metlakatla in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 2,062,784 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Metlakatla's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	964,412	964,412	964,412	964,412	964,412	964,412	964,412	964,412	964,412
Mostly Natural	1,100,434	460,083	575,944	460,083	480,111	102,142	362,162	575,944	646,543
Moderate Development	0	195,229	141,345	195,229	184,180	0	276,394	141,345	109,389
Intense Development	0	443,060	381,082	443,060	434,081	1,008,038	459,196	381,082	338,280
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	190,926	141,671	188,706	184,046	293,191	231,688	141,671	123,124

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Metlakatla
Community Use Area

Community Use Area
Non-Forest Service System Lands

Potential Effects

Metlakatla could be affected primarily by changes in recreation and tourism use, commercial fishing, timber processing, and subsistence opportunities.

The timber industry will be subject to the largest amount of variation among the alternatives. Alternative 1 would likely result in the closure of the KPC Sawmill in

Metlakatla. This could significantly reduce the employment level, and income level within the community. Alternatives 4 and 5 would likely result in the closure of one of KPC's sawmills if timber prices increase. Alternative 6 should supply enough timber to operate sawmills at full capacity if prices increase, and enough timber for at least one shift if prices remain constant. Alternatives 3, 10 and 11 would provide enough timber supply to operate both the KPC sawmills at one shift. In addition, there would be enough timber supply to operate one of these mills at full capacity if timber prices increase. Alternatives 2, 7 and 9 should provide enough timber to operate the sawmills at full capacity.

Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

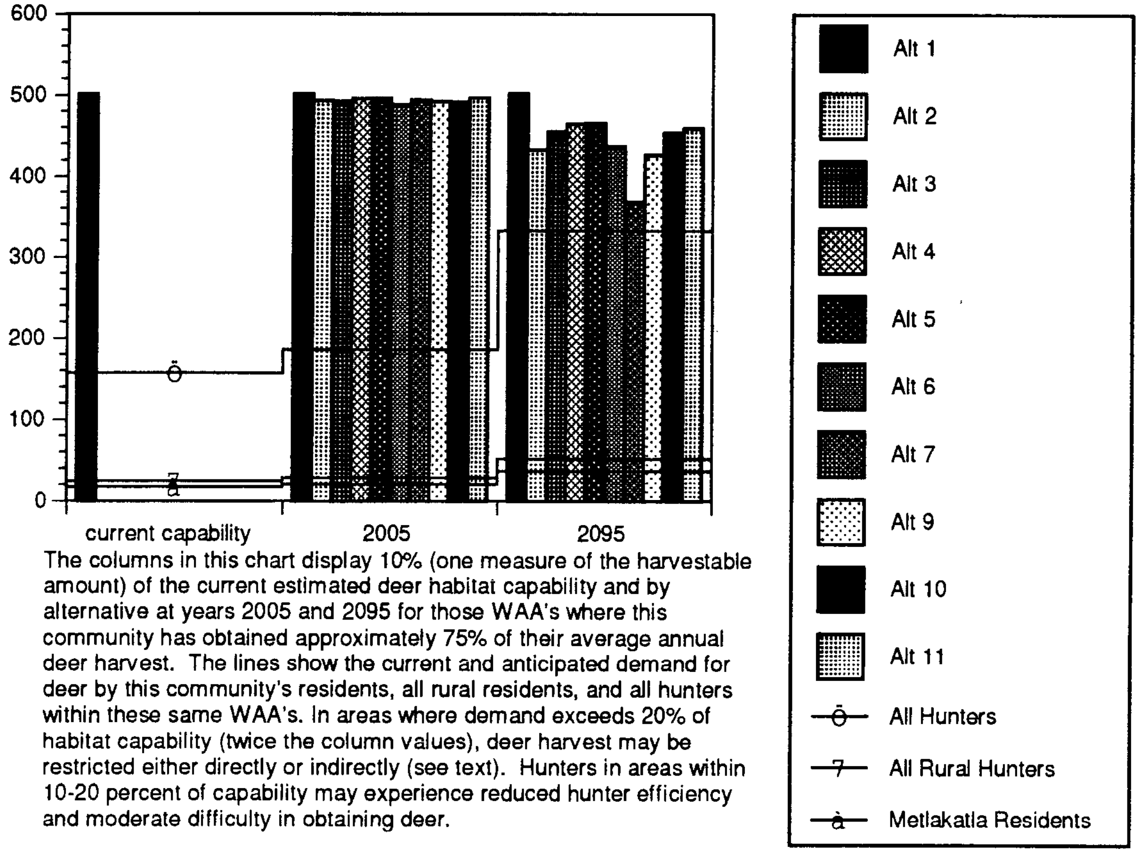
Panel Results: The Socioeconomic Panel predicted that Alternatives 2, 3 and 6 were those most likely to have the least effects either way on Metlakatla. Although Alternative 1 was expected to increase opportunities for recreation and related employment, it was viewed as likely to decrease economic structure, community stability, and quality of life. Alternatives 4 and 5 were viewed as having neutral or positive effects except for timber-related employment. Alternatives 7 and 9 were believed to have mostly negative effects except for timber industry employment opportunities; panelists disagreed on whether effects of Alternative 7 on economic structure and diversity would be positive or negative. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 75 percent of the total edible pounds of subsistence resources harvest by Metlakatla households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Metlakatla's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Metlakatla residents, as well as for all deer hunted within the WAA's. Deer account for 15 percent of the total edible pounds of subsistence resources harvested by Metlakatla households (Kruse and Frazier 1988).

Annette Island is not National Forest System land, so subsistence resources used by Metlakatla households there will not be affected by any of the alternatives. With little timber harvest activity, Alternative 1 would provide the least affect on Metlakatla's subsistence uses. Alternatives 2, 3, 4, 5, 6, 10 and 11 allocate much of Metlakatla's subsistence use areas to recreation LUD's. It is unlikely that these alternatives will directly impact Metlakatla's use of the area. Alternatives 7 and 9 allocate much of Metlakatla's subsistence use areas to Development LUD's. This will likely impact subsistence use through timber harvest activity.

Deer Availability and Anticipated Demand in Areas Used by Metlakatla Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Meyers Chuck

Meyers Chuck is a small fishing village with a seasonal population of 35 people located along Clarence Strait (ADCRA 1995), on the northwest tip of Cleveland Peninsula, 40 miles northwest of Ketchikan. Almost 11 percent of the population is Alaska Native (1990 U.S. Census).

Beginning as a protected anchorage for fishing vessels, Meyers Chuck grew with the building of a cannery in Union Bay in 1916. Postal service began in 1922. Fishing and fish processing, and support services sustained the community until the mid-1900s. Fishing and fish processing are still the basic source of income, however some residents have sought employment in Ketchikan or on Prince of Wales Island. Recently, the population has begun to grow with fishers, retirees, and a few vacationers locating there (ADF&G 1994).

Population: Meyers Chuck's population shows small changes, but in general the trend is constant.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	37	50	37	40	42	38	42	35

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Fishing is the main economic sector of Meyers Chuck. The 1989 median household income was $16,250 (1990 U.S. Census). The 1994 unemployment rate in this census area was 12.5, compared to 8.2 in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Meyers Chuck was 414 edible pounds. All households harvested some subsistence resource as Meyers Chuck residents depend on subsistence activities to supplement the relatively low cash economy. Most commonly used (by over 50% of households) were coho, chinook, and pink salmon, halibut, rockfish, deer, dungeness crab, clams and cockles, shrimp, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, finfish other than salmon at 42 percent and salmon at 25 percent are the most important subsistence resources for Meyers Chuck households. Deer comprise only five percent of the total edible pounds harvested. Meyers Chuck hunters travel an average of 12 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps of the areas that Meyers Chuck households have ever used to hunt deer. Summarizing, the majority of Meyers Chuck households hunt deer in Wildlife Analysis Areas (WAA's) 613, 614, and 1817. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 614 (4 deer), 1817 (3 deer), and 1526 (2 deer) (ADF&G 1995).

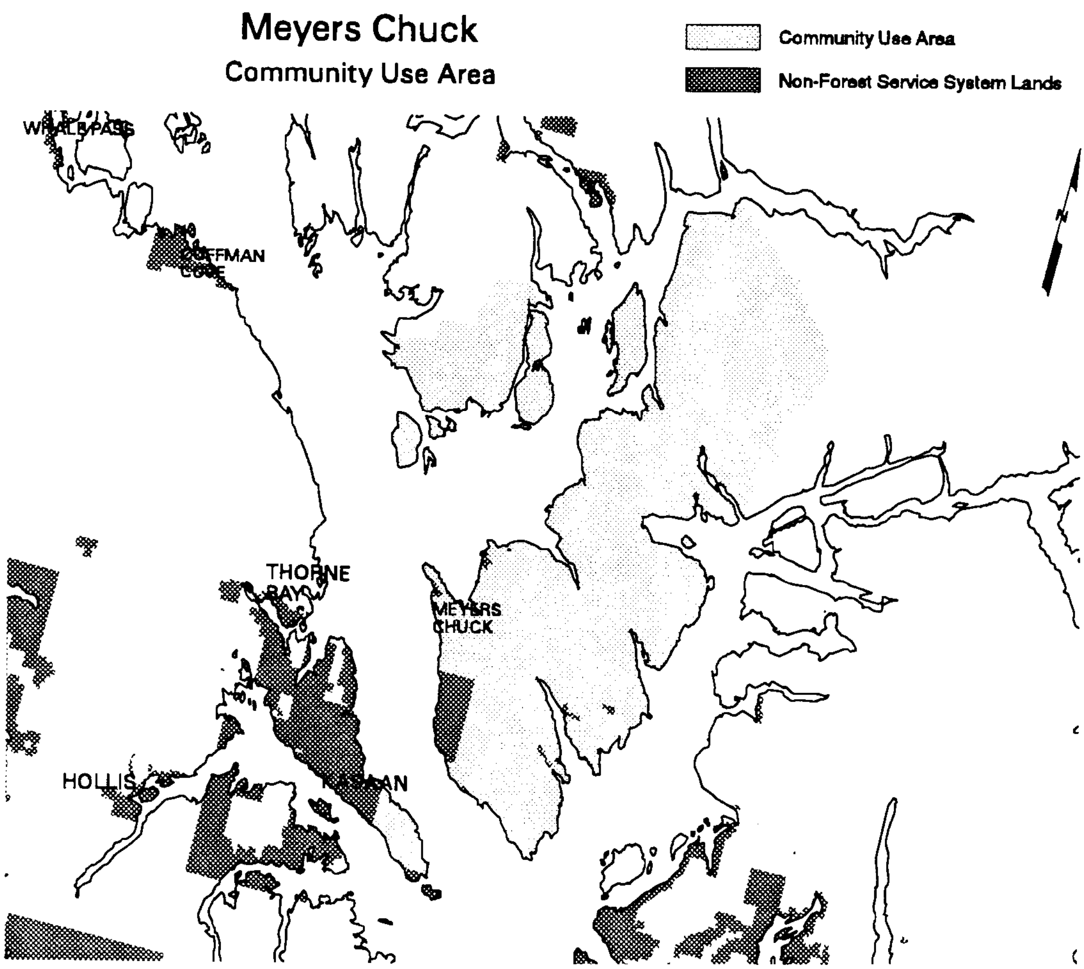
Community Comments

A number of Meyers Chuck residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion. However, a majority of residents endorsed the comments of the Meyers Chuck Community Association.

Meyers Chuck residents and the Meyers Chuck Community Association do not want roads connected to their community nor do they want logging within 3,000 feet of Meyers Chuck watershed. They want the Meyers Chuck peninsula and the Union Bay/Bear Creek valley to be a primitive recreation area and prefer that log transfer sites remain on the Behm Canal side of Cleveland Peninsula. Some residents do not want timber harvest to occur anywhere on Cleveland Peninsula. Respondents on the RSDEIS felt that management of the forest should provide for diversification within the timber industry, which would provide jobs for citizens, but cut less timber and not pollute the environment. It was specifically requested that the Cleveland Peninsula be left roadless and untouched.

Community Use Area

The general area commonly used or related to by many of the residents of Meyers Chuck in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 383,046 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Meyers Chuck's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups (1)	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	47,586	47,586	47,586	47,586	47,586	47,586	47,586	47,586	47,586
Mostly Natural	335,460	91,586	166,579	91,586	135,874	40,865	89,967	166,579	213,702
Moderate Development	0	93,170	52,744	93,170	71,437	0	58,299	52,744	37,310
Intense Development	0	150,704	116,137	150,704	128,150	294,596	187,194	116,137	84,449
Suitable National Forest System Acres for Timber Management (2)									
Total Suitable Acres	0	72,728	43,779	72,268	57,622	92,983	78,189	43,779	26,178

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Meyers Chuck is located on Cleveland Peninsula, and the primary effect will be from how Cleveland Peninsula is managed for timber harvest. This area is available for timber harvest in the current land management plan (TLMP, 1979, as amended in 1985-1986, 1991), but has not yet been entered for intensive harvest.

Alternative 1 maintains all of the Cleveland in its current state. Alternatives 2 and 9 would allow timber harvest on Cleveland Peninsula; however, these alternatives include standards and guidelines which would reduce the size and shape of harvest units in Helm Bay and Union Bay to mitigate their visual impact. Small areas of important wildlife habitat would be allocated to the Old-growth Habitat LUD. Alternative 3 would allow some timber harvesting on Cleveland Peninsula but avoid Union Bay. Visual quality would be maintained in Helm Bay. Alternative 4 would permit some timber harvest on Cleveland Peninsula, but it would be mitigated to maintain important recreation places. Alternatives 5 and 6 would permit some timber harvesting on Cleveland Peninsula, but it would be mitigated to maintain important wildlife and recreation places. Alternative 7 would allow intensive timber harvest on Cleveland Peninsula. Alternative 11 would allow some timber harvesting on the Cleveland Peninsula, but would avoid high-use areas of Helm bay, Union Bay, and the entire southern end of the Peninsula. It should also be noted that since Alternatives 4, 5 and 6 essentially eliminate timber harvest on north Prince of Wales, there could be increased pressure to harvest timber on Cleveland during the first decade of the plan. In the past, intensive timber harvest on Prince of Wales has allowed the Cleveland to remain un-harvested, despite being allocated to LUD's which permit timber harvest.

Panel Results: The Socioeconomic Panel predicted that effects on Meyers Chuck would be mostly negative for every alternative except Alternative 1, which was viewed as the only option with potential to increase community stability, quality of life, and access to traditional lifestyles. Decreases in these community characteristics were most likely under Alternatives 7 and 9, while panelists differed on whether effects would be neutral or negative under the other alternatives. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

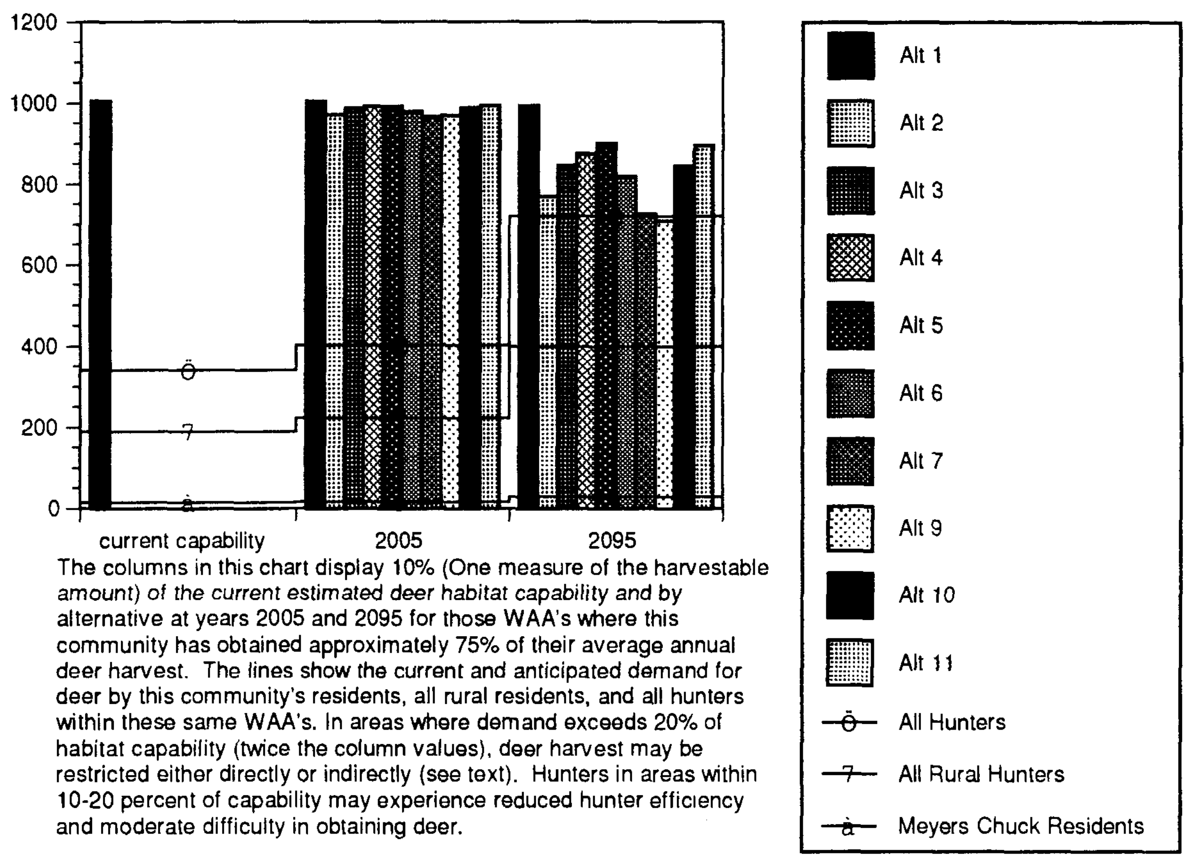
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in alternatives 2-11 (see the fish section of this chapter). These resources account for 80 percent of the

total edible pounds of subsistence resources harvest by Meyers Chuck households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated level of deer habitat capability within the WAA's where 75 percent of Meyers Chuck's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Meyers Chuck residents, as well as for all deer hunted within the WAA's. Deer account for five percent of the total edible pounds of subsistence resources harvested by Meyers Chuck households (Kruse and Frazier 1988).

Alternative 1 would provide the greatest likelihood for continuation of Meyers Chuck's subsistence uses. Alternatives 3, 5, 6, 10 and 11 allocate much of Meyers Chuck's subsistence use areas to Old-growth Habitat LUD's, providing for the maintenance of subsistence uses. Alternatives 2, 7 and 9 allocate much of Meyers Chuck's subsistence use areas to development LUD's. This will likely impact subsistence use through timber harvest activity. Alternatives 2-7, 10 and 11 also designate a minerals development LUD within Meyers Chuck's use area. Alternatives with continued or increased timber harvest activity may indirectly impact Meyers Chuck's subsistence use through increased access opportunities.

Deer Availability and Anticipated Demand in Areas Used by Meyers Chuck Residents



The columns in this chart display 10% (One measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Naukati Bay

Naukati Bay is a logging camp located on the northwest coast of Prince of Wales Island. The area covers 6.5 square miles, and has a population of 147(ADCRA 1995), with only 1.1 percent Alaska Native (1990 U.S. Census). The U.S. Coast and Geodetic Survey named the area "Naukatee Nay" in 1904 after the local Indian name.

Naukati was first developed as a logging camp, but in 1991 an area approximately a mile from the camp was opened by the State Department of Natural Resources as a land disposal site for homesteaders (ADCRA 1995). This is the reason that Naukati, while still considered a logging camp by most interpretations, is included in this TLMP analysis along with the other "permanent" Southeast communities. Other logging camps, considered temporary by the Forest Service, are not included in this community-by-community analysis.

Population: Since 1990, the population of Naukati Bay has increased by 58 percent.

Year	1990*	1991	1992	1993	1994	1995
Population	93	122	131	121	138	147

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Sawmills and related logging and lumber services are the sole income source for Naukati residents, and as with other logging camps, the bulk of the employment is seasonal. The Census showed the 1989 median household income as $43,333 (1990 U.S. Census). Unemployment in 1994 in this census area was 12.5 percent, compared to 8.2 percent for all of Southeast Region *(Alaska Economic Trends* 4:1995).

Subsistence Use: Naukati was not surveyed by the Tongass Resource Use Cooperative Survey (TRUCS), therefore there is no baseline subsistence data for this community. Similarly, Alaska Department of Fish and Game Subsistence Division has not included Naukati in its *Subsistence Resource Use Patterns* publication. Similarly, as the basis for the maps shown in Appendix H are the ADF&G hunter survey information, and Naukati is not included in this source either, there is no subsistence map for Naukati. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1422 (34 deer),and 1531 (7 deer) (ADF&G 1995).

Community Comments

A number of Naukati Bay residents provided written and/or oral comments on the issues for the TLMP Revision process. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Community residents who responded to the issues want more emphasis on timber supply and felt Alternative 2 should be selected. There is concern that increasing stream buffers, Wild and Scenic Rivers, and protection of caves and karst are being implemented without scientific data related directly to Southeast Alaska. Many respondents feel their livelihood in the timber industry are being destroyed in order to protect fish and wildlife whose populations are not declining. There is a feeling that the loggers on Prince of Wales Island deserve a right to be economically secure, the right to work, the right to raise their families, without the government and *environmentalist pushing them toward a welfare state.*

Community Use Area

The general area commonly used or related to by many of the residents of Naukati in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 1,083,156 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Naukati Bay
Community Use Area

Community Use Area
Non-Forest Service System Lands

Naukati Bay's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups (1)	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	73,525	73,525	73,525	73,525	73,525	73,525	73,525	73,525	73,525
Mostly Natural	950,961	227,913	401,355	227,913	396,325	128,354	154,593	401,355	474,007
Moderate Development	0	265,096	168,970	265,096	168,447	0	187,179	168,970	165,264
Intense Development	58,751	516,622	439,306	516,622	444,860	881,317	667,939	439,306	369,536
Suitable National Forest System Acres for Timber Management (2)									
Total Suitable Acres	0	303,262	226,734	293,264	238,565	347,686	343,532	226,734	175,440

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Naukati is primarily a logging community and as such will be directly affected by the amount of logging opportunities on north Prince of Wales Island.

Alternatives 1, 4, 5 and 6 would essentially eliminate all intensive timber harvesting on the north end of the Island. Although some individual tree selection opportunities will be available, it amounts to less than 2 MMBF in any alternative, and would most likely be purchased by very small operators for products such as music wood or cedar shakes. The result of the lack of logging opportunities could result in disruption of the community stability. Residents who want to stay in the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. If these individuals choose to relocate, the loss of their income would affect others in the community.

Alternatives 2, 3, 7, 9, 10 and 11 would continue logging opportunities on the north end of the island. This would allow those individuals associated with the logging industry to maintain their existing lifestyle within the community.

Panel Results: The Socioeconomic Panel predicted that Alternatives 7 and 9 would have the greatest overall positive effects on Naukati, although with the potential for decreases in non-timber resource jobs and in recreation opportunities. Alternative 1 was rated as having the greatest likelihood of decreases in economic diversity, community stability, quality of life, and access to traditional lifestyles. Alternatives 2, 3 and 6 were seen as generally not increasing or decreasing most community characteristics, while 4 and 5 were viewed as posing risks to valued community characteristics and quality of life. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3 except that Alternative 10 would offer slightly higher opportunities for timber-related employment.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter).

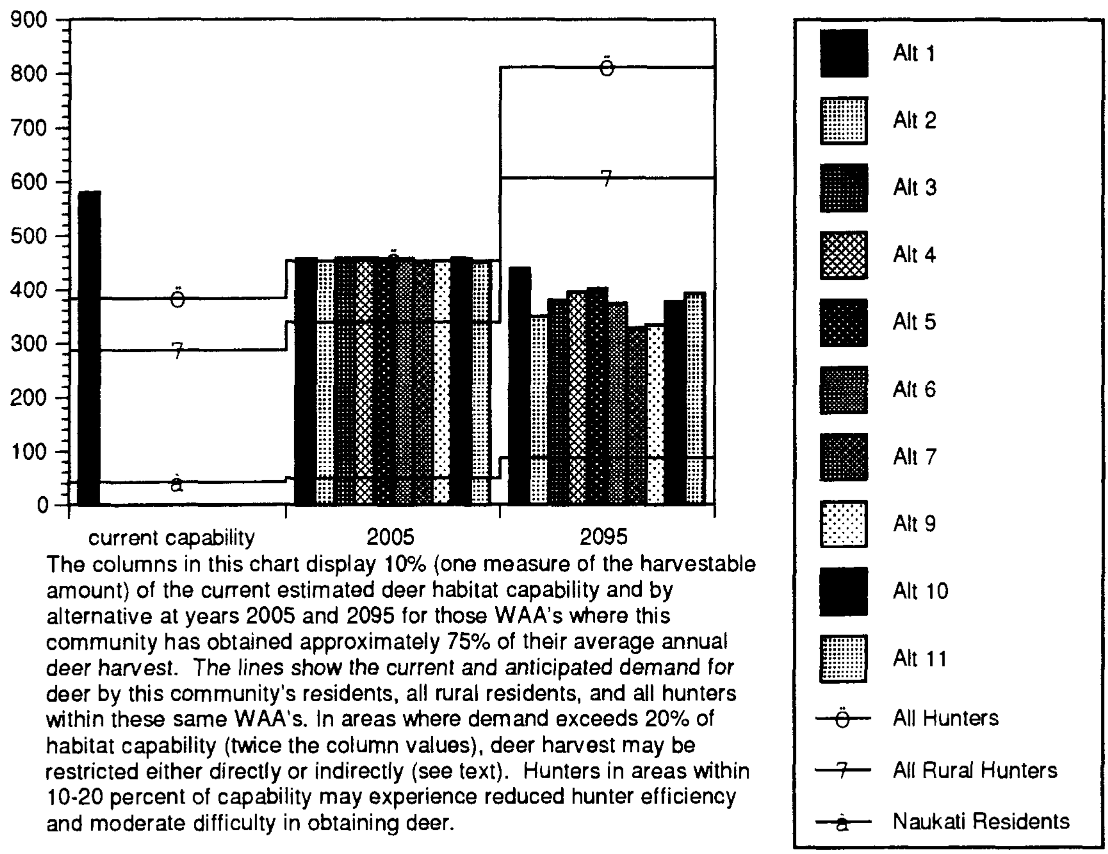
The following figure displays 10 percent of the estimated level of deer habitat capability within the WAA's where 75 percent of Naukati's average annual deer harvest occurs. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's.

Glossary

A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Naukati residents. However, projected deer harvest for all hunters exceeds 10 percent of habitat capability in the long-term and all alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in hunting may be necessary.

With little timber harvest activity, Alternative 1 would provide the greatest maintenance of Naukati Bay's subsistence uses. Alternatives 2-11 allocate much of Naukati Bay's use to development LUD's, with timber harvest activity likely to impact subsistence use. Alternatives 4 and 5 with longer rotations would likely decrease the impacts of timber harvesting on Naukati Bay's subsistence resources. Although subsistence resources may be best provided for in Alternatives 1, 4, and 5, they may result in loss of jobs and therefore community emigration.

Deer Availability and Anticipated Demand in Areas Used by Naukati Bay Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Pelican

Pelican is a fishing village along Lisianski Inlet on the northwest corner of Chichagof Island 70 air miles north of Sitka and 70 air miles west of Juneau. Part of the community is built on pilings over tideland. A boardwalk serves as the town's main thoroughfare due to lack of flat land for roads. Pelican has a population of 209 (ADCRA 1995), with almost 30 percent Alaska Native (1990 U.S. Census).

Prior to its settlement in 1938, the area had been used as a safe harbor by fishermen and as a hunting, fishing, trapping and gathering site by Hoonah Tlingit groups, who claimed lands on either side of Cross Sound (ADF&G 1994).

Pelican was incorporated as a second class city in 1943. Pelican employs a full-time city manager and is governed by a mayor and city council. The community has a local Fish and Game Advisory Committee. The Native community, largely Tlingit, is represented by a local Tlingit and Haida Community Council. No Native land allotments or withdrawals occur in the immediate vicinity of Pelican. Pelican is accessible by the Alaska ferry system as well as by float plane from Juneau or Sitka (ADF&G 1994).

Population: The population of Pelican has fluctuated over the years, but the general trend is fairly even.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	133	180	222	232	231	231	211	209

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Pelican's economy expanded rapidly during the 1940-1960 period. However, with the decline of commercial fish stocks in the late 1950s and 1960s, the community's fishing economy suffered. The sawmill closed in 1957 and the population began declining until 1970. From 1970 to the present, the economy rebounded and Pelican experienced steady population and economic growth, largely attributable to the expansion of seafood processing activities. In the 1980s the State began disposing of land parcels totaling approximately 150 acres under the State Land Lottery Program (ADF&G 1994).

Pelican Seafoods has been the primary year-round employer. The plant provides seasonal employment for 100 people in the town of just over 200, draws some 350 trollers and longliners to the town docks, and generates sales and raw fish tax revenues that cover close to half the budget for this city. In February 1996 it announced that it would not be operational in 1996. Local business were quick to feel the effects of the closure (*The Paper*, v.1, no. 15, 1996).

Before the summer 1996 season began, Kake Tribal Corporation purchased the plant and began operating. The Alaska State ferry system also lowered the price of round trip fares to Pelican to encourage tourism.

The 1990 median household income was $27,083 (1990 U.S. Census). Unemployment in 1994 in this census area was 10.6 percent, compared to 8.2 percent in all of Southeast *(Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita household subsistence harvest in Pelican was 355 edible pounds. More than 91 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook and coho salmon, cod, halibut, roe on kelp, rockfish, deer, clams, crabs, shrimp, berries, and wood (TRUCS 1989).

Residents harvest deer, black bear, waterfowl, furbearers, salmon, marine fish, shellfish, herring eggs, plants, and berries. Based on edible pounds harvested, finfish other than salmon at 33 percent, deer at 30 percent, and salmon at 17 percent are the most important subsistence resources for Pelican households. Pelican hunters travel an average of 10 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides a detailed map regarding the areas that Pelican households have used to hunt deer. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 3419 (46 deer) and 3418 (41 deer) (ADF&G 1995). These WAA's are virtually roadless.

Community Comments

A number of Pelican residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Pelican residents who responded to the issues requested that additional emphasis be placed on scenic resources along the Alaska Marine Highway routes, roads, streams and around their community. These individuals also requested that more emphasis be placed on recreation, fish, wildlife, and subsistence. The community is greatly concerned with the ecological well-being of the Tongass. They are troubled that people in timber-dependent communities confuse "historical" levels of harvest with "sustainable." The City of Pelican wants the current timber sale program reduced and the long-term contracts terminated. The City does not want additional roads, Log Transfer Facilities, or to be connected to existing roads. However, Pelican respondents were split in their opinion regarding road development with some wanting a reduction in developments and some wanting a mix of road development with other Forest uses. Individual Pelican respondents favored maintaining current management emphasis for mineral exploration and development, while the City opposed emphasizing mineral exploration and development. Individual respondents want management to emphasize tourism, wildlife, recreation and subsistence economic sectors. They do not want timber harvest in Hoonah Sound south of Lisianski Inlet.

Community Use Area

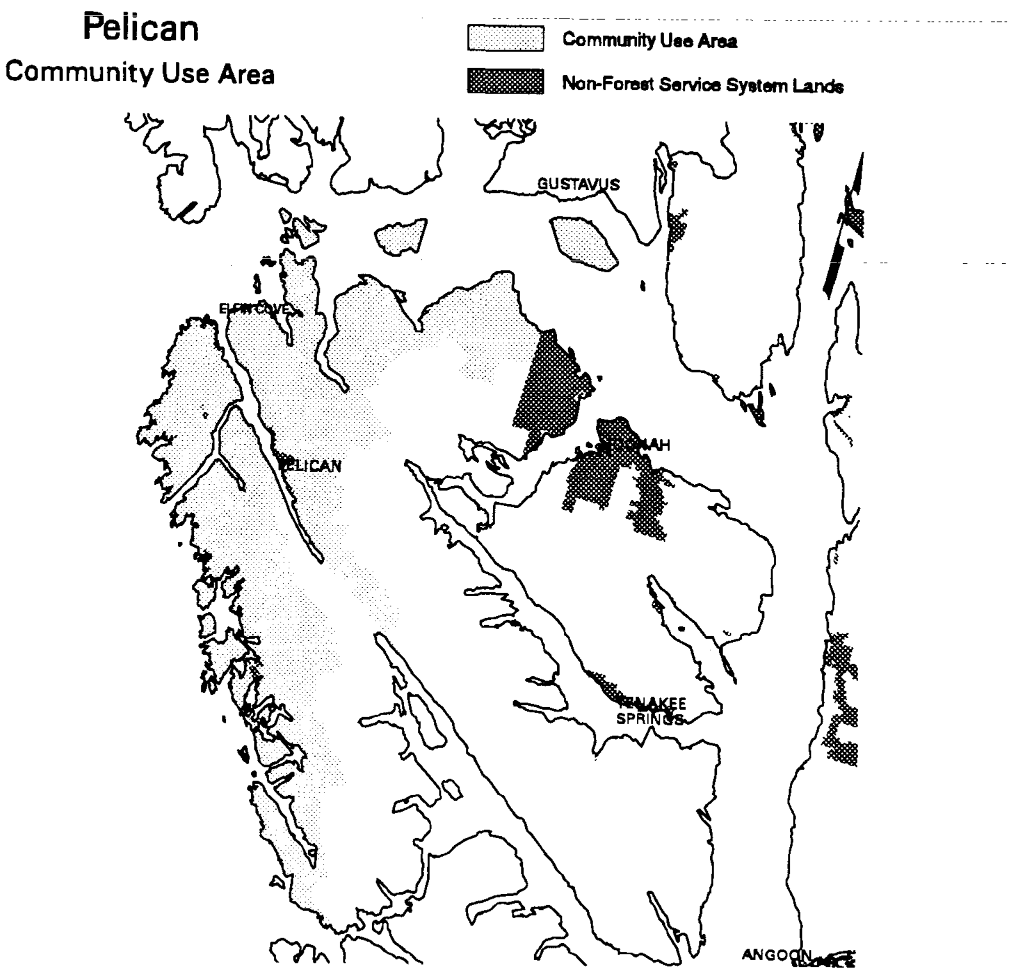
The general area commonly used or related to by many of the residents of Pelican in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 492,334 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Pelican's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	241,072	241,072	241,072	241,072	241,072	241,072	241,072	241,072	241,072
Mostly Natural	251,582	226,167	232,496	226,167	228,150	228,150	242,321	185,269	247,837
Moderate Development	0	1,702	0	1,702	1,702	1,702	0	5,524	40
Intense Development	0	23,393	18,767	23,393	21,410	21,410	24,434	60,688	3,305
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	8,712	5,267	8,352	8,352	8,352	9,013	15,971	5,267

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Pelican is primarily a commercial fishing town. The community recently avoided a major economic blow when the seafood processing plant was sold and continued operations. The community should remain stable as long as the plant operates.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Panel Results: The Socioeconomic Panel rated all of the RSDEIS alternatives as having little effect on Pelican, with the exception of risks to commercial fishing employment under Alternatives 2, 7 and 9, and possible increases under Alternative 1. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3, and therefore would have little effect on Pelican. No other community received as many “no effect” ratings.

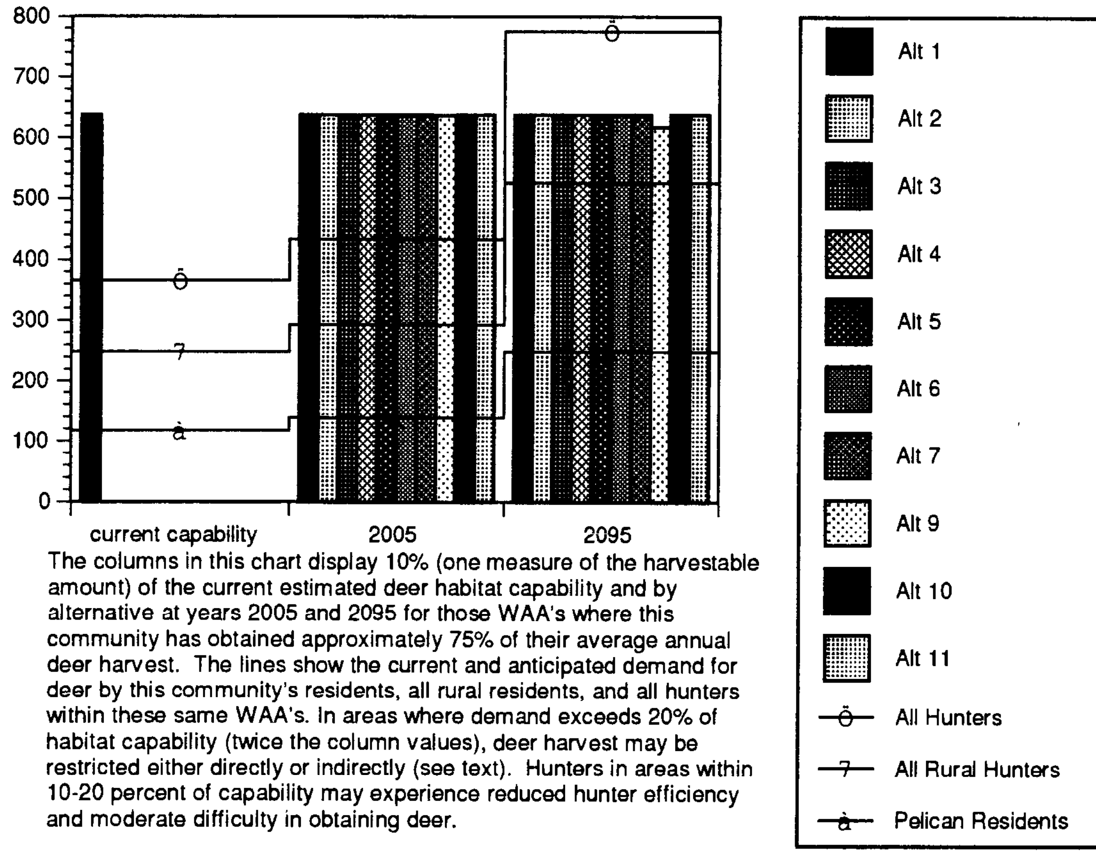
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 63 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier 1988).

The following figure displays the 10 percent of the estimated level of deer habitat capability within the WAA’s where 75 percent of Pelican’s average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community’s residents, all rural residents, and all hunters within these same WAA’s. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Pelican residents, as well as for all deer hunted within the WAA’s. Deer account for 30 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier 1988).

In terms of subsistence use, Lisianski Inlet, Icy Strait, northwest Chichagof, and Yakobi Island are the most important areas to Pelican. These areas are legislatively withdrawn from timber harvest as either Wilderness or LUD II or allocated to the Semi-Remote Recreation LUD in all alternatives except 9. Alternative 9 allows timber harvest in the non-legislated areas of Lisianski Inlet and Strait, although opportunities are very limited and no timber harvest is scheduled. Therefore, it is unlikely that subsistence use in Pelican will be directly affected by any of the alternatives. Indirectly, it is unlikely that Pelican will be affected by increased competition or access because of the limited area open for development. The current limited access is unlikely to draw many additional hunters into the area due to displacement.

Glossary

Deer Availability and Anticipated Demand in Areas Used by Pelican Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Petersburg and Kupreanof

Petersburg is located on the northern tip of Mitkof Island across Wrangell Narrows from Kupreanof Island. It lies midway between Juneau and Ketchikan, about 120 miles from either community. Its population is 3,350 (ADCRA 1995), with 10.4 percent Alaska Native (1990 U.S. Census). The community of Kupreanof, population 24, is located less than one mile from Petersburg, on Kupreanof Island. This settlement is economically tied to Petersburg, where most residents find employment, purchase goods, and attend school (ADF&G 1994).

Prior to Petersburg's development by homesteaders and fishermen at the turn of this century, Tlingit use of the area occurred at many small settlements (ADF&G 1994). The community of Petersburg was founded by Norwegian Peter Buschmann in 1899 and incorporated in 1906. More Norwegians followed and settled into a Scandinavian-style community. Petersburg has a local Fish and Game Advisory Committee, which takes an active interest in resource management issues (ADF&G 1994).

Population: The population of Petersburg increased by 57 percent between the 1970 and 1990 census. The population has continued to grow, in total, over the last six years, although there was a decline in 1994.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	2,042	2,821	3,207	3,293	3,292	3,297	3,271	3,350

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: The town of Petersburg grew up around the Icy Strait Packing Company, on the northwest shore of Mitkof Island, started by Peter Buschmann in 1900. Along with the evolution of the commercial fishing industry, in which Petersburg has always been a leader in Southeast Alaska, a larger Tlingit community developed in the expanding town. This Indian community has been a permanent and stable component of the town throughout its development (ADF&G 1994).

The Petersburg area was heavily used by 60 fur farmers until the late 1960s, serving as a center for the blue fox industry (Roppel 1983). For about five years in the early 1930s, a gold mine operated on Woewodski Island. More recently in the 1950s, a barite mine operated on Castle Island. Another stimulant to the local economy occurred in the 1960s with the introduction of large-scale logging in the area. One small mill continues to operate (ADF&G 1994).

Petersburg's main economic sector is seafood processing and manufacturing; government is the second largest employer. Other economic sectors include retail trade, construction, timber, and tourism (Shamrock FEIS, p. 3-50). The 1989 median household income was $49,318 (1990 U.S. Census). Unemployment in 1994 was 9.2 percent, compared to 8.2 percent in all of southeast Alaska (*Alaska Economic Trends* 4:1995).

Subsistence Use: Local subsistence resource use includes deer, moose, salmon, finfish, waterfowl, clams, crabs, and berries. In 1987, the per capita subsistence harvest in Petersburg was 200 edible pounds. More than 93 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho and chinook salmon, halibut, deer, dungeness crab, king crab, shrimp, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, land mammals at 31 percent, salmon at 22 percent, and shellfish at 17 percent are the most important subsistence resources for Petersburg households. Petersburg hunters generally travel to deer hunting areas by boat, either skiffs or larger commercial fishing boats.

Appendix H provides detailed maps regarding the areas that Petersburg households have ever used to hunt deer. Summarizing, the majority of Petersburg households hunt deer in Wildlife Analysis Areas (WAA's) 3938, 3939, and 3940. As displayed on the Deer Harvest by Community map (in the map packet), these areas are some distance from the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 2077 (176 deer), 3939 (169 deer), and 3940 (109 deer) (ADF&G 1995). These WAA's are virtually roadless.

Community Comments

A number of Petersburg residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Petersburg residents who responded to the issues want more emphasis on scenic resources, recreation, fish, and wildlife. Opinion was split on subsistence with some wanting more emphasis on subsistence and some wanting less. Those who responded requested that the current timber sale program continue along with the long-term timber sale contracts. Residents were split in their opinion of road development with some recommending a reduction in emphasis and some requesting a mix of road development with other Forest uses. Opinion was split three ways regarding mineral exploration and development. Some want more emphasis on mineral exploration and development, others want less, and still others want a mix. Respondents are satisfied with the current amount of designated Wilderness. They want management to emphasize the tourism, wildlife, recreation, and subsistence sectors of their economy.

Most others who commented want more emphasis on subsistence, wildlife and tourism and less emphasis on timber. They want the long-term contracts terminated and do not want a road on the north side of Blind Slough. Others areas most often mentioned for protective management include Crystal Mountain, Cape Fanshaw, Farragut Bay, and Dall Island. Even though there was strong support for protection of many areas around Petersburg and maximum protection of fish and wildlife habitat, there was also strong opposition to the Preferred Alternative in the RSDEIS because it would cripple the timber industry and destroy families. Most strongly support a value-added wood industry to perpetuate the health of the economic base. They want the forest managed for sustainability, not targets.

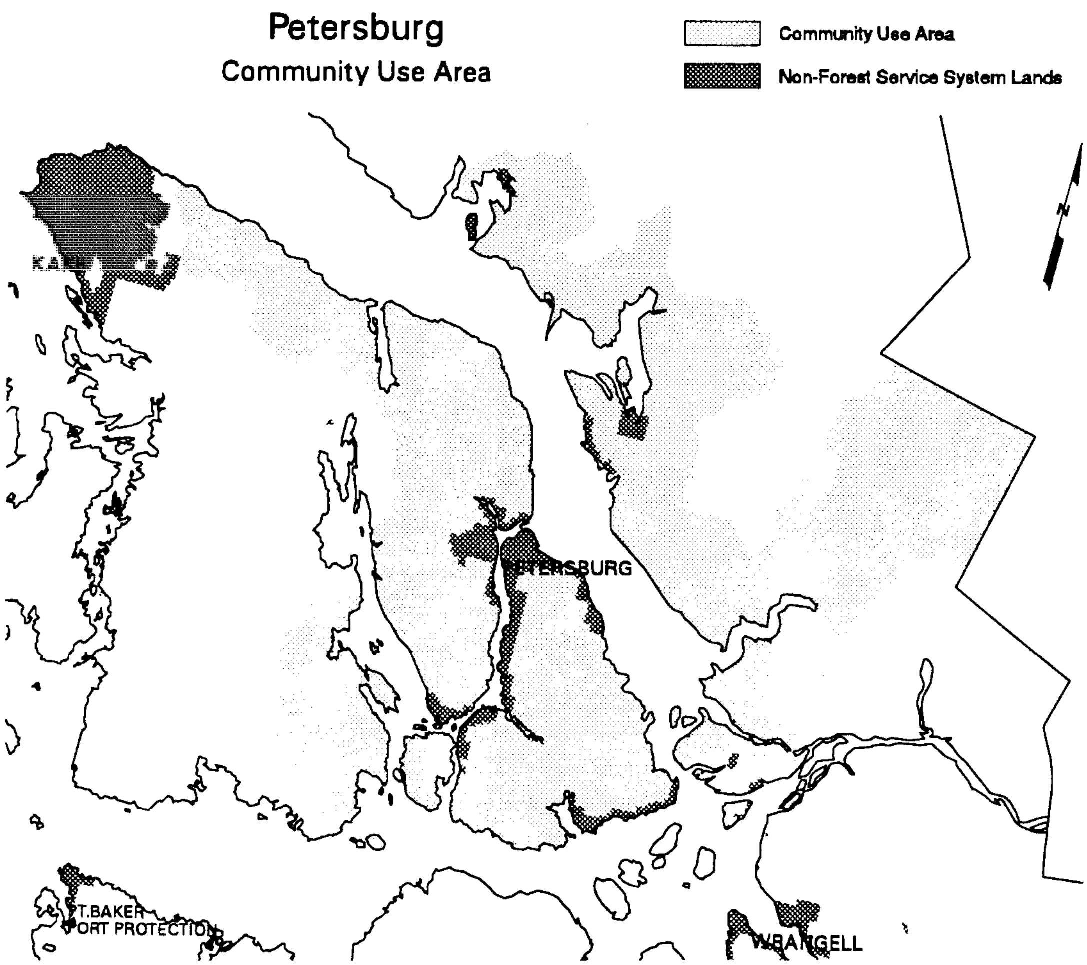
Community Use Area

The general area commonly used or related to by many of the residents of Petersburg in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 743,977 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Petersburg's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	224,413	224,413	224,413	224,413	224,413	224,413	224,413	224,413	224,413
Mostly Natural	494,019	123,869	181,916	123,869	168,451	7,542	71,905	181,916	223,521
Moderate Development	0	220,661	189,209	220,661	195,841	0	188,996	189,209	164,424
Intense Development	24,824	175,034	148,439	175,034	154,112	512,042	258,263	148,439	131,619
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	109,328	95,064	109,448	99,081	133,740	124,548	95,064	61,079

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing, and recreation and tourism are particularly important to Petersburg. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Recreation and tourism have become increasingly important to the economy of Petersburg. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives, thereby benefiting retail trade.

The primary recreation and subsistence use areas for Petersburg are Duncan Canal, Mitkof Island, and Woewodski Island. Alternative 1 would maintain all of these areas in their current condition. Alternative 2 would allow timber harvesting in these areas but would modify the size and shape of cut units along Tongass Narrows, Duncan Canal and the Mitkof Island road system to Visual Quality Objectives. In addition, Ideal Cove and the west shore of Duncan Canal would be allocated to the Old-growth Habitat LUD, and would not have any timber harvest. Alternatives 3, 4, 5, 6, 10 and 11 would have the same management as Alternative 2 plus some additional important wildlife areas would be allocated to the Old-growth Habitat LUD including west Mitkof, north Woewodski, Castle River and south Lindenburg. Alternative 7 would manage all of these areas for intensive timber production. Alternative 9 would emphasis intensive timber production, but would modify the size and shape of harvest units along the Tongass Narrows, Woewodski Island, west Duncan Canal and the Mitkof Island road system to meet Visual Quality Objectives.

Panel Results: The Socioeconomic Panel predicted that Alternative 5 would either lead to increases in valued characteristics of Petersburg or would not cause decreases; all other alternatives were rated as increasing some characteristics and decreasing others. Alternative 5 received similar ratings but with more potential for decreases in timber employment. Alternative 7 and, to a lesser extent, Alternative 9, were believed to pose the greatest risks to economic diversity, community stability, access to traditional lifestyles, recreation opportunities, and quality of life. Alternative 2 was rated in similar directions, but with some panelists believing effects would be more neutral. Alternatives 3 and 4 were viewed as having generally neutral or positive effects except for decreases in timber employment under Alternative 4. The effects of Alternative 1 were believed to be more mixed, with increases in non-timber resource jobs, recreation opportunities, and access to traditional lifestyles, but decreases in timber employment, community stability and quality of life. Panelists did not agree on whether economic diversity would increase or decrease under Alternative 1. Although not rated by the panel, Alternatives 10 and 11 would be viewed very similar to Alternative 3 except that they would offer slightly higher opportunities for timber-related employment.

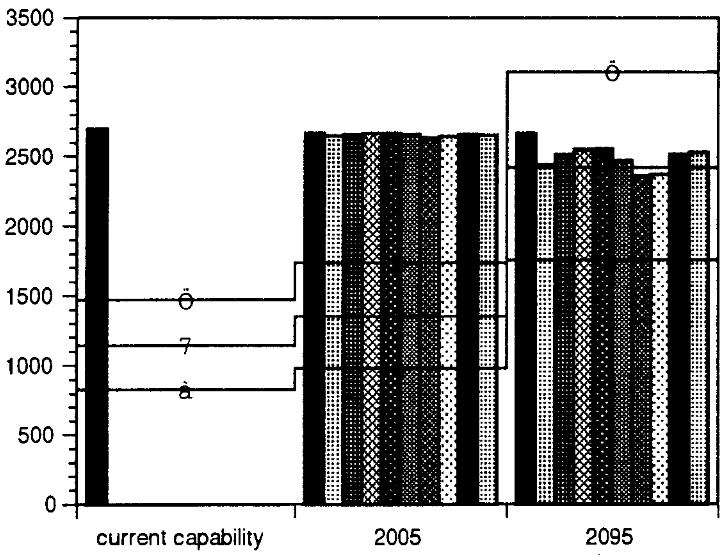
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Petersburg households (Kruse and Frazier 1988).

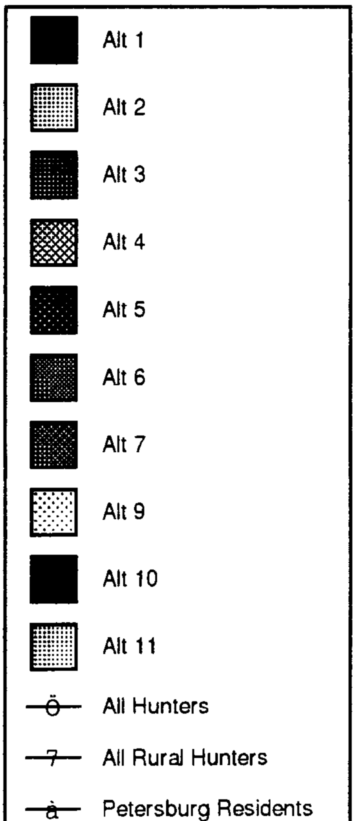
The following figure displays 10 percent of the estimated level of deer habitat capability within the WAA's where 75 percent of Petersburg's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Petersburg residents. However, in the long term, projected deer demand for all rural hunters in Alternatives 7 and 9 and for all hunters in all alternatives exceeds 10 percent of habitat capability and these alternatives may have future inadequate habitat capability. At some point, a restriction in hunting may occur. Deer account for 21 percent of the total edible pounds of subsistence resources harvested by Petersburg households (Kruse and Frazier 1988).

Petersburg households hunt throughout the forest but the majority of hunting occurs within Wilderness which will not change by alternative. Alternative 1 is unlikely to have direct impacts on Petersburg's subsistence use with little timber harvest activity occurring. Alternatives 7 and 9 will likely impact Petersburg's use area is within the development LUD's if timber harvesting continues or increases. Alternatives 3, 5, 6, 10 and 11 will provide some habitat maintenance with Old-growth Habitat LUD's. Alternatives 2, 4 and 5 also provide habitat maintenance within recreation LUD's. Alternatives 4 and 5 may also increasing habitat with longer rotations. Only Alternative 1 restricts all of Petersburg's use area from possible timber activity.

Indirectly, Alternatives 2, 7 and 9 which may offer opportunities for expanding access may increase competition if hunters from other communities come to Petersburg's use areas due to the increased access. But because much of Petersburg's hunting already occurs in Wilderness and areas with limited access, it is unlikely that competition in these areas would effect them.

Deer Availability and Anticipated Demand in Areas Used by Petersburg Residents





The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Point Baker

Point Baker is located on the northern tip of Prince of Wales Island, 101 air miles northwest of Ketchikan. Point Baker received its name in 1793 from Captain George Vancouver. It has a population of 62 (ADCRA 1995). with no Natives (1990 U.S. Census).

Native settlement of the area during Vancouver's time was already established. Tlingits used fish camps at Point Baker to participate in both customary trade and subsistence fishing. Commercial fishing at Point Baker began in the early 1900s, when the area was used as the site of a floating fish packer. Land sales in Point Baker accounted for part of an increase in year-round residents, the majority being non-Native (ADF&G 1994).

Point Baker is accessible by floatplane and skiff. Point Baker is not an incorporated city, nor is it within any other local government jurisdiction. It is not part of any Native organization and has no traditional council. The town is not recognized under the Alaska Native Claims Settlement Act. Residents of Point Baker are members of the Sumner Strait Fish and Game Advisory Committee (ADF&G 1994).

Population: The population of Point Baker has decreased significantly between the 1970 and 1990 census, with the largest population recorded in 1980. Since 1990, the population has shown some growth, increasing in total by 59 percent.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	80	90	39	38	47	57	57	62

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Commercial fishing began in the early 1990s when the area was used as the site of a floating fish packer. The first store was built in Point Baker in 1941, followed by a post office. Then, in 1955, the townsite was withdrawn from within the boundaries of the Tongass National Forest. In 1961, a floating dock was built by the State, replaced in 1968 by larger ones. The community has grown since the 1920s as increasing numbers of hand trollers used the area for home base, some of them eventually building homes there (ADF&G 1994).

In the 1990s, the Point Baker economy continues to be based upon fishing. The majority of the fishermen are hand trollers, although a few are power trollers and gillnetters. Besides commercial fishing, other economic enterprises include a bar, a restaurant, a grocery store, laundry facilities, a post office, fuel sales, and gasoline and diesel sales on a floating dock. Today, the Point Baker bar and store also serves as the fish buyer (ADF&G 1994).

The main economic sector for Point Baker is fishing. The 1989 median household income was $12,083 (1990 U.S. Census). Unemployment for this census area was 12.5 percent, compared with 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Point Baker was 344 edible pounds, one of the highest in all Southeast. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook salmon, cod, halibut, rockfish, deer, dungeness crab, clams and cockles, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, deer at 27 percent, salmon at 26 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Point Baker households (Kruse and Frazier 1988).

Point Baker hunters travel an average of nine miles to their most reliable deer hunting areas (Kruse and Frazier 1988). Harvest data from the ADF&G show that most of Point Baker's deer harvest during the years of 1987 through 1990 occurred on the northwest corner of Prince of Wales Island.

Appendix H provides detailed maps regarding the areas that Point Baker households have ever used to hunt deer. Summarizing, the majority of Point Baker households hunt deer in Wildlife Analysis Areas (WAA's) 1528, 1529, and 1526. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA 1529 (11 deer) (ADF&G 1995). This WAA is 64 percent accessible by existing roads.

Community Comments

A number of Point Baker and Port Protection residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Community residents who responded to the issues want more emphasis on scenic resources, recreation, fish, wildlife, and subsistence. The Sumner Strait Fish and Game Advisory Committee would also like to see management emphasize wildlife and subsistence. Individual respondents and the Committee want the current timber sale program reduced, and the long-term contracts terminated. They do not want additional roads, Log Transfer Facilities or connections to other existing roads. The Advisory Committee is opposed to emphasizing mineral exploration and development and favors additional Wilderness designations as do community residents. Both groups believe a balanced combination of timber, mining, tourism, recreation and fishing would be most desirable for the economy. Many Point Baker respondents wanted more protection of special places, such as the Wrangell Narrows, Honker Divide, Cleveland Peninsula, and Protection Head, to name just a few.

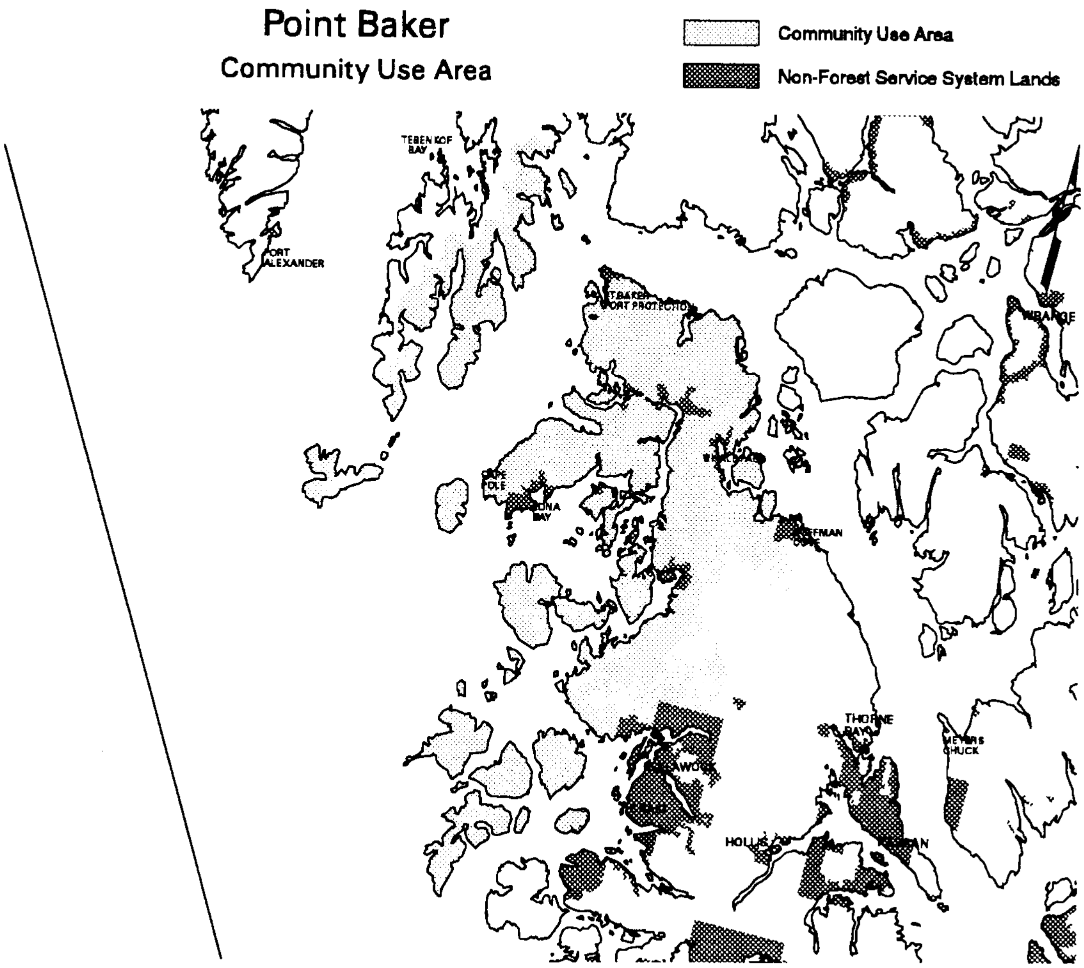
Community Use Area

The general area commonly used or related to by many of the residents of Point Baker in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 844,915 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Point Baker's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	75,657	75,657	75,657	75,657	75,657	75,657	75,657	75,657	75,657
Mostly Natural	730,291	231,964	322,962	231,964	319,741	155,936	181,122	322,962	406,403
Moderate Development	0	137,736	100,780	137,736	101,022	0	125,485	100,780	93,606
Intense Development	38,947	399,558	345,517	399,558	348,496	613,323	462,631	345,517	267,230
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	212,779	167,164	203,482	175,017	251,313	247,060	167,164	121,634

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fisheries and subsistence use are important to Point Baker.

Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Panel Results: The Socioeconomic Panel predicted that Alternatives 2, 7 and 9 would have the most negative effects on Point Baker, while 1, 4 and 5 would be more likely to increase valued community characteristics. Alternative 3's impacts were viewed as more mixed, with possible decreases in quality of life and access to traditional lifestyles. Alternative 6 was viewed as having the least effects either way. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

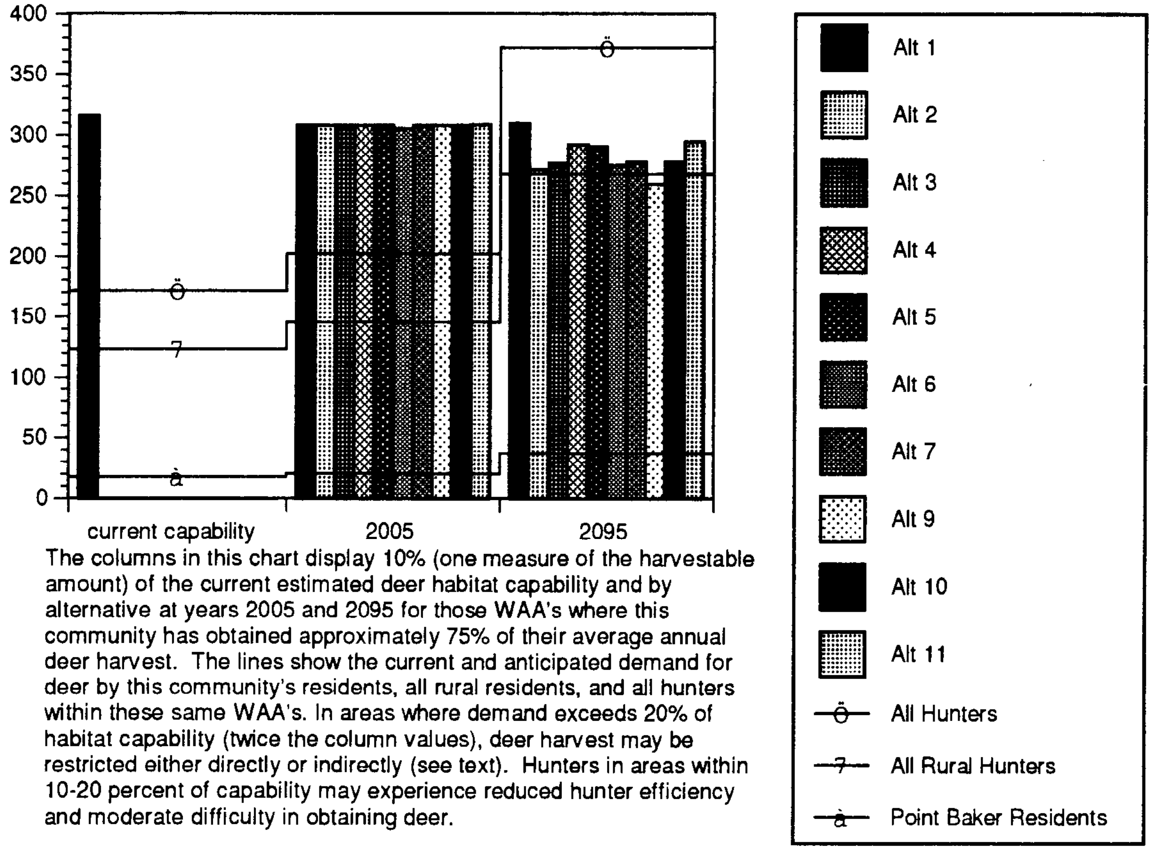
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 59 percent of the total edible pounds of subsistence resources harvested by Point Baker households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Point Baker's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Point Baker residents, as well as for all deer hunted within the WAA's. Deer account for 27 percent of the total edible pounds of subsistence resources harvested by Point Baker households (Kruse and Frazier 1988).

Alternative 1 would provide the greatest habitat maintenance for Point Baker's subsistence uses although some timber harvest activity could occur in their use area although none is scheduled. Alternatives 3, 5, 6, 10 and 11 would offer some maintenance of habitat with Old-growth Habitat LUD's within a small portion of Point Baker's use area. Alternatives 2, 3, 4, 5, 10 and 11 also offer maintenance of some of Point Baker's use area within recreation LUD's. Aside from these Old-growth Habitat and recreation LUD's, Alternatives 2-11 may have direct effects on Point Baker's use area within the Development LUD's. These LUD's prescriptions indicate continued and possibly increased timber harvest and possible mining activity. Alternatives 4 and 5 have longer rotations which would provide Point Baker with a higher level of older forest within the Development LUD's they use.

Competition is likely to indirectly affect Point Baker in Alternatives 2-11 as displaced hunters from other communities may be able to travel to Point Baker for hunting as the access opportunities increase with development. These same access opportunities may also increase Point Baker's opportunities to access more area, and possibly lower their access costs.

Deer Availability and Anticipated Demand in Areas Used by Point Baker Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Port Alexander

Port Alexander is located on the southern tip of Baranof Island about 85 miles south of Sitka. Its population of 110 (ADCRA 1995) includes 2.5 percent Alaska Native (1990 U.S. Census).

The site was named in 1849 by the governor of the Russian American colonies. In 1913, salmon trollers discovered the rich fishing grounds in the area, and two floating processors arrived soon after. By 1916 there was a fishing supply store, a shore station, and a bakery at Port Alexander. During the 1920s and 1930s a prosperous fishing fleet evolved, and houses, stores, restaurants, and a school were constructed. The 1940s and 1950s saw a steep decline in Port Alexander's population. Today, people choose Port Alexander as a home because of its independent, subsistence lifestyle, and commercial fishing opportunities, as well as its remote setting. There are no roads in Port Alexander; travel within the community is by skiff, boardwalks and footpaths (ADF&G 1994).

The community has a local Fish and Game Advisory Committee.

Population: In 1990, Port Alexander's population was over three times the 1970 population. Since 1990, the population has shown a trend of slow decline, with a current population 80 percent that of 1990.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	36	86	119	115	115	113	103	98

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: During the 1920s, Port Alexander harbored the largest salmon trolling fleet in Alaska. By 1938, local salmon and herring stocks had decreased. The outbreak of World War II made remaining levels of processing uneconomical and finished the collapse of the town's economy. By 1950, only 22 residents were counted in the census, and throughout the 1950s and 60s only a few families, comprised mainly of trollers and retirees, remained in Port Alexander (ADF&G 1994).

During the 1970s, Port Alexander's population began to increase again. Federal land transfers and state land disposals provided opportunities for new families and individuals to establish homes in the community. Fisheries employ almost three-quarters of the residents of Port Alexander. The 1989 median household income was $20,625 (1990 U.S. Census). Unemployment in 1994 for this census area was 9.2 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Port Alexander was 306 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho and chinook salmon, cod, halibut, rockfish, deer, clams and cockles, berries, plants, seaweed, and wood (TRUCS 1989).

Based on edible pounds harvested, deer at 36 percent, and salmon and finfish other than salmon at 23 percent each are the most important subsistence resources for Port Alexander households. Port Alexander hunters travel an average of four miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Port Alexander households have ever used to hunt deer. Summarizing, the majority of Port Alexander households hunt deer in Wildlife Analysis Areas (WAA's) 3207, 3733,

Glossary

and 3734. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA 3734 (58 deer) (ADF&G 1994). This WAA is roadless.

Community Comments

A number of Port Alexander residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Port Alexander residents who responded to the issues along with the City of Port Alexander want more emphasis on fish, wildlife, and subsistence. The City wants the current timber sale program reduced and the long-term contracts terminated. People are opposed to clearcutting because of the negative effects to the visuals for tourism, and to the long-term sale contracts because of the transient workforce that puts pressure on subsistence resources. The City does not want additional roads, Log Transfer Facilities, or connection to existing roads. While the City is opposed to emphasizing mineral exploration and development, individual respondents are split in their opinion with some wanting more emphasis and some wanting a mix. The City wants management to emphasize tourism, wildlife, recreation and subsistence sectors of the economy.

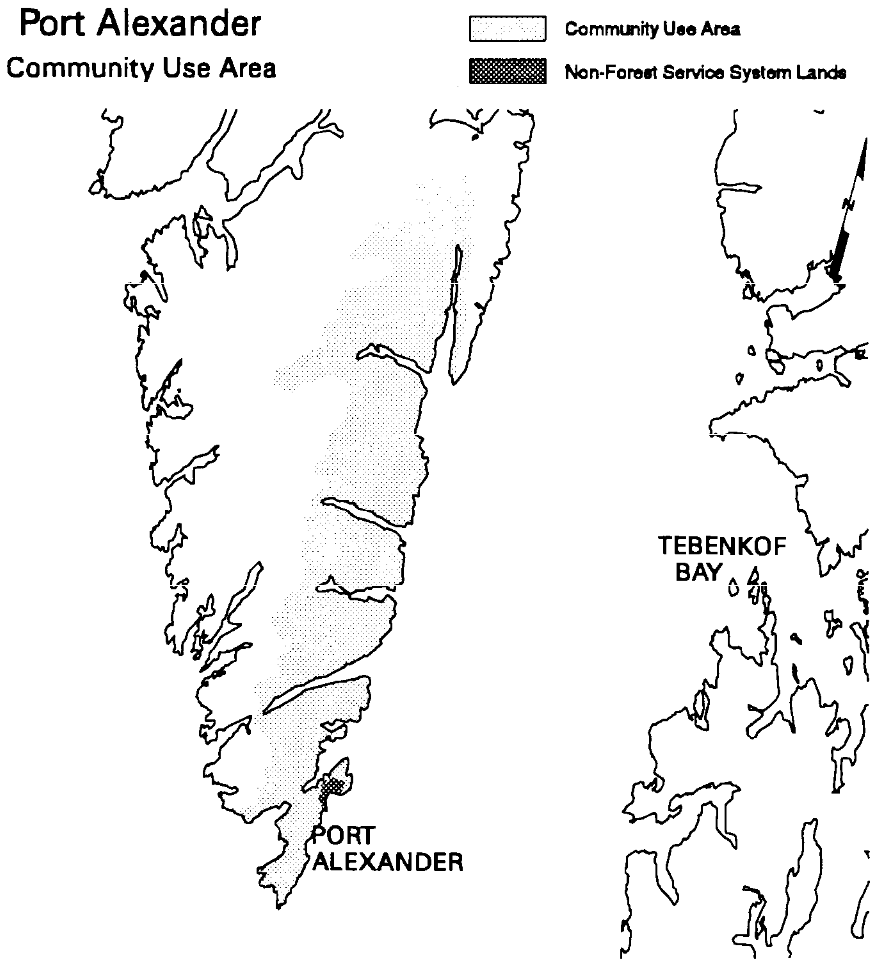
Community Use Area

The general area commonly used or related to by many of the residents of Port Alexander in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 86,976 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Port Alexander's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups (1)	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	17,860	17,860	17,860	17,860	17,860	17,860	17,860	17,860	17,860
Mostly Natural	69,116	69,116	69,116	69,116	69,116	68,932	69,116	69,116	69,116
Moderate Development	0	0	0	0	0	0	0	0	0
Intense Development	0	0	0	0	0	185	0	0	0
Suitable National Forest System Acres for Timber Management (2)									
Total Suitable Acres	0	0	0	0	0	0	0	0	0

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Port Alexander is primarily a commercial fishing town. Commercial fishing and subsistence use will continue to be important to the community.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Panel Results: The Socioeconomic Panel predicted that Port Alexander would benefit the most from Alternative 1, while Alternatives 3, 4 and 5 would have little effect either way. The other alternatives were viewed as posing greater risks to fishing jobs, quality of life, recreation opportunities, and access to traditional lifestyles, while having little effect on the other rated community characteristics. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3, and therefore would have little effect either way.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 55 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier 1988).

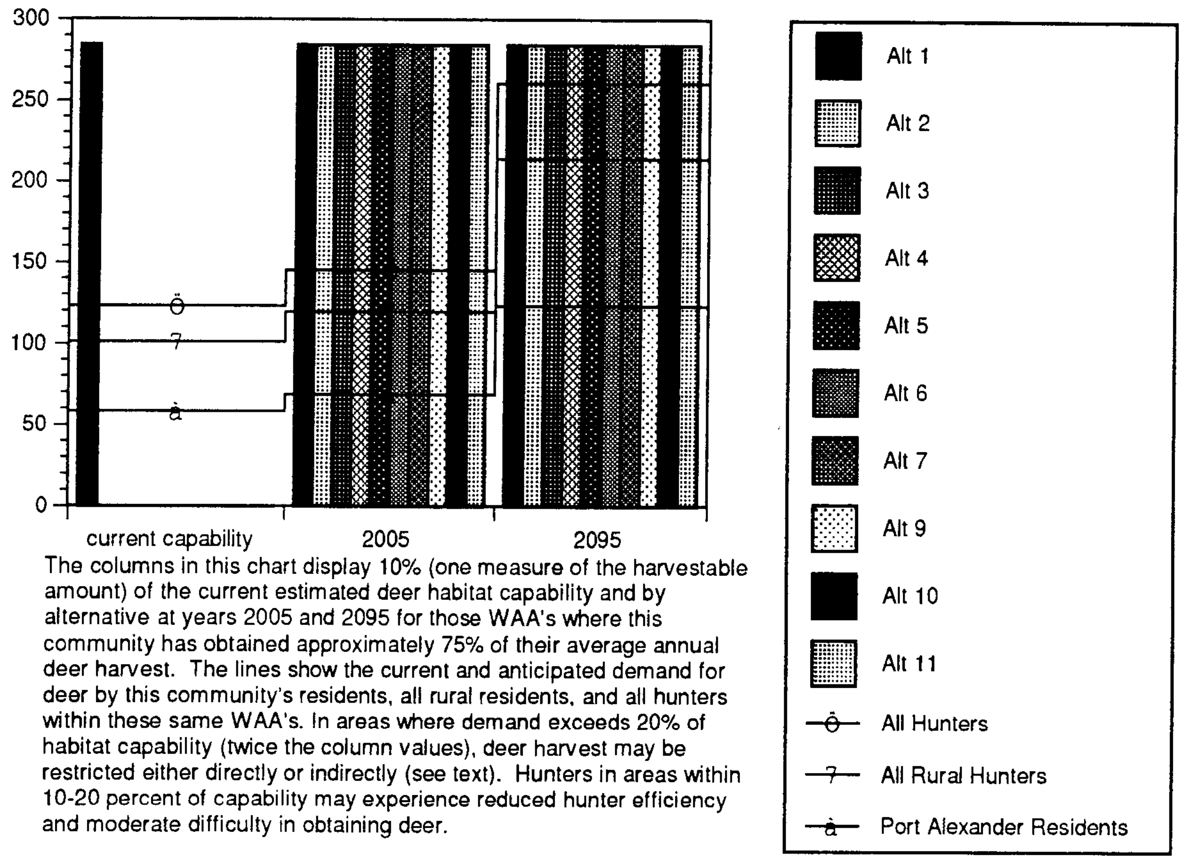
The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Port Alexander's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Port Alexander residents, as well as for all deer hunted within the WAA's. Deer account for 36 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier 1988).

Subsistence use in Port Alexander is unlikely to be directly affected by any of the alternatives as their most heavily used areas are within Wilderness or are allocated as recreation LUD's, and will be maintained under all alternatives.

Indirectly, it is unlikely that Port Alexander will be affected by increased competition or access because of the limited area open for development. The current limited access is unlikely to draw additional hunters into the area due to displacement.

Until recently, Kuiu Island was closed to deer hunting. Now that deer hunting is again allowed, residents of Port Alexander may access the area. If that were to happen, Alternatives 1 and 11 allocate the southern end of the island to Wilderness and Recreation LUDs, Alternatives 2-10 allocate the area to a development LUD.

Deer Availability and Anticipated Demand in Areas Used by Port Alexander Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Port Protection

Port Protection is located at the northern end of Prince of Wales Island and is only accessible by air and water. The nearby logging camp at Labouchere Bay, however, is a roaded port. The community's setting along the water front of the cove requires skiff travel for most purposes (ADF&G 1994).

Port Protection is not an incorporated city, nor is it within any local government jurisdiction. Residents of Port Protection are members of the Sumner Strait Fish and Game Advisory Committee (ADF&G 1994). Located on the northern tip of Prince of Wales Island in a quiet bay facing Sumner Strait, Port Protection has a population of 64 (ADCRA 1995), 1.6 percent of whom are Alaska Native (1990 U.S. Census).

Port Protection was first reported to the western world by the English explorer George Vancouver in 1793. Signs of earlier indigenous occupation of the northern shoreline of Prince of Wales Island include stone and wooden stake fish weirs and traps, as well as shell middens of edible marine invertebrates (ADF&G 1994).

A scow served as a fish-buying station until it was replaced in 1946 by a trading post. A long float dock accommodated many fishing boats at the post (ADF&G 1994).

Population: The population of Port Protection shows a fairly constant trend with some fluctuations over the last six years.

Year	1980*	1990*	1991	1992	1993	1994	1995
Population	40	62	56	48	50	58	64

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: In the 1880s, salmon salteries were constructed in adjacent bays on Sumner Strait, and for two decades harvested thousands of sockeye for commercial markets. After the turn of the century commercial fishing in the area developed into purse seine and troll fisheries, and subsistence uses continued through commercial fishing as well as non-commercial harvest of a wide range of resources. During the 1970s, homesites in Port Protection were acquired by new residents under State of Alaska land disposal programs (ADF&G 1994).

Port Protection has been characterized by a seasonal cash economy with its peak during the summer and fall fishing seasons, and by a subsistence way of life. The main economic sector for Port Protection is fishing. Its 1989 median household income was $10,000 (1990 U.S. Census). Unemployment for this census area was 12.5 percent in 1994, compared with 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Port Protection was 311 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho, chinook, pink, and sockeye salmon, cod, halibut, rockfish, deer, dungeness crab, clams and cockles, berries, plants, seaweed, and wood (TRUCS 1989).

Based on edible pounds harvested, salmon at 36 percent, finfish other than salmon at 29 percent, and deer at 13 percent are the most important subsistence resources for Point Protection households (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Port Protection households have ever used to hunt deer. Summarizing, the majority of Port Protection households hunt deer in Wildlife Analysis Areas (WAA's) 1528, 1529, and 1526. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA 1529 (15 deer) (ADF&G 1994). This WAA is 64 percent accessible via existing roads.

Community Comments

A number of Point Baker and Port Protection residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Community residents who responded to the issues want more emphasis on scenic resources, recreation, fish, wildlife, and subsistence. The Sumner Strait Fish and Game Advisory Committee would also like to see management emphasize wildlife and subsistence. Individual respondents and the Committee want the current timber sale program reduced, and the long-term contracts terminated. They do not want additional roads, Log Transfer Facilities or connections to other existing roads. The Advisory Committee is opposed to emphasizing mineral exploration and development and favors additional Wilderness designations as do community residents. Both groups believe a balanced combination of timber, mining, tourism, recreation and fishing would be most desirable for the economy. Many Port Protection respondents wanted more protection of special places, such as Honker Divide, Cleveland Peninsula, Wrangell Narrows, and Protection Head, to name a few.

Community Use Area

The general area commonly used or related to by many of the residents of Port Protection in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 720,224 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

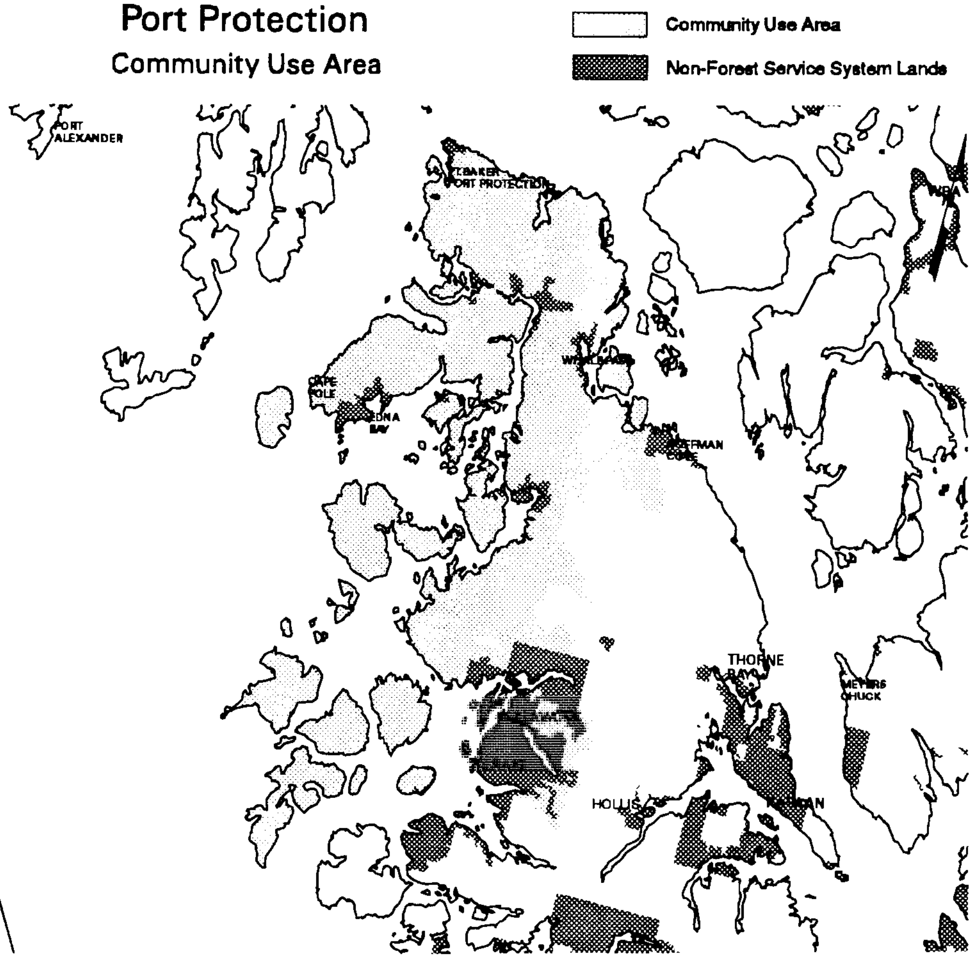
Port Protection's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	14,812	14,812	14,812	14,812	14,812	14,812	14,812	14,812	14,812
Mostly Natural	676,764	226,811	317,667	226,811	314,428	151,282	175,929	317,667	347,614
Moderate Development	0	121,172	84,216	121,172	84,458	0	92,349	84,216	81,673
Intense Development	28,608	357,429	303,530	357,429	306,527	554,130	437,134	303,530	274,305
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	189,748	144,773	180,430	151,966	222,695	218,501	144,773	115,103

1 See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

2 Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Port Protection
Community Use Area



Potential Effects

Port Protection is primarily a commercial fishing village; subsistence use is also important. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Panel Results: The Socioeconomic Panel predicted that Alternatives 1, 4 and 5 would have the greatest potential to positively affect Port Protection, while 2, 7 and 9 would pose the greatest risks. Alternative 3 was viewed as having mixed effects, with potential decreases in quality of life and access to traditional lifestyles but with little effect on economic structure and community stability. Alternative 6 was viewed as most likely to maintain the status quo. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

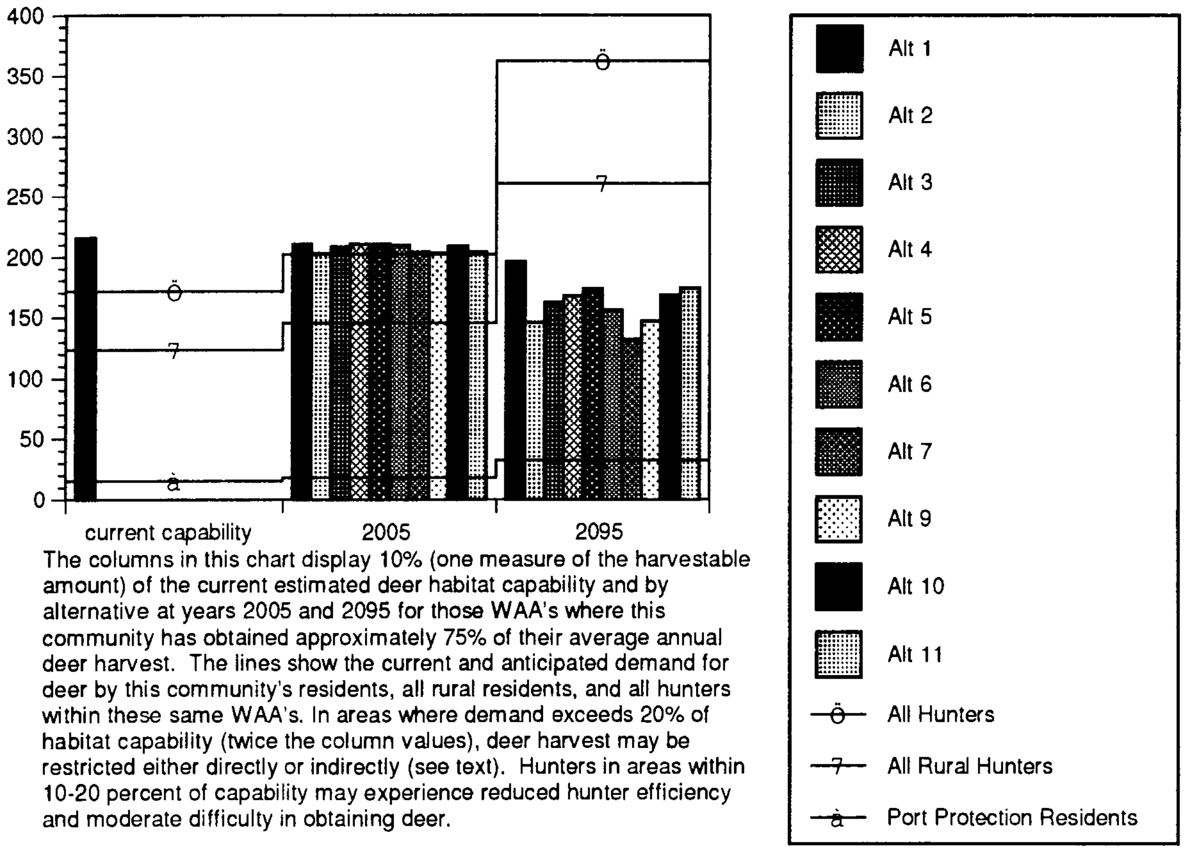
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Port Protection's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Port Protection residents, as well as for all deer hunted within the WAA's in the short term. In the long term, these WAA's may not be able to provide enough deer for all hunters.

Alternative 1 would provide the greatest habitat maintenance for Port Protection's subsistence uses although some timber harvest activity could occur in their use area although none is scheduled. Alternatives 3, 5, 6, 10 and 11 would offer some maintenance of habitat with Old-growth Habitat LUD's within a small portion of Port Protection's use area. Alternatives 2, 3, 4, 5, 10 and 11 also offer maintenance of some of Point Baker's use area within recreation LUD's. Aside from these Old-growth Habitat and recreation LUD's, Alternatives 2-11 may have direct effects on Port Protection's use area within the development LUD's. These LUD's prescriptions indicate continued and possibly increased timber harvest and possible mining activity. Alternatives 4 and 5 have longer rotations which would provide Port Protection with a higher level of older forest within the development LUD's they use.

Competition is likely to indirectly affect Port Protection in Alternatives 2-11 as displaced hunters from other communities may be able to travel to Port Protection for hunting as the access opportunities increase with development. These same access opportunities may also increase Port Protection's opportunities to access more area, and possibly lower their access costs.

Deer Availability and Anticipated Demand in Areas Used by Port Protection Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, about three miles south of Ketchikan. Its population is 402 (ADCRA 1995), with 77 percent Alaska Native (1990 U.S. Census).

In 1894, Tlingits from the old Cape Fox and Tongass villages chose Saxman as the site for a new village in which to locate a government school and a new Presbyterian church. The Saxman people are also known as the Cape Fox people or Sanya in the earlier ethnographies. Saxman was incorporated in 1929 and was certified by the federal government as a second class municipal corporation. Three years later, the federal government issued a patent to 365 acres of land to the townsite trustee for Saxman (ADF&G 1994).

When the Ketchikan Gateway Borough was formed in 1963, Saxman was included within its boundaries. In 1971 and 1973, respectively, Saxman was recognized and then certified as a Native village under the Alaska Native Claims Settlement Act. An elected mayor and six city council members constitute the governing body of the municipality as organized under state law. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

When the Tlingits left their old villages to move to Saxman, they abandoned houses, totems, carvings and other cultural and ceremonial artifacts. In 1938, the Civilian Conservation Corps retrieved and brought to Saxman original totems from the abandoned villages and cemeteries of Tongass, Cat, and Pennock Islands, and Cape Fox. The Totem Park in Saxman has become a major attraction for Ketchikan area visitors (ADF&G 1994).

Population: The population of Saxman more than doubled between the 1970 and 1990 census. Since 1990, the population has continued to show small increases.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	135	273	369	381	383	388	389	394

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Fishing and cutting lumber for the growing town of Saxman were the early economic mainstays. Although Saxman residents still depend on Ketchikan for most services and employment opportunities, development of a barge terminal, a fishing fleet, and the Cape Fox Village Corporation investments have led to some recent growth in Saxman's population and economic base. The Saxman Totem Park was recently expanded to a cultural center, including a tribal house, a totem carving shed and a hall for traditional Tlingit dance exhibitions which draw many tourists.

Major economic sectors at Saxman are timber, government, tourism and retail trade. Median household income in 1989 was $30,481 (1990 U.S. Census). Unemployment in the Ketchikan census area in 1994 was 8.3 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Saxman was 89.3 edible pounds. More than 83 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho, sockeye salmon, halibut, herring roe on kelp, deer, clams and cockles, and berries (TRUCS 1989).

Based on edible pounds harvested, salmon at 37 percent, finfish other than salmon at 20 percent and deer at 19 percent are the most important subsistence resources for Saxman households. Saxman hunters travel an average of 20 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Saxman households have ever used to hunt deer. Summarizing, the majority of Saxman households hunt deer in Wildlife Analysis Areas (WAA's) 1003, 1422, and 1531. As displayed on the Deer Harvest by Community map (in the map packet), these areas are a distance from the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 406 (2 deer) and 1315 (2 deer) (ADF&G 1995). These WAA's are six percent accessible by existing roads.

Community Comments

Saxman residents provided oral testimony on the TLMP Revision 1990 DEIS. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Residents expressed concern about the effects of timber harvesting on subsistence salmon streams. They do not want logging in domestic watersheds or storage of timber where it will affect returning salmon. They expressed opposition to clearcutting and prefer only limited road construction. Concern was expressed for total traditional Native subsistence lifestyle and tribal sovereignty. People commenting on the RSDEIS Preferred Alternative were concerned about their traditional lifestyle and what the consequences of the timber program would be to their quality of life if the mill was closed and harvest levels reduced. Even though they want protection of the subsistence resources they use, they are concerned about their families.

Community Use Area

The general area commonly used or related to by many of the residents of Saxman in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 2,062,784 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Saxman's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	962,350	964,412	964,412	964,412	964,412	952,604	965,032	964,412	968,572
Mostly Natural	1,100,434	460,083	575,944	460,083	480,111	102,142	362,162	575,944	646,543
Moderate Development	0	195,229	141,345	195,229	184,180	0	276,394	141,345	109,389
Intense Development	0	443,060	381,082	443,060	434,081	1,008,038	459,196	381,082	338,280
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	190,926	141,671	188,706	184,046	293,191	231,688	141,671	101,374

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Saxman
Community Use Area

Community Use Area

Non-Forest Service System Lands

Potential Effects

Saxman, a traditional native community, could be affected primarily by changes in recreation and tourism use, commercial fishing, timber processing, and subsistence opportunities. Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

The timber industry would be subject to the largest amount of variation among the alternatives. KPC has announced the closure of the pulp mill effective in March, 1997. This closure will affect all alternatives and will result in the loss of approximately 500 direct wood products jobs within the community. Alternative 1 would likely result in the closure of the KPC Sawmill, and Seaborne Lumber. This could significantly reduce the employment level, tax base, and income level within the community. Alternatives 4 and 5 would likely result in the closure of either Seaborne Lumber or one of KPC's sawmills if timber prices increase. If timber prices remain constant, Alternatives 4 and 5 would likely close Seaborne Lumber, and one of KPC's sawmills. Alternative 6 should supply enough timber to operate both sawmills at full capacity if prices increase, and enough timber for at least one shift if prices remain constant. Alternatives 3, 10 and 11 would provide enough timber supply to operate both the KPC sawmills and Seaborne Lumber operating at one shift. In addition, there would be enough timber supply to operate one of these mills at full capacity if timber prices increase. Alternatives 2, 7 and 9 should provide enough timber to operate both sawmills at full capacity.

Recreation and tourism have become increasingly important to the economy of Saxman. The Ketchikan downtown dock has been expanded to accommodate additional cruise ships, and the Totems and Tribal House in Saxman are one of the premier attractions in Southeast. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives benefiting retail trade in Saxman. However since the pulp mill will be closing, declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is lower. The impact of the decline in timber employment will be increased in Alternatives 1, 4 and 5 due to the closure of some of the sawmills.

The most important subsistence opportunities for Saxman residents include Duke Island, Cleveland Peninsula, Revilla Island, Gravina Island, and Misty Fiords. Alternative 1 maintains all of these areas in essentially their current condition. This would provide for remote and semi-remote recreational opportunities but would preclude road access for residents to the northern end of Revilla Island via Carrol River. Alternatives 2 and 9 would allow some timber harvest on Cleveland Peninsula and Revilla Island including a potential road connection out of town to the northern part of Revilla. Gravina Island and Misty Fiords would remain in their current condition. Alternatives 3, 10 and 11 would allow some timber harvesting on Cleveland Peninsula but avoid Union Bay. The visual quality would be maintained in Helm Bay. Some timber harvesting would be permitted on Revilla Island, but key recreation and wildlife areas would be avoided. Misty Fiords and Gravina Island would be maintained in the current condition. Alternative 4 would maintain Revilla, Gravina and Misty Fiords in their current condition. Some timber harvesting would be permitted on Cleveland Peninsula but would be mitigated to maintain important recreation places. Alternatives 5 and 6 would maintain Revilla, Gravina and Misty Fiords in their current condition. Some timber harvesting would be permitted on Cleveland Peninsula but would be mitigated to maintain important wildlife and recreation places. Alternative 7 would allow intensive timber harvest on Cleveland Peninsula, Gravina, and Revilla Island.

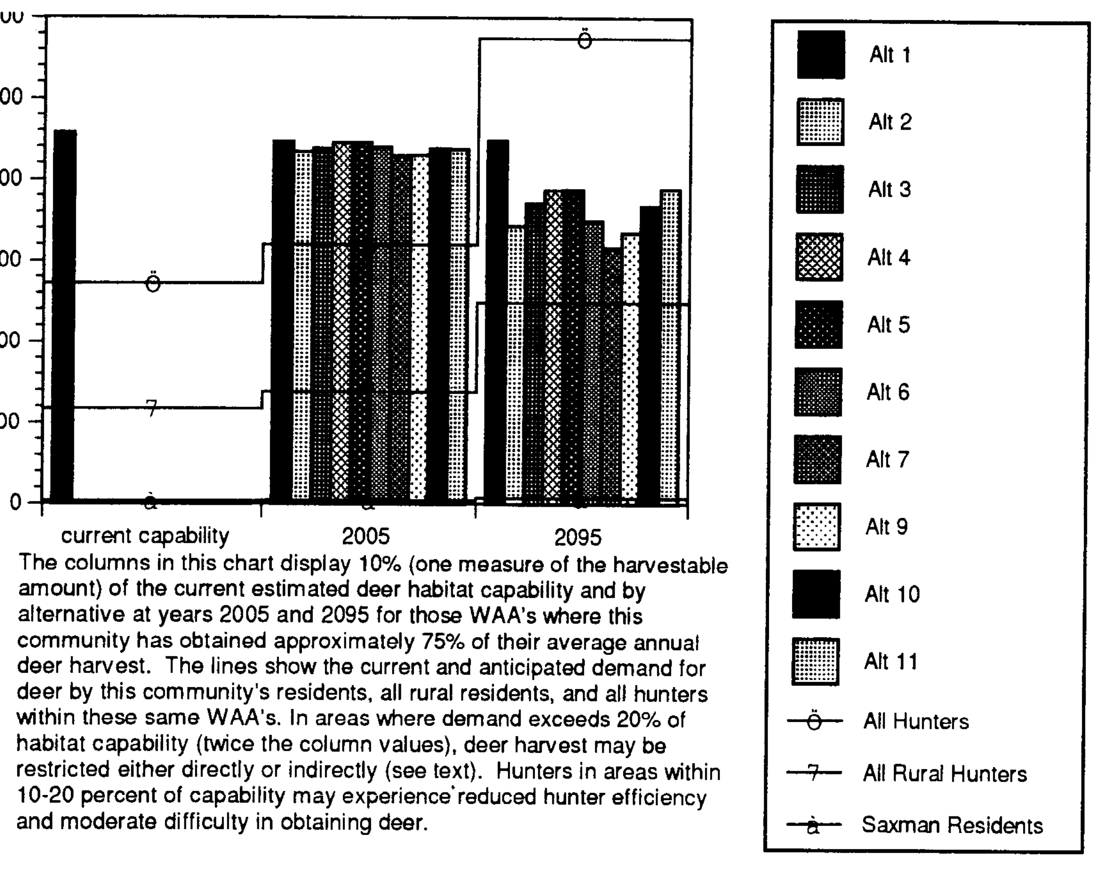
Panel Results: The Socioeconomic Panel predicted that Saxman benefit the most from Alternatives 4 and 5, although with risks of decreased timber employment. Alternatives 3 and 6 received similar ratings, although with less certainty and greater potential for neutral rather than positive effects. Alternative 7 and 9 were rated as those most likely to decrease quality of life; Alternative 2 was also predicted to lead to decreases in valued community characteristics, but some panelists believed effects could be more neutral. Alternative 1 was rated as having mixed effects, with decreases in timber employment, economic diversity, and community stability and potential increases in commercial fishing employment, recreation opportunities, and access to traditional lifestyles. Panelists did not agree on whether the overall effects on quality of life would be positive or negative. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3 except that Alternative 10 would offer slightly higher opportunities for timber-related employment.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 68 percent of the total edible pounds of subsistence resources harvest by Saxman households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Saxman's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for the effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Saxman residents, as well as for all deer hunted within the WAA's in the short term. In the long-term, no alternatives appear to have enough habitat capability to provide for deer for all hunters. Deer account for 19 percent of the total edible pounds of subsistence resources harvested by Saxman households (Kruse and Frazier 1988).

Some of the Saxman household's use area is non-National Forest System Lands which will not be affected by any of the alternatives. With little timber harvest activity, Alternative 1 would have the least effect on Saxman's subsistence uses. Alternatives 3, 5, 6, 10 and 11 allocate much of Saxman's subsistence use areas to natural setting LUD's including the Old-growth Habitat LUD. It is unlikely that these alternatives will directly impact Saxman's use of the area. Alternatives 2 and 4 allocate some of this same area to natural setting LUD's, but does not contain Old-growth Habitat LUD allocation. Alternatives 7 and 9 allocate much of Saxman's subsistence use areas to development LUD's, but also allocates some habitat within a recreation LUD. Even with that designation, Alternatives 7 and 9 will likely impact Saxman's subsistence use through timber harvest activity. Alternative 4 and 5, with a longer rotation, would likely maintain the habitat within all of Saxman's use areas over time. The displacement of hunters that may occur in Alternative 2-11 with continued or increased timber harvesting would likely increase competition for deer with other communities. The impact of increased competition may not greatly affect Saxman households who already travel long distances to hunt. An increase in access opportunities may create lower cost access for Saxman subsistence use.

Deer Availability and Anticipated Demand in Areas Used by Saxman Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Sitka

Located on the west side of Baranof Island, Sitka is the only community in Southeast Alaska that fronts the open sea. Its population is 9,194 (ADCRA 1995), 21 percent of whom are Alaska Natives (1990 U.S. Census). Present-day Sitka was originally inhabited by a major tribe of Tlingits who called the village "Shee Atika." Traditionally, the Tlingits used a wide area surrounding the community for hunting, fishing, and gathering wild resources. The site became "New Archangel" in 1799 as the capital of Russian America (ADF&G 1994).

Sitka became the focal point of Russian fur trade in North America beginning in 1741. During the mid-1800s, Sitka was the major port on the north Pacific coast, with ships calling from many nations. After the purchase of Alaska by the U.S. in 1867, it remained the capital of the Territory until 1906, when the seat of government moved to Juneau. During the early 1900s gold mines contributed to its growth, and during World War II the town was fortified. After the war, the Bureau of Indian Affairs converted some of the buildings to a boarding school for Alaska Natives (ADF&G 1994).

Population: Sitka's population shows a trend of steady growth, increasing almost 41 percent between the 1970 and 1990 census. The increasing trend has continued since 1990 with a total increase of seven percent in the last six years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	6,109	7,803	8,588	8,911	8,987	9,052	9,031	9,194

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: After the fur trade era, fishing and fish processing dominated Sitka's economy for a time. The development of refrigeration, which opened new markets for fisheries, led to the opening of Sitka's first cold storage plant in 1913, which processed salmon, halibut, crab, and black cod. Major changes in Sitka since 1940 include construction of a large World War II military base on Mt. Edgecumbe Island, and construction of a large hospital and related facilities during the 1950s' tuberculosis epidemic (ADF&G 1994).

Other important elements in Sitka's economic growth include the establishment of Mount Edgecumbe boarding school and the expansion of the U.S. Coast Guard facilities in 1977 to enforce the 200-mile fisheries limit. The Halibut Producers Cooperative (now Seafood Producers Cooperative) built a major cold storage plant in 1980, used for processing salmon, black cod, herring, and halibut (ADF&G 1994). Sitka is also port-of-call to many cruise ships each summer, bringing in thousands of tourists.

However, until it closed in September 1993, the largest employer in town was the pulp mill, opened in 1959 by Japanese-owned Alaska Lumber and Pulp Company (later named Alaska Pulp Company (APC). APC was the first major investment made by the Japanese after World War II. The mill employed almost 400 people, with a $19 million annual payroll. The impact of its closure is still not completely known (Sitka Economic Development Commission (SEDC), *Sitka Economic Base Study,* 1995).

Sitka's economy is now based on health care, tourism, education, commercial fishing and services, and local, state, and federal government. The town's largest private employer is now the Southeast Alaska Regional Health Corporation (SEDC 1995).

Sitka's median income per household in 1989 was $43,337 (1990 U.S. Census), placing it sixth among Southeast communities in size of median income. The high number of those employed in health, education, tourism, and fishing positions (46.9 percent of the work force) indicates a seasonal and part-time pattern of employment, with multiple job holdings by households (SEDC 1995). Unemployment in 1994 in the Sitka census area was 9.9 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

The community is currently investigating ways to increase activity in ecotourism, education and fisheries, according to a draft comprehensive plan released in February 1995. The Forest Service is cooperating with the City and Borough of Sitka in a study to find alternative wood products industries to replace the economic sector lost with the mill closure.

Subsistence Use: In 1987, the per capita subsistence harvest in Sitka was 146 edible pounds. More than 88 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were salmon and berries (TRUCS 1989).

Based on edible pounds harvested, salmon at 28 percent, deer at 27 percent, and finfish other than salmon at 25 percent are the most important subsistence resources for Sitka households. Sitka hunters travel an average of 24 miles to their most reliable deer hunting areas (TRUCS 1989).

A 1982 study by the Division of Subsistence found the overall level of resource use in Sitka high. Many Sitka residents reported a heavy dependency on use of local fish and wildlife resources (Schroeder and Nelson 1983). Resource use was locally perceived to have been increasing over the five years preceding the study. The number of hunting licenses and subsistence permits issued in the previous ten years increased much faster than the population of Sitka. As a subsistence activity, food harvesting is reported to be the foundation of the Native culture in Sitka. It also seems to be a crucial element in the adaptation that many non-Native Sitkans have made to life in Alaska (ADF&G 1994).

Appendix H provides detailed maps regarding the areas that Sitka households have ever used to hunt deer. Summarizing, the majority of Sitka households hunt deer in Wildlife Analysis Areas (WAA's) 3001, 3002, and 3314. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 3002 (527 deer), 3001 (522 deer), and 3003 (269 deer) (ADF&G 1995).

Community Comments

A number of Sitka residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Sitka residents who responded to the issues, and the City and Borough of Sitka, requested that additional emphasis be placed on scenic resources. While individuals requested that less emphasis be placed on managing for recreation, the Sitka State Parks Advisory Board requested that additional emphasis be placed on recreation.

The City and Borough requested additional emphasis on fish and wildlife and the Sitka Advisory Committee requested additional emphasis on subsistence. Individuals are split with some wanting more emphasis on subsistence, some less, and still others satisfied with existing management emphasis.

During the comment period for the DEIS and the SDEIS the City and Borough recommended that the current timber sale program continue. However, residents were split in their opinion with some wanting the same mix of emphasis and some wanting less timber harvest. Some individual respondents favored additional roads, transfer facilities, and encouraged connecting existing roads. Certain residents also support additional emphasis on access for mineral exploration and development. Some individual respondents favored emphasizing timber and mining economic sectors. Other individuals and the Sitka State Parks Advisory Board want management to emphasize tourism, wildlife, recreation, and subsistence.

During the comment period for the RSDEIS, people from Sitka commented that the Preferred Alternative would be detrimental to the fish and wildlife habitat and to the subsistence way of life. People were clearly opposed to clearcutting and were not in favor of extending KPC's contract. On the other hand, some felt that the Preferred Alternative would not provide enough timber to keep the large and small mills in operation; they also support a value-added wood product industry.

Community Use Area

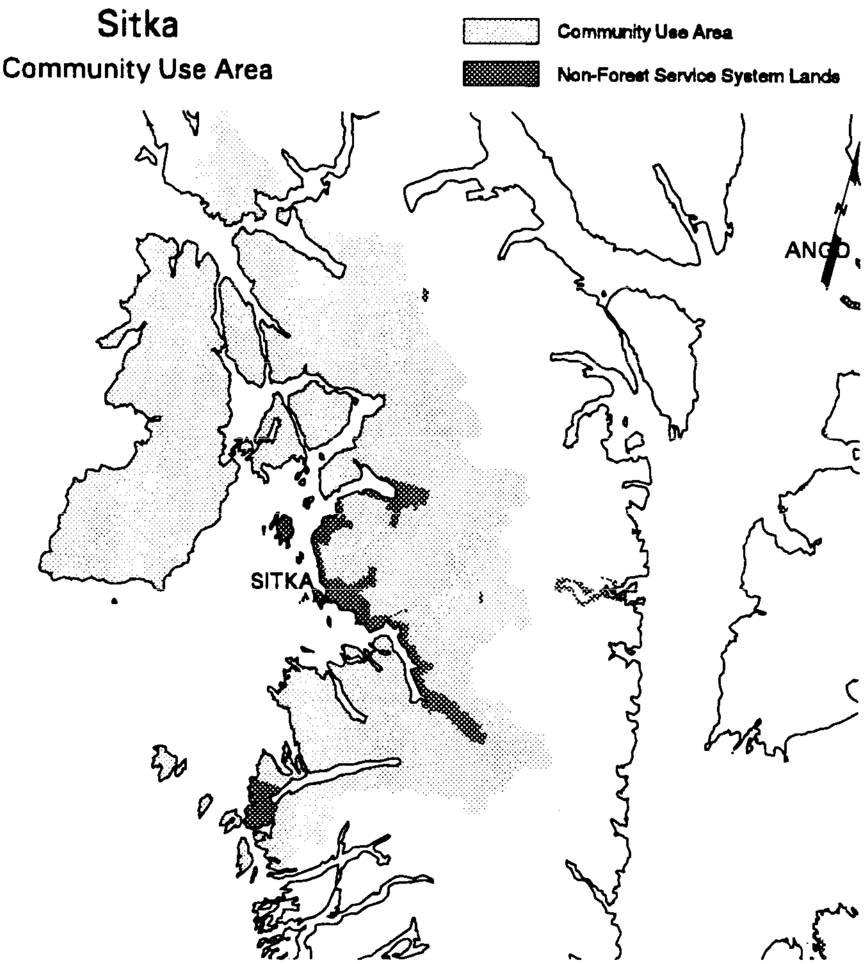
The general area commonly used or related to by many of the residents of Sitka in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 427,673 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Sitka's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	15,995	16,015	16,015	16,015	16,015	15,975	15,995	16,015	16,015
Mostly Natural	411,679	158,212	257,650	158,212	158,212	134,905	63,402	257,650	318,747
Moderate Development	0	56,251	34,593	56,251	56,251	0	295,238	34,593	41,496
Intense Development	0	197,195	119,416	197,195	197,195	276,794	53,040	119,416	51,415
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	56,312	27,434	54,871	54,871	49,529	75,300	27,434	19,465

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing, recreation and tourism, subsistence, and developing a timber industry are important to Sitkans.

The APC Pulp Mill closed in Sitka in 1994. Some members of the community have expressed interest in the possibility of continued wood processing in Sitka to replace the Pulp Mill, including a medium density fiberboard (MDF) plant. There should be enough material to open a MDF plant in Alternatives 2, 7 and 9. Alternative 6 should make enough pulp material available for this plant if timber prices increase. All alternatives, except Alternative 1, would provide enough pulp material for an MDF plant should the KPC Pulp Mill close.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

Recreation and tourism use is expected to increase by roughly the same amount in all alternatives. This should benefit retail and services sectors in Sitka.

Panel Results: The Socioeconomic Panel predicted that most of the alternatives would have a mixture of effects on Sitka. Alternative 1 was expected to pose risks to timber employment, economic structure and community stability, but to lead to potential increases in access to traditional lifestyles, recreation opportunities and related employment, and quality of life. Every other alternatives was expected to not increase recreation opportunities or access to traditional lifestyles. Alternatives 7 and 9 were expected to have positive effects on timber employment, economic structure, and community stability, but to decrease non-timber employment, recreation opportunities, and access to traditional lifestyles. Panelists disagreed whether these effects would increase or decrease the quality of life in Sitka. Alternatives 2, 4, 5, and 6 were anticipated to show similar patterns of effects—increases in timber employment, economic structure, and stability, with potential decreases in recreation and access to traditional lifestyles. Alternative 3 was the only option viewed as having either neutral or positive effects on Sitka in each of the nine impact categories. Alternatives 3 and 5 were the only ones viewed as potentially increasing employment in timber, fishing, and recreation sectors. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 69 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier 1988).

Table 3-145 displays the estimated level of deer habitat capability within the WAA's where 75 percent of Sitka's subsistence use occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The average number of deer harvested is assumed to be constant throughout the analysis. The table shows the number of deer currently harvested by Sitka hunters as a percent of the estimated year 2095 habitat capability, and the number of deer harvested by all hunters as a percent of the estimated year 2095 deer habitat capability. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort decreases, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. Sitka residents are currently harvesting approximately 15 percent of habitat capability each year; Sitkan and other hunters combined are currently harvesting approximately 18 percent of habitat capability, which is close to a rate that may not be sustainable. Implementation of any alternative would result in less than 20 percent of habitat capability being harvested by Sitkans; however, for total hunting, Alternatives 2, 7 and 9 would exceed 20 percent of the habitat capability being harvested in year 2095. At some point, a restriction in hunting may be necessary for all alternatives. Deer accounts for 27 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier 1988).

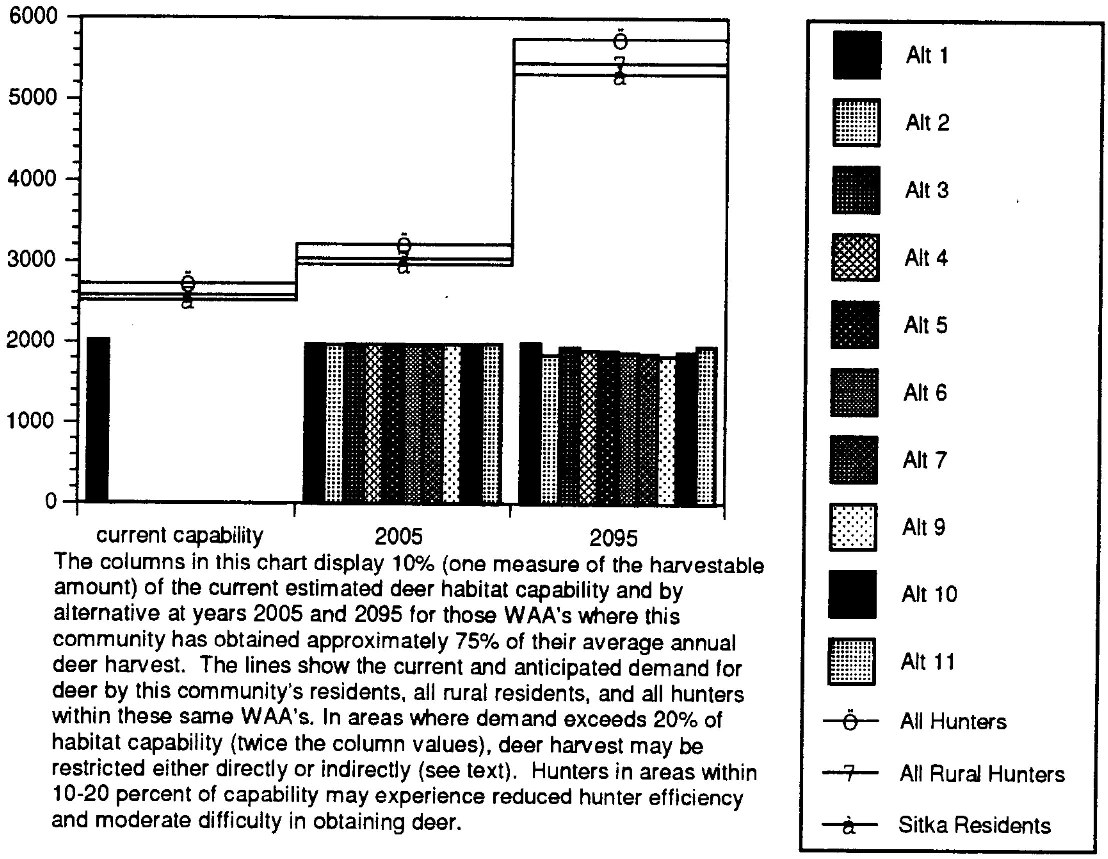
WAA's 3001, 3002, 3003, 3311, 3309, and 3312 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5, 6, 10 and 11. Sitka households hunt throughout Chichagof Island, with some hunting occurring within Wilderness and LUD II designations which will not change by alternative. Alternative 1 is unlikely to have direct impacts on Sitka's subsistence use with little timber harvest activity occurring. Alternatives 7 and 9 will likely impact Sitka's use area within the Development LUD's if timber harvesting continues or increases. Additionally, Alternative 7 allocates a portion of Sitka's highest use area to a Recreation LUD. Alternatives 2, 4, 5, and 6, will provide some habitat maintenance with recreation LUD's, but much of Sitka's high use areas would be allocated to a development LUD. Alternatives 4 and 5 may improve subsistence resource habitat with longer rotations. Alternatives 3, 10 and 11 greatly increase the likelihood of maintaining subsistence uses throughout the Old-growth Habitat LUD designations.

Glossary

But only Alternative 1 allocates the majority of all of Sitka's use area to a natural setting LUD.

Indirectly, alternatives which offer opportunities for expanding access may increase competition if hunters from other communities come to Sitka's use areas due to increased access.

Deer Availability and Anticipated Demand in Areas Used by Sitka Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Skagway

Skagway is located in northern Southeast Alaska at the head of Taiya Inlet, 95 air miles north of Juneau. It is the end-of-the line for the Alaska Marine ferry and the entrance to the Klondike Highway. Its population of 811 (ADCRA 1995) includes 5.5 percent Alaska Native (1990 U.S. Census).

Prior to the founding of the community, the area was settled by Chilkoot Tlingit who called it "Skagua," or "the place where the north wind blows." The Chilkoots controlled access into the interior along what has become known as the Chilkoot Trail, which follows the Taiya River and over the Chilkoot Pass. It was a major trade route for the Chilkoot Tlingit with interior Tlingit and Athabaskans (ADF&G 1994).

Settlement began in Skagway in 1887 when a seafarer named William Moore decided to develop a trading and mining route into the Yukon Territory using the Chilkoot Trail. As the Klondike gold rush hit the area in 1896, the Chilkoot and White Pass trails became the major routes into the Interior. Within a few years the trails were superseded by the adjacent White Pass and Yukon Railway. The railway continued to function as a supply and shipping route between Skagway and Whitehorse until 1982 (ADF&G 1994). Currently the railway operates as a tourist attraction.

Skagway is incorporated as a first class city. The community participates in the Upper Lynn Canal Fish and Game Advisory Committee (ADF&G 1994).

Population: Since 1990, Skagway's population has seen a trend of small but steady growth. The population increased by less than three percent between the 1970 and 1990 census, and has increase a total of 17 percent in the last six years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	675	814	692	730	749	782	818	811

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: During the Klondike gold rush days, the town of Skagway became well-established as a staging area for hopeful prospectors. Skagway became Alaska's first incorporated city in 1900. As the gold rush waned, Skagway's businesses concentrated on serving as a port city for the Yukon Territories. After World War I, cruise ships stopped at Skagway and tourism increased; World War II brought a temporary boom with pipeline construction and the presence of military personnel. Throughout the 20th century, the mining industry and tourism maintained the economic base of the community. In 1975, part of the city was included in the Klondike Gold Rush National Historic Park; tourism continues to play an important role in Skagway's economy (ADF&G 1994).

Major employment sectors of Skagway are retail trade, entertainment, recreation, tourist services, and transportation. It is the shipping center for zinc and copper ore from the Yukon. The present mainstay of Skagway's economy is tourism. Approximately 300,000 tourists arrive each year on cruise ships.

The 1989 median household income was $37,500 (1990 U.S. Census). Unemployment in this census area was 10.6 in 1994, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Skagway was 52 edible pounds. About 68 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were halibut and king crab (TRUCS 1989).

Based on edible pounds harvested, salmon at 34 percent, finfish other than salmon at 31 percent, and invertebrates at 23 percent are the most important subsistence resources for Skagway households. Deer comprise only 6 percent of the total edible pounds harvested. Skagway hunters travel an average of 155 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Skagway households have ever used to hunt deer. Summarizing, the majority of Skagway households hunt deer in Wildlife Analysis Areas (WAA's) 3523, 3524, and 4252. As displayed on the Deer Harvest by Community map (in the map packet), these areas are quite a distance from the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 3836 (5 deer), 3629 (3 deer), and 3310 (2 deer) (ADF&G 1995).

Community Comments

A number of Skagway residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Skagway residents who responded to the issues recommended that the Forest be managed for both scenic quality and timber harvesting, with more emphasis on recreation. Community opinion was split on fish management and wildlife management with some wanting more emphasis and some satisfied with existing emphasis. Respondents to the issues requested that the current timber sale program continue with a mix of management emphasis to include other resources. Some residents offering oral testimony indicated that any alternative placing the area around Skagway in primitive or semi-primitive recreation was acceptable. Others indicated a preference for stopping clearcutting Forest-wide.

Community Use Area

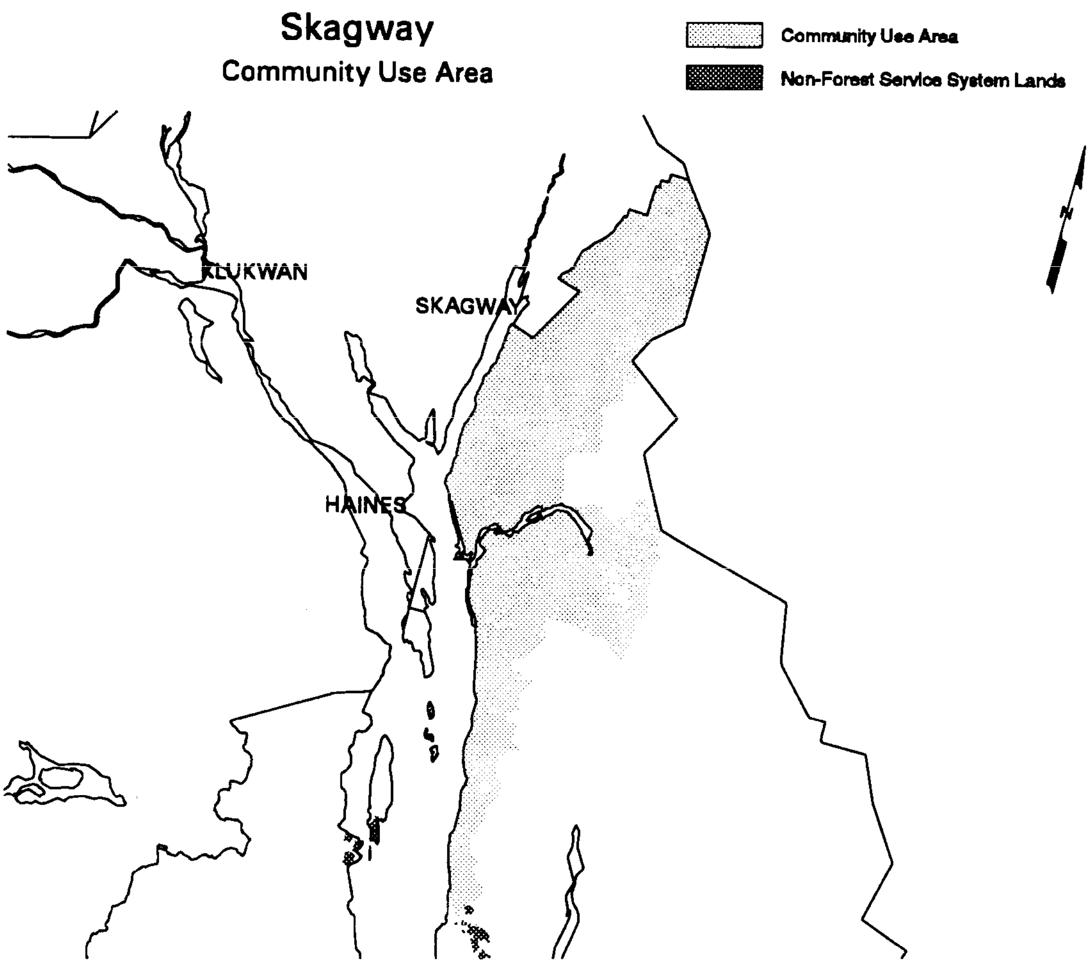
The general area commonly used or related to by many of the residents of Skagway in their local, day- to- day work, recreational, and subsistence activities is shown on the following map. This area contains 202,122 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Skagway's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	0	0	0	0	0	0	0	0	0
Mostly Natural	202,122	193,046	193,046	193,046	193,046	127,139	202,122	193,046	194,308
Moderate Development	0	9,076	9,076	9,076	9,076	74,804	0	9,076	7,814
Intense Development	0	0	0	0	0	180	0	0	0
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	441	361	441	441	2,660	0	361	40

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Recreation, tourism, and subsistence use are important to the community of Skagway.

Recreation and tourism use is expected to increase by roughly the same amount in all alternatives. This would benefit the retail sales and services sectors of Skagway's economy.

Panel Results: The Socioeconomic Panel predicted that Skagway would be relatively unaffected by any of the alternatives. The only exceptions were possible increases in timber employment and economic structure under Alternative 7, and risks to quality of life under this alternative. These were the only effects the panel identified, and panelists were divided on whether these effects would actually occur. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

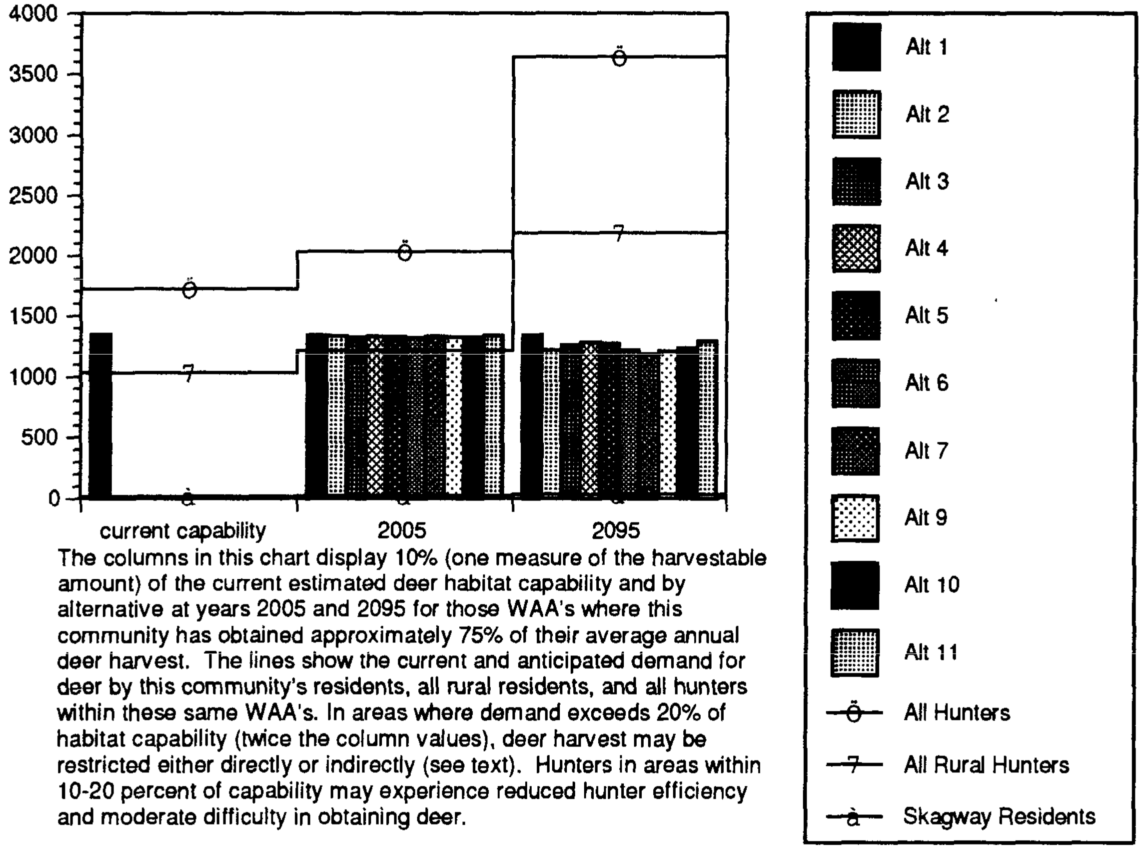
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 88 percent of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier 1988).

Deer account for only a small fraction of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier 1988). The following figure displays the estimated level of deer habitat capability within the WAA's where 75 percent of Skagway's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Skagway residents and all rural hunters in the short term. However, current deer harvest for all hunters exceeds 10 percent of habitat capability and all alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in hunting may be necessary.

With little timber harvest activity, Alternative 1 would provide the least effect on Skagway's subsistence uses. A majority of Skagway's use area is within Development LUD's in Alternatives 2, 4, 7 and 9 and will likely impact subsistence use with timber harvest activity. Alternatives 5 and 6 allocate portions of Skagway's highest use area in Old-growth Habitat LUD's, offering some habitat maintenance. Alternatives 4 and 5 have longer rotations which would maintain a higher level of older forest within the Development LUD's. Recreation LUD's are allocated inland in Alternatives 2, 4, 5 and 6 which would likely increase habitat maintenance in those areas. Alternatives 3, 10 and 11 prescribe additional Old-growth Habitat LUD's within Skagway's high use areas.

As hunters from Skagway travel some distance already, alternatives which may increase access from the ferry system (2-11), may decrease their cost of accessing areas to hunt in. But with this additional access would likely come an increase in competition from hunters of other communities. In some cases this competition could cause Skagway hunters to travel even farther to harvest deer.

Deer Availability and Anticipated Demand in Areas Used by Skagway Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Tenakee Springs

Tenakee Springs is located 50 miles northeast of Sitka on the north shore of Tenakee Inlet (east Chichagof Island). With a population of 111 residents (ADCRA 1995), Tenakee Springs has a 9.6 percent Alaska Native population (1990 U.S. Census). Tenakee Springs is accessible only by floatplane or boat, and is a stop on the Alaska Marine Highway ferry system.

A Tlingit winter village site was located in the vicinity of the present-day harbor and a summer village was located across the Inlet at Kadashan Bay (ADF&G 1994). Early prospectors and fishermen came to the site to wait out the winters and enjoy the natural hot springs in Tenakee. Around 1895, a large tub and building were constructed to provide a warm bathing place. The 108-degree sulfur springs is the social focus of the community, with bathing times scheduled for men and women.

In 1904, E. Snyder bought a tract of land from a Tlingit resident, including a house located near the public bath house. The post office, established in 1903, used the name Tenakee. In 1928, the community's name was changed to Tenakee Springs. The community has a local Fish and Game Advisory Committee, and many residents practice a subsistence lifestyle, actively exchanging resources with neighbors (ADF&G 1994).

Population: Tenakee Springs' population has increased slowly since 1990 to 107 people, but is still below the 1980 high point of 138 people.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	86	138	94	97	99	101	98	107

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Various salmon and crab canneries operated in the Tenakee region from as early as 1916 until 1974. The Tenakee Springs economy historically centered around the commercial fishing industry, and to a lesser extent included logging. Participation in the commercial fishing industry decreased after the demise of the local canneries, but residents continue to fish commercially (ADF&G 1994).

Logging began at nearby Corner Bay in the early 1970s, and the town has experienced some growth. Logging in the Indian River drainage, directly adjacent to Tenakee, began in the late 1970s and continued intermittently in the 1980s. When logging in the Indian River drainage ended, logging jobs decreased and some residents left Tenakee to find jobs elsewhere in the logging industry. A local sawmill operated off and on until it was destroyed in the 1984 Thanksgiving Day storm. A fire on July 19, 1993 destroyed part of the town, including the hotel.

Tenakee is popular with area people and a favorite stop for boaters. A number of Juneau residents maintain second homes there. Tourism in the area includes guided fishing trips and lodges, pleasure boating, cabin rentals, and smaller, educational tour boats

The 1989 median household income was $18,125 (1990 U.S. Census). Unemployment in 1994 for this census area was 10.6 percent, compared to 8.2 percent throughout Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: Appendix H provides detailed maps regarding the areas that Tenakee Springs households have ever used to hunt deer. Summarizing, the majority of Tenakee Springs households hunt deer in Wildlife Analysis Areas (WAA's) 3526, 3627, and 3628. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 3526 (39 deer), 3629 (23 deer), and 3527 (10 deer) (ADF&G 1995).

In pursuing traditional subsistence resources, Tenakee Springs residents hunt deer and seals; catch salmon and other finfish; collect shellfish; and trap furbearers. In 1987, the per capita subsistence harvest in Tenakee Springs was 345 edible pounds. More than 90 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook salmon, halibut, rockfish, deer, seal, dungeness crab, and berries (TRUCS 1989).

Based on edible pounds harvested, deer at 39 percent, finfish other than salmon at 24 percent, and invertebrates at 17 percent are the most important subsistence resources for Tenakee Springs households. Tenakee Springs hunters travel an average of seven miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Community Comments

A number of Tenakee Springs residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Tenakee Springs residents who responded to the issues, and the City of Tenakee Springs, want to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. They want the current timber sale program reduced, and the long-term sales terminated. They do not feel that jobs should be the reason for making forest-use decisions. However, in comments on the RSDEIS, residents felt that more research should be done to find out what the economic and social impacts of reducing harvest would be. Neither respondents nor the City want additional roads, Log Transfer Facilities, or connections to existing roads. Respondents indicated that more roads means more hunter access and fewer deer. They are opposed to emphasis on mineral exploration and development and favor additional Wilderness designations. They want management to emphasize tourism, wildlife, recreation, and subsistence sectors of the economy. Both the City and the Tenakee Fish and Game Advisory Committee, are very concerned with current and projected future declines in wildlife habitat near Tenakee, especially along Tenakee Inlet.

Community Use Area

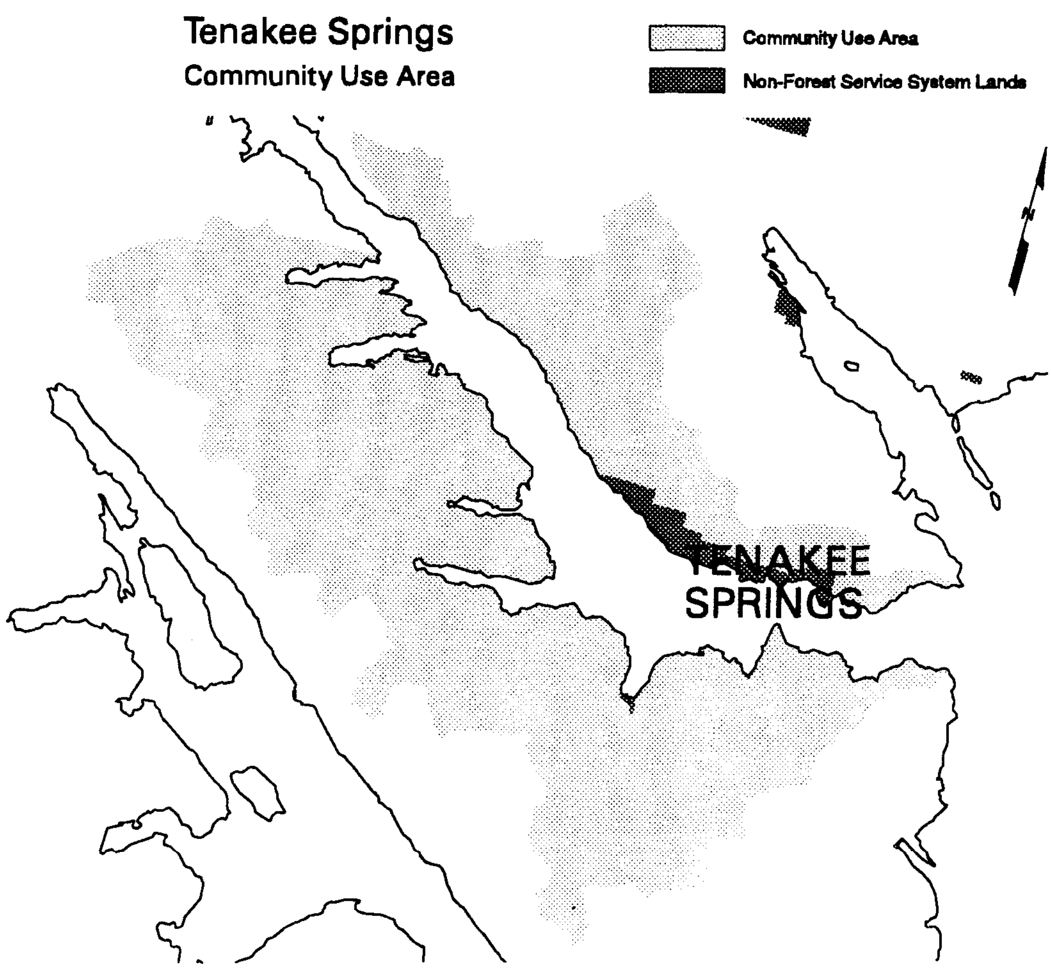
The general area commonly used or related to by many of the residents of Tenakee Springs in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 196,793 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Tenakee Springs Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	0	0	0	0	0	0	0	0	0
Mostly Natural	196,793	41,135	66,006	41,135	60,453	60,453	41,175	86,168	79,009
Moderate Development	0	13,288	6,811	13,288	10,309	10,309	0	16,880	6,112
Intense Development	0	142,370	123,976	142,370	126,032	126,032	155,618	93,746	111,672
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	42,110	30,234	40,830	36,150	36,150	46,964	37,068	30,234

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Tenakee Springs is primarily a commercial fishing, subsistence, and retirement community. The lands along Tenakee Inlet are some of the most important to the community.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next ten years.

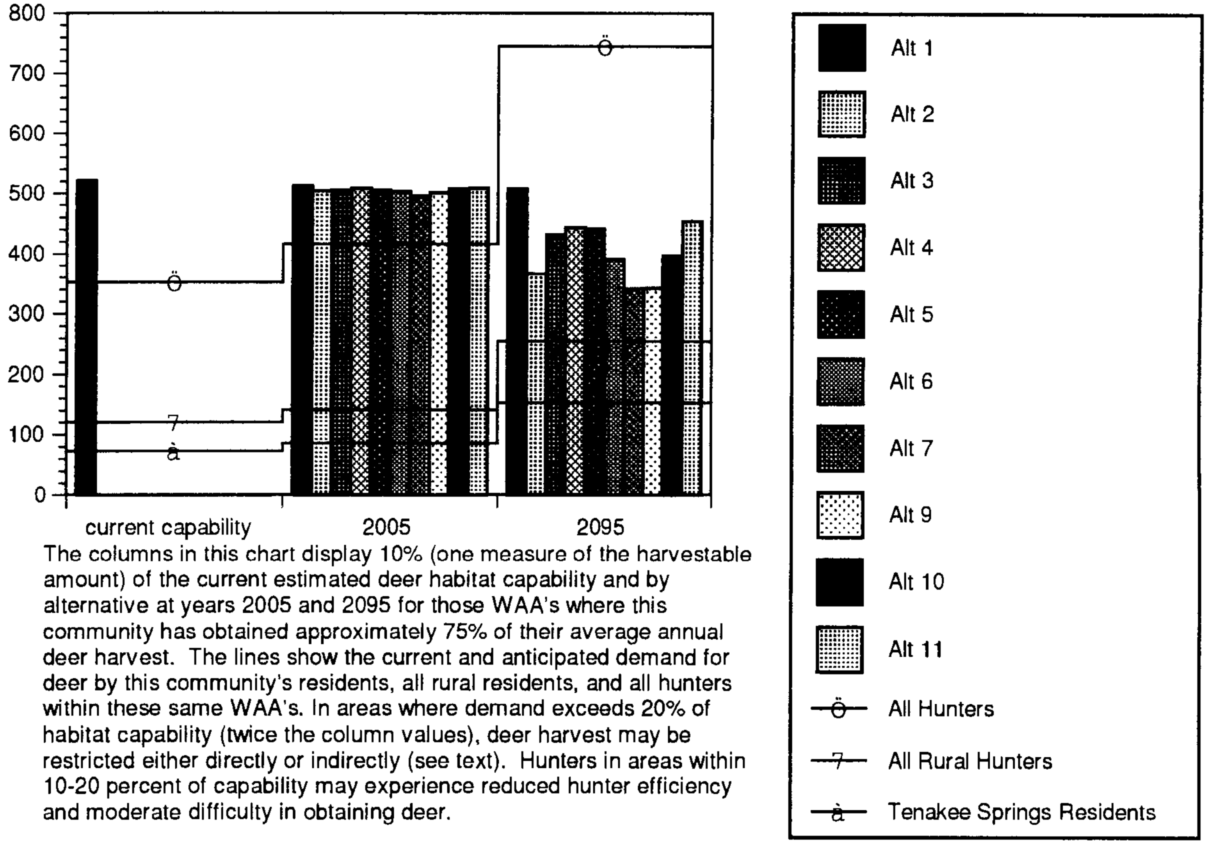
Panel Results: The Socioeconomic Panel rated Alternative 1 as the only option likely to increase community stability, quality of life, recreation opportunities, access to traditional lifestyles, and employment in non-timber resource industries in Tenakee Springs. The other alternatives were expected to either not affect or to decrease all other rated characteristics except opportunities for timber employment, anticipated to increase under Alternatives 2, 3, 6 and 7. Decreases in recreation opportunities, access to traditional lifestyles, and quality of life were risks under every alternative except 1 (where increases were expected) and 5 (where no change was expected). Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 55 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Tenakee Springs' average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Tenakee Springs residents, all rural hunters and all hunters in the short term. However, in the long term, the projected deer harvest for all hunters exceeds 10 percent of habitat capability and all alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in hunting may be necessary. Deer account for 39 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier 1988).

Kadashan and Trap Bay watersheds are legislated LUD II areas. These areas were designated in the Tongass Timber Reform Act, in part, because of their high value for subsistence use to Tenakee Springs residents. WAA's 3526, and 3525 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5, 6, 10 and 11. With little timber harvest activity, Alternative 1 would have the least effect on Tenakee Springs' subsistence uses. A majority of Tenakee Springs' use area is within development LUD's in Alternatives 2, 4, 7 and 9 and will likely impact subsistence use with timber harvest activity. Alternatives 5 and 6 allocate portions of Tenakee Springs' highest use area in Old-growth Habitat LUD's, offering some habitat maintenance. Alternatives 4 and 5 have longer rotations which would maintain a higher level of older forest within the development LUD's. Recreation LUD's are allocated inland in Alternatives 2, 4, 5 and 6 which would likely provide better for habitat in those areas. Alternatives 3, 10 and 11 prescribe additional Old-growth Habitat LUD's within Tenakee Springs' high use areas. Long and Seal Bays in Tenakee Inlet, areas considered important for subsistence by local residents, would be available for timber harvest in Alternatives 2, 4, 5, 6 and 7; in the current TLMP and Alternative 9 they are LUD II.

Deer Availability and Anticipated Demand in Areas Used by Tenakee Springs Residents.



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

better for habitat in those areas. Alternatives 3, 10 and 11 prescribe additional Old-growth Habitat LUD's within Tenakee Springs' high use areas. Long and Seal Bays in Tenakee Inlet, areas considered important for subsistence by local residents, would be available for timber harvest in Alternatives 2, 4, 5, 6 and 7; in the current TLMP and Alternative 9 they are LUD II.

Deer Availability and Anticipated Demand in Areas Used by Tenakee Springs Residents.

Thorne Bay

Thorne Bay, a young and rapidly growing city about 40 air miles northwest of Ketchikan, is located at the head of Thorne Bay on eastern Prince of Wales Island. Its population of 650 (ADCRA 1995) includes 1.2 percent Alaska Native (1990 U.S. Census).

Petroglyphs and other archaeological remains indicate occupation and use of the area by Alaska Natives dating back at least 3,000 years. Post-contact development began in the early 1900s with construction of a saltery on the south shore of Thorne Bay (ADF&G 1994).

In 1960, a floating logging camp was built in Thorne Bay, and in 1962 a shop, barge terminal, log sort year and camp were built to replace facilities at Hollis. Thorne Bay was incorporated as a second class city in 1982 making it one of Alaska's newest cities. Thorne Bay is accessible by road, water or float plane. Three air carriers serve the community with six to ten flights daily, and the Alaska Marine Highway system is accessed by the road system to Hollis (ADF&G 1994).

Population: Thorne Bay shows a fairly steady trend of increasing population. Between the 1970 and 1990 census, the population increased a total of 31 percent, since 1990, the population has increase 12 percent in total.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	443	377	581	565	596	619	638	650

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Thorne Bay, with a population of 550, became the hub of Prince of Wales logging activities in 1962, after operations were shifted from nearby Hollis (Roppel, 1983). Although logging was seasonal, many employees chose to remain at Thorne Bay year-round. Road development, completed in 1973, connected Thorne Bay with other major Prince of Wales communities including Craig, Hydaburg, and Klawock and to the ferry terminal at Hollis (ADF&G 1994).

Land disposals and employment opportunities helped spur growth in Thorne Bay in the 1980s. The population nearly doubled between 1980 and 1990 with logging and forest management remaining the mainstay of the economy. Ketchikan Pulp Company and the U.S. Forest Service are among the largest employers. Forestry and wood processing employ the major amount of Thorne Bay's populations with the other major employer being retail trade. Several lodges are nearby. Over 80 percent of the population remains in the community year-round. The community is currently in the process of upgrading its infrastructure to serve the growing economy and year-round community (ADF&G 1994). The 1989 median household income was $39,688 (1990 U.S. Census). Unemployment in 1994 in this census area was 12.5, compared to 8.2 throughout Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Thorne Bay was 188 edible pounds. More than 97 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were coho salmon, halibut, rockfish, trout and char, deer, dungeness crab, berries and wood (TRUCS 1989).

Based on edible pounds harvested, finfish other than salmon at 40 percent, salmon at 25 percent, and deer at 20 percent are the most important subsistence resources for Thorne Bay households. Thorne Bay hunters travel an average of 18 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Thorne Bay households have ever used to hunt deer. Summarizing, the majority of Thorne Bay households hunt deer in Wildlife Analysis Areas (WAA's) 1315, 1319, and 1422. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1319 (141 deer), 1315 (88 deer) and 1422 (35 deer) (ADF&G 1995). These WAA's are 47, 57 and 66 percent accessible by existing roads.

Community Comments

A number of Thorne Bay residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

During the DEIS and SDEIS comment period, Thorne Bay residents were split in their opinion on management of scenic resources. Some want more emphasis on scenic resources while some want less. Thorne Bay residents who responded to the issues want more emphasis on fish and wildlife but think that current emphasis on subsistence is adequate. They are split in their opinion of emphasis on timber harvesting with some wanting the same mix of emphasis and some wanting less timber harvesting. Those responding to the issues indicated they do not want additional road or Log Transfer Facilities. Some want management to emphasize recreation, tourism and fishing sectors of the economy while others want commodity industries emphasized.

Oral or written comments on the DEIS or Supplement generally favored continuing or increasing the timber sale program, many citing its importance to the local economy. The Mayor of Thorne Bay agreed.

Comments on the RSDEIS were mainly concerned with the timber program. Residents of Thorne Bay feel threatened with job loss if the Preferred Alternative is implemented. They are angry that the government seems to be taking greater pains to protect the wildlife, old-growth, and caves that to protect people. Most feel the ASQ should be maintained at the TTRA levels so that large and small mills can be supported. Before any drastic decisions are made, respondents ask that a detailed socioeconomic study be done to show the effects that these alternatives could have to the region and the state.

Community Use Area

The general area commonly used or related to by many of the residents of Thorne Bay in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 1,003,669 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

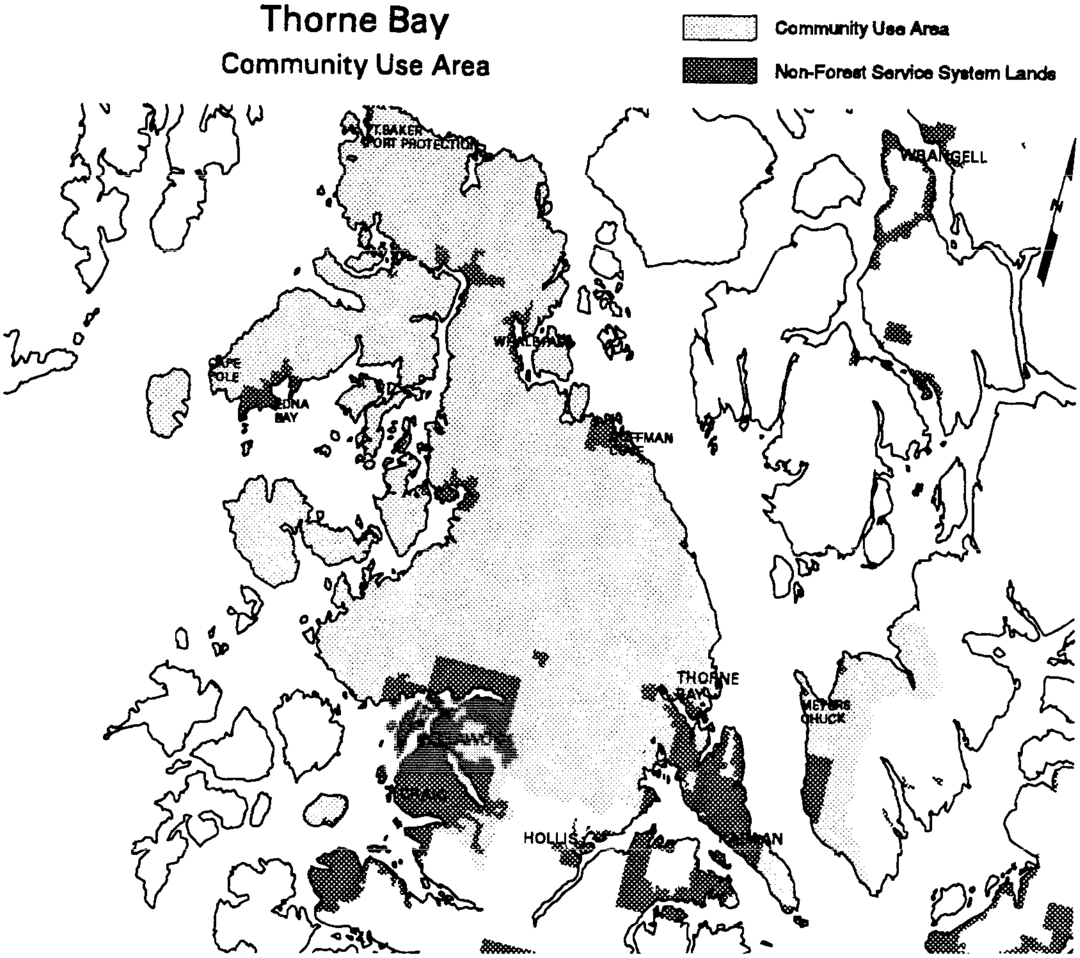
Thorne Bay's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	51,226	51,226	51,226	51,226	51,226	51,226	51,226	51,226	51,226
Mostly Natural	893,753	152,944	326,527	152,944	321,676	76,375	101,101	326,527	406,505
Moderate Development	0	269,716	173,590	269,716	172,727	0	193,040	173,590	165,763
Intense Development	58,751	529,783	452,327	529,783	458,041	876,109	658,383	452,327	380,336
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	310,083	232,795	299,625	244,866	353,100	348,965	232,795	177,320

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).

[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Thorne Bay
Community Use Area



Potential Effects

Thorne Bay is primarily a logging community and as such would be directly affected by the amount of logging opportunities on north Prince of Wales Island. The KPC sort yard through which almost all of the long-term timber sale volume is transferred is located in Thorne Bay. Several small timber purchasers, such as Black Bear Logging, are associated with the community

Alternatives 1, 4, 5 and 6 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities will be available, it amounts to less than 2 MMBF in any alternative, and would most likely be purchased by very small operators for products such as music wood or cedar shakes. This volume would probably only be sufficient for small operators such as Black Bear. The operation at the sort yard would likely be closed. The Forest Service associated employment would also decline. Alternative 3, 6, 10 and 11 continue some logging opportunities on the north end of the island, but at a lower quantity compared to the current levels of timber harvesting. The result of the lack of logging opportunities could result in disruption of community stability. Residents who want to remain with the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. If these individuals choose to relocate, the loss of their income could affect others in the community. Alternatives 2, 7, and 9 would continue logging opportunities on the north end of the island. This would allow those individuals associated with the logging industry to maintain their existing lifestyle within the community.

The lodges located nearby the community would likely not be affected by any of the alternatives. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives, benefiting these lodges.

Several small timber operators produce value added products in Thorne Bay. These value added products include music wood, cabinets and other products. They need relatively low volumes of timber, but of specific species and grades to meet their needs. All alternatives except Alternative 1 would meet their needs.

Panel Results: The Socioeconomic Panel predicted mixed effects of the alternatives on Thorne Bay. None of the alternatives were viewed as likely to increase the quality of life except for Alternative 7, which also was expected to increase timber employment, economic structure, and quality of life, while posing risks to community stability, recreation, and non-timber resource employment. Alternatives 1, 3, and 4 were expected to pose risks of decreases in timber employment, economic structure, community stability, quality of life, and access to traditional lifestyles. Alternative 2 was expected to have few changes under any alternative, with the exception of decreases in fishing employment. Panelists differed on whether Alternative 5 would increase or decrease economic structure and community stability, while decreases in timber employment, quality of life and access to traditional lifestyles were likely. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3 except that Alternative 10 would offer more opportunities for timber-related employment.

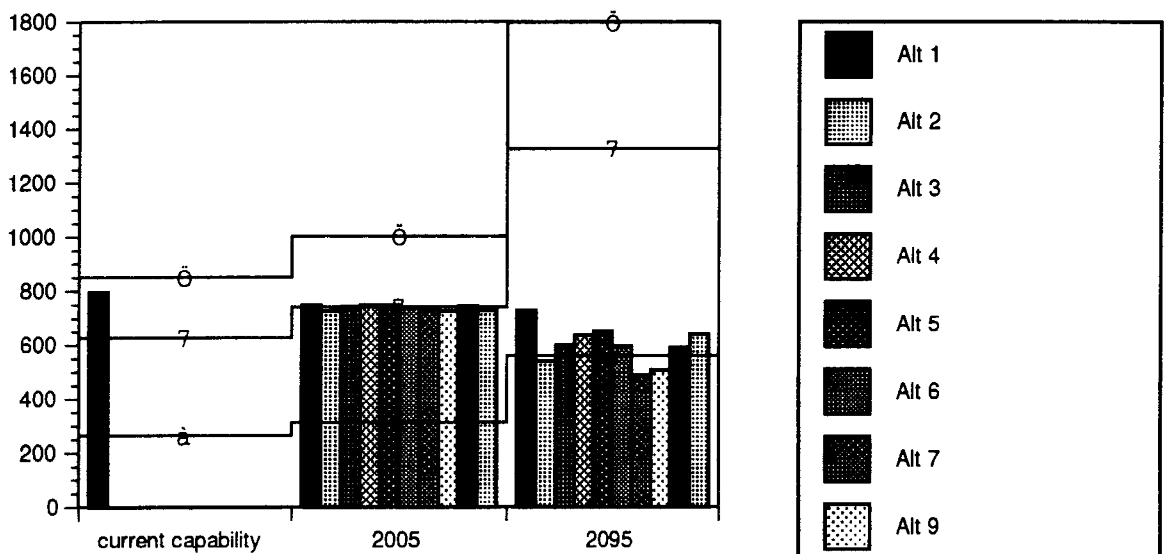
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 75 percent of the total edible pounds of subsistence resources harvest by Thorne Bay households (Kruse and Frazier 1988).

The following figure displays the estimated level of deer habitat capability within the WAA's where 75 percent of Thorne Bay's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Thorne Bay residents. However, projected deer harvest for all rural hunters and all hunters exceeds 10 percent of habitat capability and all alternatives may have future inadequate habitat capability for the total deer hunted. Deer account for 20 percent of the total edible pounds of subsistence resources harvested by Thorne Bay (Kruse and Frazier 1988).

WAA 1319 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5 and 6. Alternative 1 is unlikely to have direct impacts on Thorne Bay's subsistence use with little timber harvest activity occurring. Alternatives 7 and 9 allocate most of Thorne Bay's use area to a development LUD. The timber harvest activity that is likely to occur would directly impact Thorne Bay's subsistence resource. Alternatives 3, 10 and 11 maintain some Old-growth Habitat LUD's within a major portion of Thorne Bay's use area. This may decrease the impacts of continued harvesting on subsistence use. Alternatives 5 and 6 offer a larger area of Old-growth Habitat LUD's within Thorne Bay's highest use area. And Alternatives 2 and 4 maintain some habitat with Natural Setting LUD's, but a majority of Thorne Bay's use area is allocated to development LUD's. Alternatives 4 and 5 also are beneficial to Thorne Bay's subsistence use areas because of the longer timber rotation which better maintains habitat over time.

Thorne Bay is currently competing with other communities in their subsistence use areas and this is likely to continue under all alternatives. Alternatives increasing access by roads due to harvest activity may increase competition from other communities on Prince of Wales Island indirectly impacting Thorne Bay's use. This possible increase in access may also allow Thorne Bay household's to increase the range of their use at a lower cost.

Deer Availability and Anticipated Demand in Areas Used by Thorne Bay Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Whale Pass

Whale Pass is a dispersed unincorporated community located on the northeast coast of Prince of Wales Island. The population of 92 residents (ADCRA 1995) is 2.7 percent Alaska Native (1990 U.S. Census).

Whale Pass was originally established as a logging camp about 1962 by Ketchikan Pulp Company. According to local residents, a float camp there housed loggers and their families for almost 30 years. In 1982, the float camp was removed and many of the logging families left. Others moved to trailer pads on land at the head of the cove. That same year, Whale Pass became the site of a State land sale, which brought renewed population growth and the founding of a homeowners association. The community has been connected to the road system on Prince of Wales Island since 1981. A log transfer station remains on the southwest side of the bay (ADF&G 1994).

Population: The population of Whale Pass has remained fairly constant since 1980, with a low point in 1990, and a high point in 1994.

Year	1980*	1990*	1991	1992	1993	1994	1995
Population	90	75	91	92	96	106	92

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: With the influx of homesite owners, the economy of Whale Pass became somewhat less dependent on the logging industry. A recreational lodge, the school, the Alaska Marine Highway System, US Forest Service, commercial fishing, and limited services provided income sources for local residents. Production and consumption of wild resources comprised an additional sector in the local mixed economy. Whale Pass residents have expressed an interest in forming a local Fish and Game Advisory Committee in order to participate more fully in local subsistence, sport, and commercial fisheries and hunting management issues (ADF&G 1994).

Whale Pass is still economically dependent on the logging industry and is connected to several other Prince of Wales Island communities by the Island road system. The 1989 median household income was $49,583 (1990 U.S. Census). Unemployment in 1994 for this census area was 12.5 percent, compared to 8.2 percent in all of Southeast (*Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Whale Pass was 186 edible pounds. All households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook salmon, halibut, trout and char, deer, dungeness crab, clams and cockles, shrimp, berries, and wood (TRUCS 1989).

Based on edible pounds harvested, deer at 27 percent, salmon at 22 percent, and finfish other than salmon at 20 percent are the most important subsistence resources for Whale Pass households. Whale Pass hunters travel an average of 10 miles to their most reliable deer hunting areas (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Whale Pass households have ever used to hunt deer. Summarizing, the majority of Whale Pass households hunt deer in Wildlife Analysis Areas (WAA's) 1527, 1528, and 1530. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1530 (27 deer) and 1318 (7 deer) (ADF&G 1994).

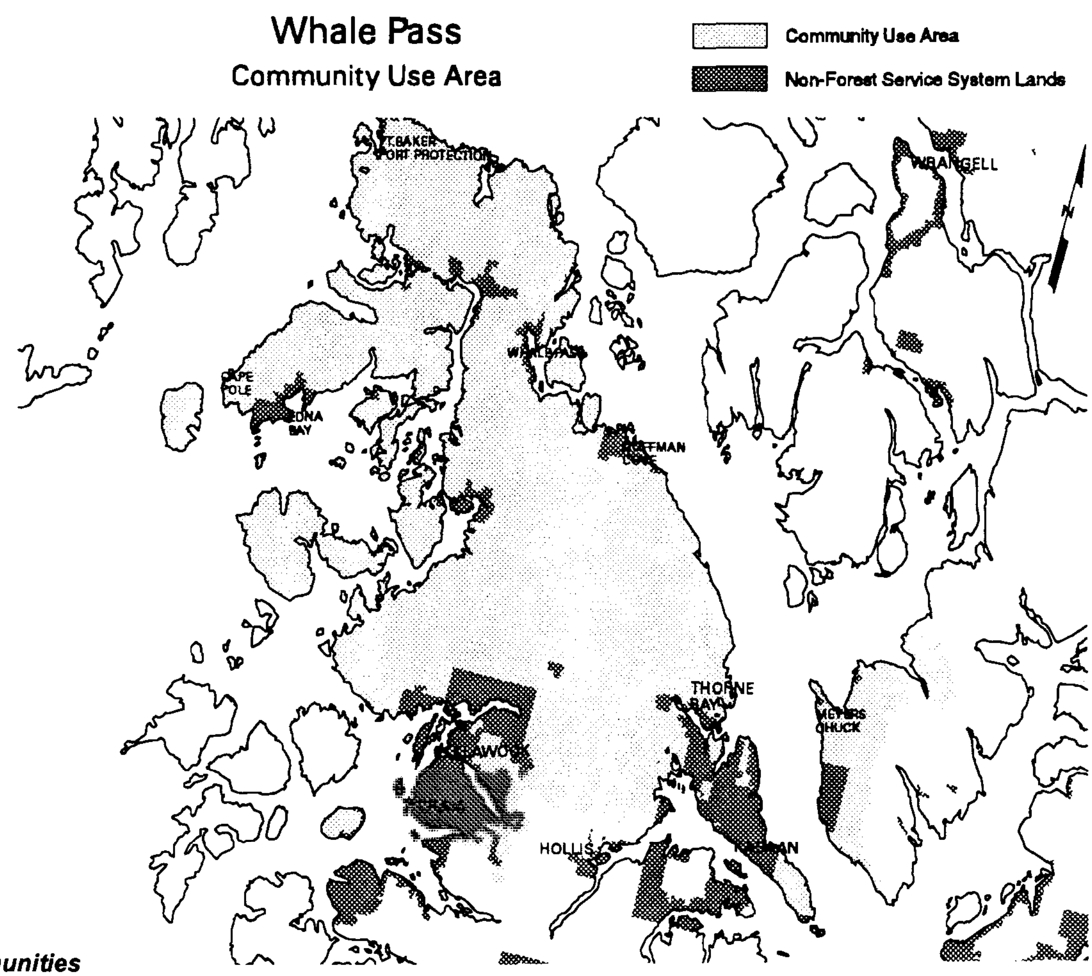
Community Comments

Whale Pass residents commenting on the DEIS or Supplement favored a continuation of logging, higher ASQ's, and leaving the road system open. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Residents of Whale Pass expressed concern over many issues, including wildlife, karst and caves, stream buffers, impacts to communities, and forest health. Many of the respondents felt that the Preferred Alternative in the RSDEIS was seriously deficient because it gave more protection to fish and wildlife that to people and would result in serious job loss. Most felt that fish and wildlife and streams had adequate protection. Some felt that harvesting less was good, that value-added wood industries should be encouraged, but maybe too many trees were left standing and were wasted. Some expressed concern over their subsistence rights.

Community Use Area

The general area commonly used or related to by many of the residents of Whale Pass in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 1,003,669 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.



Whale Pass' Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [(1)]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	51,226	51,226	51,226	51,226	51,226	51,226	51,226	51,226	51,226
Mostly Natural	893,753	152,944	326,527	152,944	321,676	76,375	101,101	326,527	406,505
Moderate Development	0	269,716	173,590	269,716	172,727	0	193,040	173,590	165,763
Intense Development	58,751	529,783	452,327	529,783	458,041	876,109	658,383	452,327	380,336
Suitable National Forest System Acres for Timber Management [(2)]									
Total Suitable Acres	0	310,083	232,795	299,625	244,866	353,100	348,965	232,795	177,320

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.

Potential Effects

Whale Pass would primarily be affected by timber harvest levels, the level of karst protection, recreation and tourism levels, and subsistence opportunities.

Some of the individuals in Whale Pass are employed by the timber industry. Alternatives 1, 4, 5 and 6 essentially eliminate all intensive timber harvesting on the north end of the island. Although some individual tree selection opportunities will be available, it amounts to less than 2 MMBF in any alternative, and would most likely be purchased by very small operators for products such as music wood or cedar shakes. The result of the lack of logging opportunities could result in disruption of the community stability. Alternative 3, 6, 10 and 11 continue some logging opportunities on the north end of the island, but at a lower quantity compared to the current levels of timber harvesting. Residents who want to remain with the logging industry would either have to relocate or travel to remote logging camps elsewhere during the week for employment. If these individuals choose to relocate, the loss of their income would affect others in the community.

Alternatives 2, 7, and 9 would continue logging opportunities on the north end of the island. This would allow those individuals associated with the logging industry to maintain their existing lifestyle within the community.

There are also individuals in Whale Pass who are very concerned about the level of cave and karst protection. Members of several speliological societies derive a portion of their income from cave and karst analysis and exploration in the vicinity. Alternative 9 meets the minimum requirements of the Federal Cave Resource Protection Act. Alternatives 2 and 7 would provide an incrementally higher level of protection by all known significant caves and some recognition of the connection between karst geology and caves. Alternatives 1, 3, 4, 5, 6, 10, and 11 provide the highest level of protection by implementing a forest wide karst vulnerability assessment methodology.

The Whale Pass Resort and a retail store are located in Whale Pass. Both could be impacted by changes in the level of recreation and tourism use. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives thereby benefiting retail trade and the resort. However since Alternatives 1, 4, 5 and 6 result in the essential elimination of logging opportunities on north Prince of Wales, the resulting declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is much lower.

Thorne Island is particularly of concern to subsistence users and the lodge in Whale Pass due to potential visual and wildlife impacts from timber harvesting. Alternative 1 schedules no timber harvest on Thorne Island. Alternatives 2, 3, 4, 5, 6, 9, 10 and 11 all reduce the size and shape of the potential cut units to minimize their visual impact. Alternative 7 allows for intensive timber management on Thorne Island.

Panel Results: The Socioeconomic Panel ratings suggested that Alternatives 4, 5, and 6 would have the most positive effects on Whale Pass, although timber employment was anticipated to decrease, and panelists disagreed on whether Alternative 5 would increase or decrease quality of life. Alternative 2 was expected to have the fewest effects, but with risks of decreasing non-timber resource employment. Alternative 3's effects were mixed, with possible decreases in timber harvest and economic diversity, and increases in non-timber resource jobs and recreation opportunities. Alternative 1 was expected to decrease timber employment, community stability, economic diversity, and access to traditional lifestyles, but to increase non-timber resource employment and recreation opportunities; panelists disagreed on whether quality of life would increase or decrease. Alternatives 7 and 9 were rated similarly, with expected increases in timber employment but decreases in most other characteristics, including quality of life and economic structure. Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

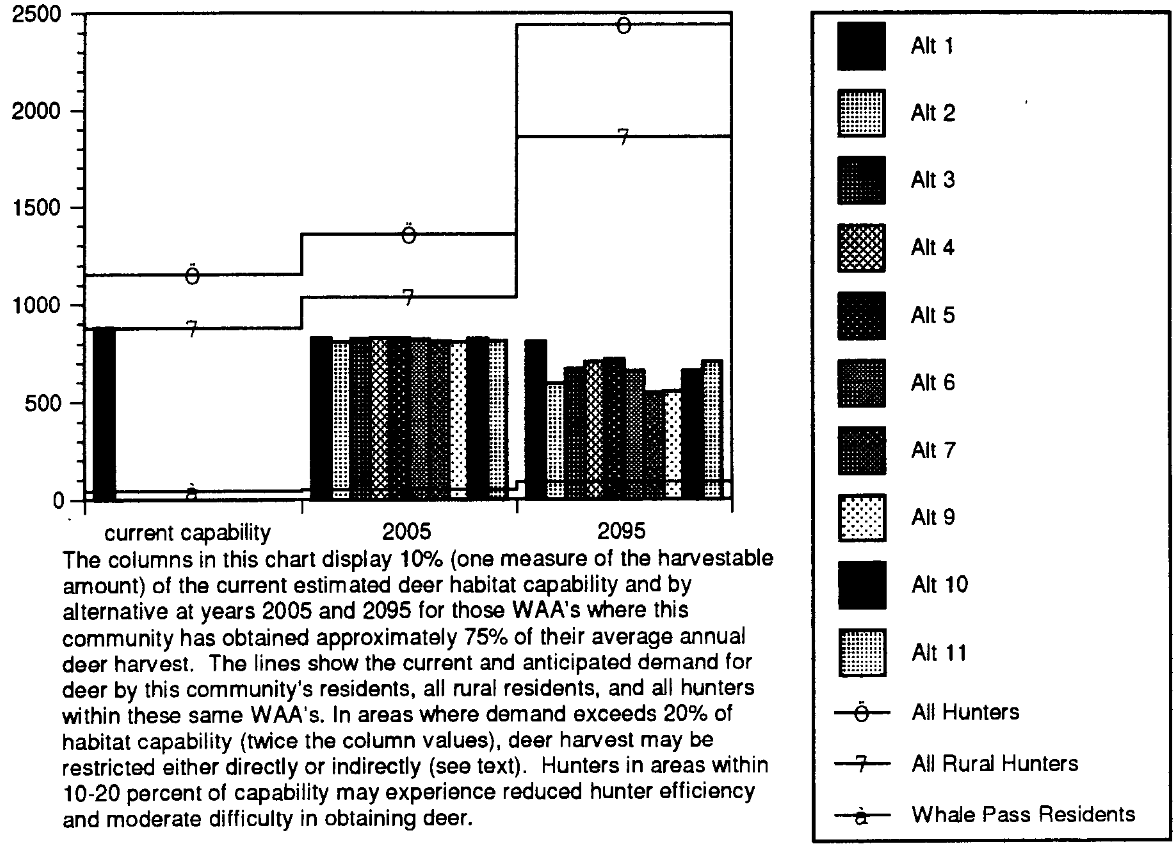
Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 60 percent of the total edible pounds of subsistence resources harvest by Whale Pass households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated of deer habitat capability within the WAA's where 75 percent of Whale Pass's average annual deer harvest use occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Whale Pass residents, but not enough for all rural hunters or all hunters within these WAA's. Deer account for 27 percent of the total edible pounds of subsistence resources harvested by Whale Pass households (Kruse and Frazier 1988).

WAA's 1530, 1319, 1318 , and 1422 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5 and 6. Part of Whale Pass' highest use area is allocated as LUD II and will not change in any of the alternatives. Alternative 1 would provide the least effect on Whale Pass' subsistence uses although some timber harvest activity would be likely to occur in their use area. Alternatives 3, 5, 6, 10 and 11 would offer some maintenance of habitat with Old-growth Habitat LUD's within a small portion of Whale Pass' use area. Alternatives 2, 4, 7, and 9 allocate much of Whale Pass' use area to a development LUD. These LUD prescriptions indicate continued or possibly increased timber harvest and possible mining activity which would likely impact Whale Pass use. Alternatives 4 and 5 have longer rotations which would maintain habitat within the development LUD's Whale Pass uses.

Whale Pass is currently competing with other communities in their subsistence use areas and this is likely to continue under all alternatives. Alternatives increasing access by roads due to harvest activity may increase competition from other communities on Prince of Wales Island indirectly impacting Whale Pass' use. This possible increase in access may also allow Whale Pass household's to increase the range of their use at a lower cost.

Deer Availability and Anticipated Demand in Areas Used by Whale Pass Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Wrangell

Wrangell is located on the tip of Wrangell Island, 35 miles southeast of Petersburg. It lies on the Stikine river, an historic trade route to the Canadian interior. It has a population of 2,758 (ADCRA 1995), including 20 percent Alaska Native (1990 U.S. Census).

Wrangell began as an important Tlingit site primarily because of its proximity to the Stikine River. Wrangell clans held a monopoly of trading rights along the Stikine (SE Chichagof FEIS, p. 3-101). In recent history, Wrangell has flown the flags of three nations, England, Russia, and the United States. The late 19th century saw Wrangell become a supply center for gold miners and prospectors during three gold rushes.

In 1811, the Russians began fur trading with area Tlingits and built a stockade named Redoubt Saint Dionysius in 1834. In 1867, as part of the Alaska Territory, a military post named Fort Wrangell was established. The community continued to grow because of its strategic location as a military fur trading center, and as an outfitter for gold prospectors between 1861 and the 1930s (ADF&G 1994; ADCRA 1995).

Wrangell is incorporated as a home rule municipality, and has maintained its historic cultural diversity. The community has a local Fish and Game Advisory Committee. In a move to emphasize the importance of subsistence, the Wrangell Indian Reorganization Act Council has formed its own local Fish and Game Advisory Committee (ADF&G 1994).

Population: Wrangell's population seven percent between the 1970 and 1990 census. Since 1990, the population has grown about 27 percent in total, with a small decline in 1993.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	2,029	2,184	2,179	2,602	2,696	2,683	2,744	2,758

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: Today, timber, fishing, and fish processing dominate Wrangell's economy. More than 100 residents fish commercially and for nearly 50 percent of them, it is their major source of income. Tourism is also a growing influence in the area. Timber, however, grew to surpass fishing in economic importance to the community. Then, in 1994, Alaska Pulp Company announced it was closing its large mill which processed forest resources from the area and exported timber products mainly to Japan. Some 225 workers and loggers were employed by the mill. There is now one small mill in the district, sawing spruce, hemlock and cedar (ADF&G 1994).

Unemployment in this census area in 1994 was 9.2, compared to 8.2 in all of Southeast (*Alaska Economic Trends* 4:1995). The 1990 median household income was $37,538 (1990 U.S. Census).

Subsistence Use: Wrangell residents hunt deer, bear, moose, and waterfowl; fish for salmon, halibut, and other finfish; and gather shellfish and berries. In 1987, the per capita subsistence harvest in Wrangell was 164 edible pounds. About 80 percent of all households harvested some subsistence resource. Most commonly used (by over 50% of households) were chinook salmon, halibut, dungeness crab, deer and berries. The average Wrangell household derives 23 percent of its meat and fish from subsistence activities (TRUCS 1989).

Appendix H provides detailed maps regarding the areas that Wrangell households have ever used to hunt deer. Summarizing, the majority of Wrangell households hunt deer in Wildlife Analysis Areas (WAA's) 1903, 1904, and 1906. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1995 average number of deer harvested, the most successful deer hunting occurred in WAA's 1905 (110 deer), 1904 (48 deer), and 1903 (42 deer) (ADF&G 1995).

Community Comments

A number of Wrangell residents provided written comment on the issues for the TLMP Revision process and offered and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

Wrangell residents who responded to the issues during the DEIS and SDEIS comment periods were split in their opinion on managing for scenic resources with some wanting more emphasis and some wanting the Forest to be managed for both scenic quality and timber harvesting. The City of Wrangell recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality. Individual respondents recommended additional emphasis be placed on recreation, particularly developed sites. The City recommended a mix of management emphasis on recreation and other Forest uses including timber harvesting and mining.

While individual respondents recommended greater emphasis on fisheries, the City believes the current mix of management for fish and timber harvesting is sufficient. Individuals want additional emphasis on wildlife habitat. The City favors the current timber sale program and the long-term contracts. However, residents are split with some wanting the same mix of timber emphasis and some wanting less timber harvesting. The City favors additional roads, Log Transfer Facilities, and connections to existing roads, particularly a connection to Canada. Individual respondents oppose emphasizing mineral exploration and development while the City favors maintaining current management emphasis for mineral exploration and development. Individuals were split between emphasizing timber harvesting, mining, and a mix between these and amenity industries.

Subsequent respondents presented differing opinions. Some want the timber program to be emphasized citing the importance of the timber industry to the community as a whole. They believe Wrangell cannot survive on fishing and tourism alone. Others believe there is already too much emphasis on timber harvesting and that the current program should be reduced.

Wrangell residents who commented during the RSDEIS comment period mainly expressed concern over the timber program. The majority were in favor of Alternative 2 because it would provide a sustained yield and multiple use for all. Respondents asserted that their community is highly dependent on forestry for their economic well-being and would like an adequate socioeconomic study on the impacts of the Preferred Alternative. They also want the Forest Service to address the aboriginal claims of the Alaska Natives who live and work on the Tongass, and to be aware of the study supporting Wrangell as a traditional Native village.

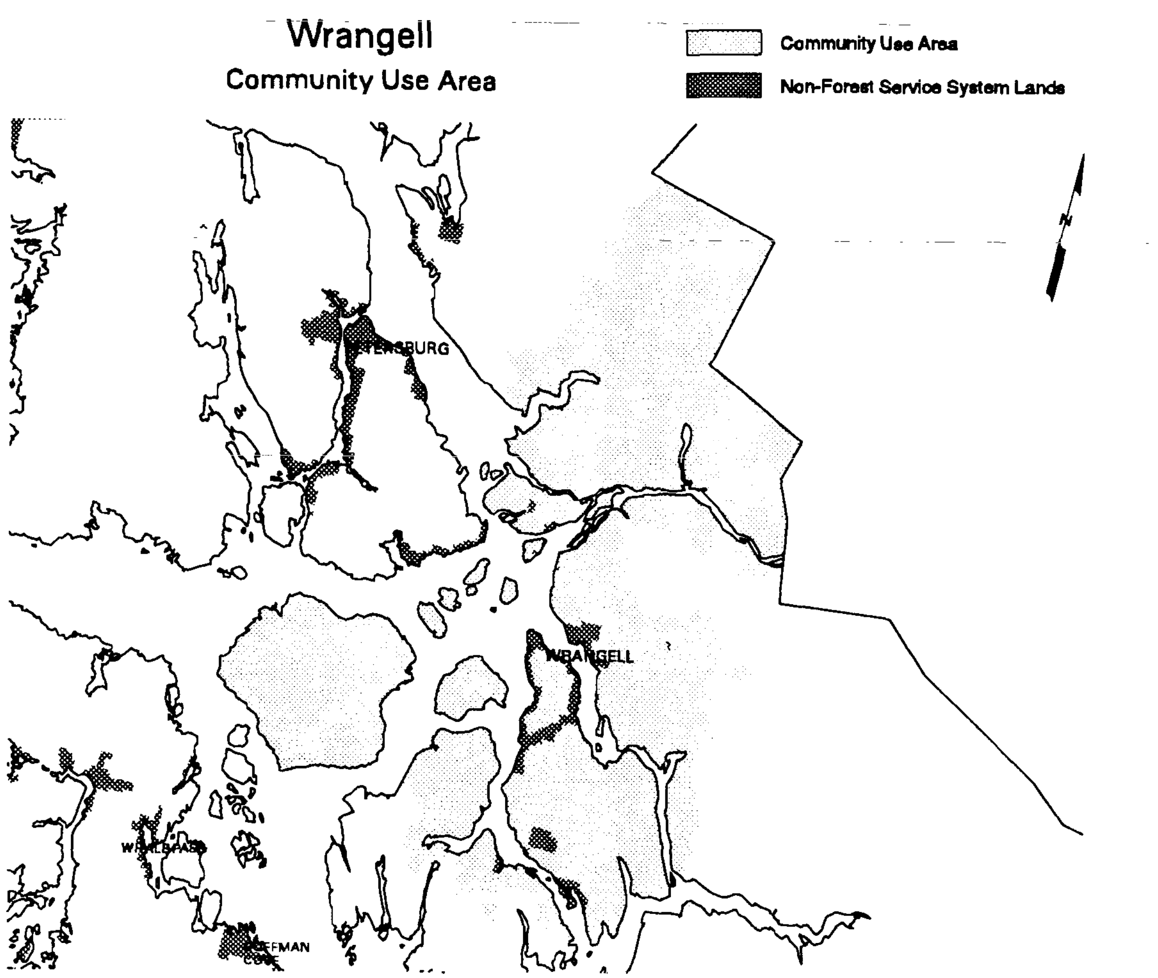
Community Use Area

The general area commonly used or related to by many of the residents of Wrangell in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 840,868 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Wrangell's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	365,218	365,218	365,218	365,218	365,218	365,218	365,218	365,218	365,218
Mostly Natural	475,009	74,857	133,857	74,857	74,857	13,846	23,032	133,857	170,070
Moderate Development	0	232,321	189,457	232,321	232,321	0	209,827	189,457	155,051
Intense Development	0	168,472	152,335	168,472	168,472	461,843	242,451	152,335	150,390
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	118,911	98,154	118,911	118,911	137,778	135,276	98,154	48,447

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing, timber processing, recreation and tourism, and subsistence opportunities are particularly important to Wrangell.

The timber industry will have the largest amount of variation among the alternatives. The sawmill in Wrangell is currently closed. Alternatives 1, 4 and 5 would likely not supply enough timber to reopen the Wrangell mill. Alternatives 3, 10 and 11 could provide enough timber to partially reopen the mill only if other mills operate at one shift, and timber prices increase. Alternative 6 should allow the Wrangell mill to fully open with one shift if all other mills also operate at one shift and timber prices increase. If timber prices do not increase, the mill should only be able to open part time, and, if other operators run at full capacity the Wrangell would likely be unable to open at all. Alternatives 2 and 9 should allow the mill to reopen at historic capacity even with all other mills running at historic capacity. If other sawmills remain open at full capacity, Wrangell could only reopen part time if timber prices increase. Alternative 7 would allow the Wrangell mill to operate near full capacity.

Commercial fisheries employment is not likely to be affected by forest management activities to any significant degree during the next ten years.

Recreation and tourism are also important to the economy of Wrangell. Wrangell is one of the stop-over points for visitors traveling to the Stikine River and the Stikine-LeConte Wilderness. Recreation and tourism use is projected to increase roughly to the same degree in all alternatives, thereby benefiting retail trade in Wrangell. However, since Alternatives 1, 4 and 5 would likely not allow the sawmill to reopen, the resulting declines in timber employment could have a ripple effect and reduce retail trade and services employment. This would be especially true during September through May when recreation and tourism use is much lower.

The most important recreational and subsistence use opportunities for Wrangell residents include the Stikine River, Wrangell Island and Zarembo Island. All alternatives allow for essentially no development in the Stikine River. Alternative 1 maintains all of the other areas in essentially their current condition. Alternatives 2, 3, 4, 5, 6, 9, 10 and 11 allow some timber harvesting on Zarembo and Wrangell Islands but would maintain Visual Quality Objectives along the most sensitive viewsheds. In addition Alternative 3 would provide for some of the remaining large fragmented old-growth blocks under the Old-growth Habitat LUD. Alternative 7 would manage Zarembo and Wrangell Islands for timber production.

Panel Results: The Socioeconomic panelists differed on the likely effects on Wrangell more than for any other community. Alternatives 7 and 9 were rated similarly, as likely to increase timber employment, economic structure, community stability, and quality of life, while posing risks to fishing and tourism employment and recreation opportunities. Alternative 2 was judged to have similar effects, but with little effect either way on economic structure, quality of life, recreation opportunities, and access to traditional lifestyles. Alternatives 3, 4, 5 and 6 were all rated as posing risks to timber employment and community stability, but as having the potential to increase fishing and tourism employment, economic diversity, and recreation opportunities. Panelists were divided on whether the resulting effects would increase or decrease quality of life and access to traditional lifestyles. Alternative 1 was predicted to decrease timber employment, economic diversity, community stability, and quality of life, while increasing non-timber resource employment and recreation opportunities; effects on access to traditional lifestyles were unclear. Although not rated by the Panel, Alternatives 10 and 11 would be expected to have effects very similar to Alternatives 3 and 6.

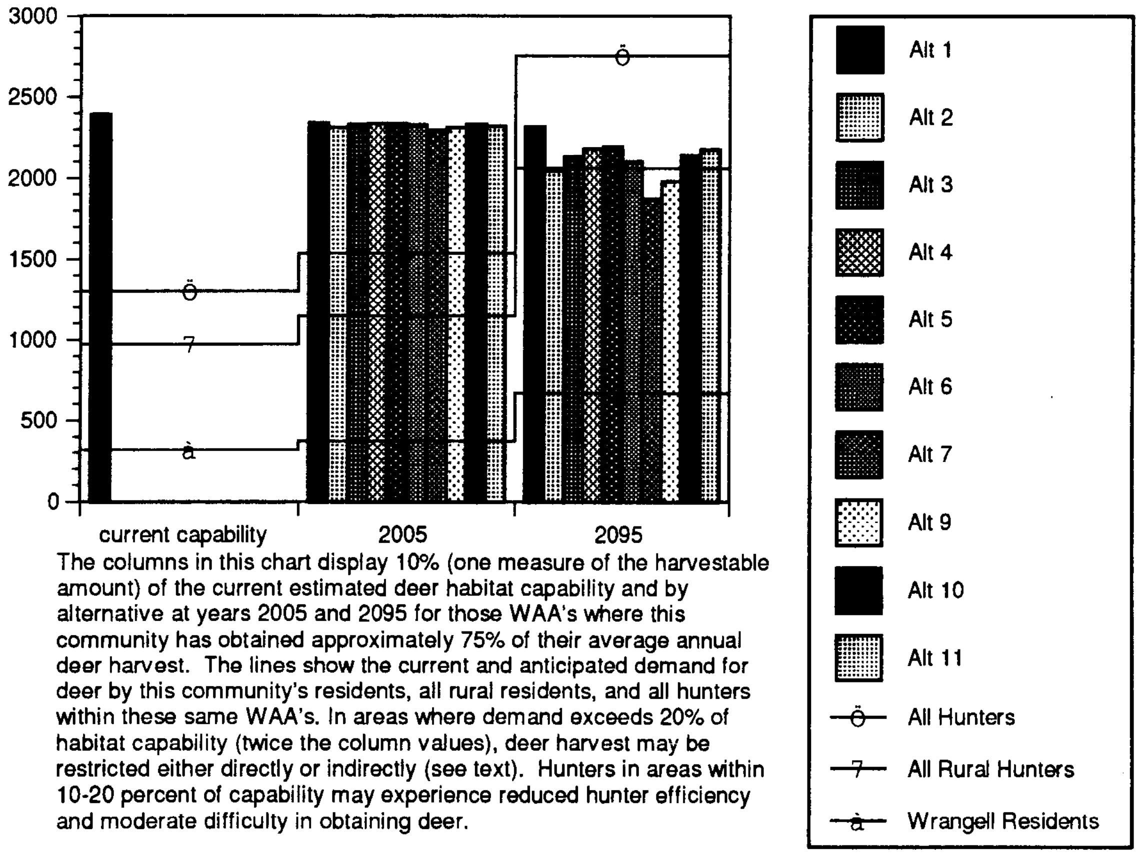
Glossary

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 52 percent of the total edible pounds of subsistence resources harvest by Wrangell households (Kruse and Frazier 1988).

The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Wrangell's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent, the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Wrangell residents, as well as for all deer hunted within the WAA's in the short term. In the long term, alternatives 7 and 9 would not provide enough habitat capability for all rural hunters, nor enough for all hunters in all alternatives. Deer account for 21 percent of the total edible pounds of subsistence resources harvested by Wrangell households (Kruse and Frazier 1988).

WAA's 1530 and 1319 will have 25 percent of the highest quality deer winter range conserved in Alternatives 1, 3, 4, 5, 6, 10 and 11. Alternative 1 is unlikely to have direct impacts on Wrangell's subsistence use with little timber harvest activity occurring. Alternatives 7 and 9 will likely impact Wrangell's use area within the Development LUD's if timber harvesting continues or increases. Alternatives 3, 10 and 11 will provide some habitat maintenance with Old-growth Habitat LUD's. Alternatives 2, 4, 5 and 6 will provide a small amount of habitat maintenance within recreation LUD's. Alternatives 4 and 5 may also increasing habitat with longer rotations. Only Alternative 1 restricts all of Wrangell's use areas from possible timber activity. Indirectly, alternatives which offer opportunities for expanding access may increase competition. But because much of Wrangell's hunting already occurs in areas with limited access, it is unlikely that competition in these areas would affect them.

Deer Availability and Anticipated Demand in Areas Used by Wrangell Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Yakutat

Yakutat is located in the lowlands along the northern Gulf of Alaska, 212 miles northwest of Juneau at the mouth of Yakutat Bay. Its population is 801 (ADCRA 1995), 55 percent of whom are Alaska Native (1990 U.S. Census).

Yakutat has a diverse cultural history. The original settlers are believed to have been Eyak people from the Copper River area who were conquered by the Tlingits. Yakutat means "the place where the canoes rest."

Intensive contact with European explorers came in the late 1700s when a Russian fur trading company moved into the Yakutat area. By the mid-1800s, foreign traders were well established along the coast. The contemporary town grew up around "the old village" which was established in 1889 by missionaries (ADF&G 1994).

Incorporated as a first-class city in 1948, Yakutat is governed by a mayor and a city council. Recently, a City and Borough was formed with boundaries expanded to include a large section of the Gulf Coast north of Cape Fairweather. Yakutat has a local Fish and Game Advisory Committee. The city is accessible by jet service from Juneau and Anchorage and is bordered by two national parks/preserves: Glacier Bay and Wrangell-Saint Elias (ADF&G 1994).

Population: The population of Yakutat has increased dramatically; between the 1970 and 1990 census the population increased 271 percent. Since 1990, the population has continued to grow, with a total increase of 14 percent in the last six years.

Year	1970*	1980*	1990*	1991	1992	1993	1994	1995
Population	190	449	705	724	672	704	754	801

*US Census Data
Source: ADOL, Alaska Population Overview- 1995 Estimates

Economy: In the early 1900s, the Gulf of Alaska was among the richest commercial fishing areas in the state. Southeast Alaska's first standard-gauge railroad was constructed in order to haul building materials from Yakutat to the cannery site and later to transport fish from the nearby Situk and Lost Rivers. Declining fish stocks led to the closure of the cannery in 1970. However, fishing and fish processing remain vital sectors of the economy, and commercial catches have increased since the mid-1970s (ADF&G 1994).

In addition to commercial fishing, timber harvesting, tourism, outdoor recreation, oil and gas development, and government have contributed to Yakutat's economic development. A number of hunting and fishing guides operate out of Yakutat. Yak-Tat-Kwaan, the local Native corporation, was launched in 1971 (ADF&G 1994). The 1989 median household income was $36,875 (1990 U.S. Census). Unemployment in this census area in 1994 was 14.3 percent, compared to 8.2 percent for Southeast Alaska *(Alaska Economic Trends* 4:1995).

Subsistence Use: In 1987, the per capita subsistence harvest in Yakutat was 398 edible pounds, with 95.6 percent of all households harvesting some subsistence resource. Most commonly used (by over 50% of households) were chinook, coho, and sockeye salmon, halibut, hooligan, moose, harbor seal, dungeness crab, clams and cockles, shrimp, scallops, berries, seaweed/kelp, wood (TRUCS 1989). Based on edible pounds harvested, salmon at 54 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Yakutat households (Kruse and Frazier 1988).

Appendix H provides detailed maps regarding the areas that Yakutat households have ever used to hunt deer. Summarizing, the majority of Yakutat households hunt deer in Wildlife Analysis Areas (WAA's) 4042, 4043, and 4054. As displayed on the Deer Harvest by Community map (in the map packet), these areas are close to the community. In terms of the 1987 - 1994 average number of deer harvested, the most successful deer hunting occurred in WAA's 3315 (2 deer) and 3416 (2 deer) (ADF&G 1995). (Note, for Yakutat residents, subsistence harvest of moose is more important than harvest of deer.)

Community Comments

A number of Yakutat residents provided written comment on the issues for the TLMP Revision process and offered oral and/or written comments during the DEIS, Supplement or Revised Supplement comment periods. Those who commented were part of a non-random, self-selecting sample. Their comments may not necessarily reflect community opinion.

The following comments are from the DEIS and SDEIS comment periods. The City and Borough of Yakutat and the Yakutat Fishermen's Association requested that additional emphasis be placed on managing for scenic resources. While the Association is satisfied with current management emphasis on recreation, the City wants additional recreation emphasis. The City and the Yakutat Fish and Game Advisory Committee requested additional emphasis on fish resources. The City, Advisory Committee, and Association all want management to emphasize wildlife. The City and the Advisory Committee want additional emphasis on subsistence while the Fishermen's Association believe that current emphasis is adequate.

The City and the Fishermen's Association want the current timber sale program reduced and the long-term contracts terminated. Community residents were split in their opinion regarding timber harvesting with some wanting the same mix of emphasis and some wanting less timber harvesting. All three organizations requested no additional roads, Log Transfer Facilities, or connections to existing roads. Yakutat is opposed to having the community connected to Canada by road. The City and Fishermen's Association are opposed to emphasizing mineral exploration and development. The City of Yakutat and the Fishermen's Association requested that additional areas be designated as Wilderness and that management emphasize tourism wildlife, recreation, and subsistence economic sectors. Residents are split with some wanting emphasis on recreation, tourism and fishing and others wanting a mix between these and commodity industries.

During the Revised SDEIS comment period, Yakutat residents expressed concern over many issues. They were especially concerned about their subsistence rights and viewed it as a lifestyle that is an important facet of their economic prosperity. They expressed concern over the ASQ and feel it is too high and may pit large mills against small businesses. Some felt concern over the difficulty of getting fishing permits and the unwillingness of the Forest Service to allow outfitter guides to build cabins.

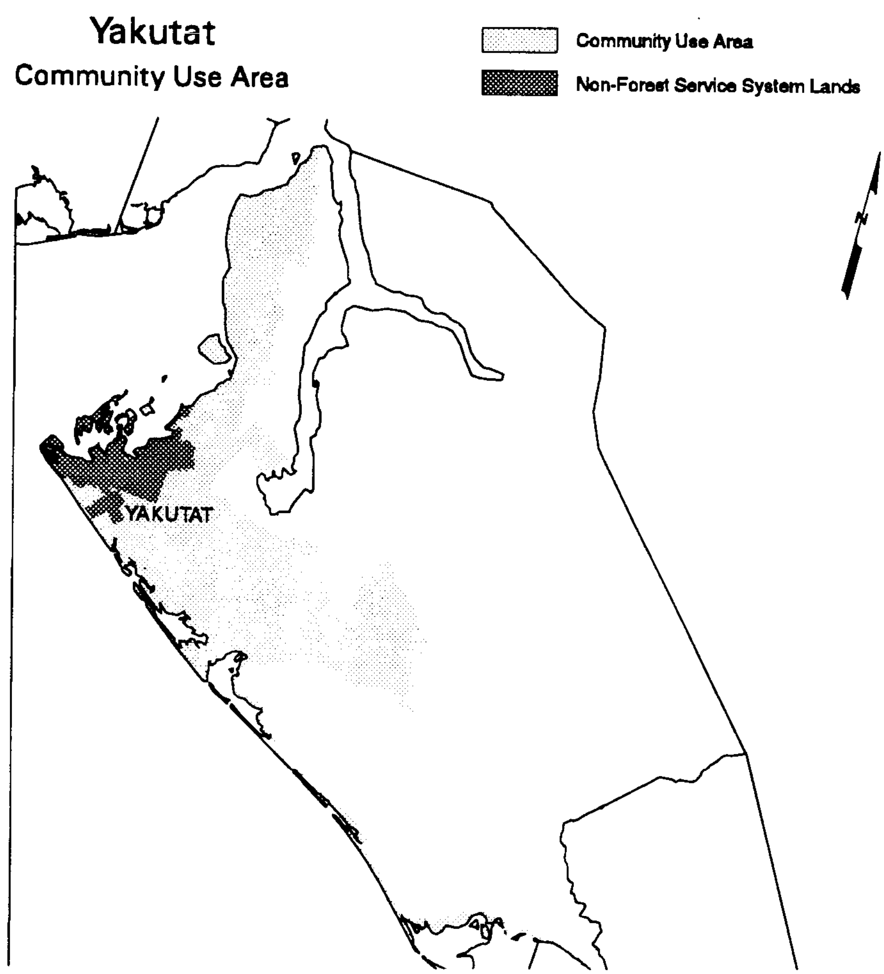
Community Use Area

The general area commonly used or related to by many of the residents of Yakutat in their local, day-to-day work, recreational, and subsistence activities is shown on the following map. This area contains 263,816 acres of National Forest System land (among other land ownerships). With the map is a table showing how the lands with this community use area have been allocated by alternative. The LUD Groups are explained in the introduction to Chapter 3.

Yakutat's Community Use Area

	Alternatives								
	1	2	3	4	5 & 6	7	9	10	11
LUD Groups [1]	**Acres of National Forest System Land per LUD Group**								
Wilderness/National Monument	97,260	97,260	97,260	97,260	97,260	97,240	97,260	97,260	97,260
Mostly Natural	166,557	122,274	137,579	122,274	122,274	31,586	113,532	137,579	129,638
Moderate Development	0	17,286	11,967	17,286	17,286	90,429	26,802	11,967	20,866
Intense Development	0	26,996	17,011	26,996	26,996	44,562	26,222	17,011	16,052
Suitable National Forest System Acres for Timber Management [2]									
Total Suitable Acres	0	15,890	14,269	16,331	16,331	22,640	18,232	14,269	11,028

[1] See the Alternative Maps for which of the 19 specific Land Use Designations (LUD's) are actually included in each LUD Group within the general CUA (and beyond it).
[2] Acreage scheduled for timber management over various rotation ages (see alternative descriptions) within lands that are allocated to Moderate and Intense Development LUD Groups within the CUA.



Potential Effects

Commercial fishing and subsistence are important to Yakutat. Oil exploration may begin again in the Pacific Ocean close to Yakutat. The Yakutat Forelands are some of the community's most important subsistence use areas.

Commercial fishing is not expected to be significantly affected by Forest Service Activities in any alternative.

Sport fishing (primarily for salmon), and hunting (primarily for moose and brown bear), are popular attractions. Within the limits that the CUA can supply these without diminishing subsistence opportunity, these activities are anticipated to increase at the same rate in all alternatives.

Panel Results: The Socioeconomic Panel predicted that the alternatives would have few effects on Yakutat, with most expected to maintain existing conditions. The anticipated exceptions included increases in timber employment under Alternatives 5, 7 and 9, increases in non-timber employment under Alternative 1, and decreases under Alternative 2. Alternative 5 also was expected to increase economic diversity, quality of life, and recreation opportunities. Recreation opportunities were anticipated to increase also under Alternatives 1 and 6, and to decrease under Alternative 7 (along with access to traditional lifestyles). Alternatives 10 and 11 were not rated by the panel, but the effects of these alternatives would be similar to Alternative 3.

Subsistence: No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. There is some risk of decline in salmon habitat capability over longer periods of time in Alternatives 2-11 (see the fish section of this chapter). These resources account for 82 percent of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier 1988).

Moose is more important than deer as a subsistence meat source for Yakutat residents. It is anticipated that moose availability will not be affected by the alternatives.

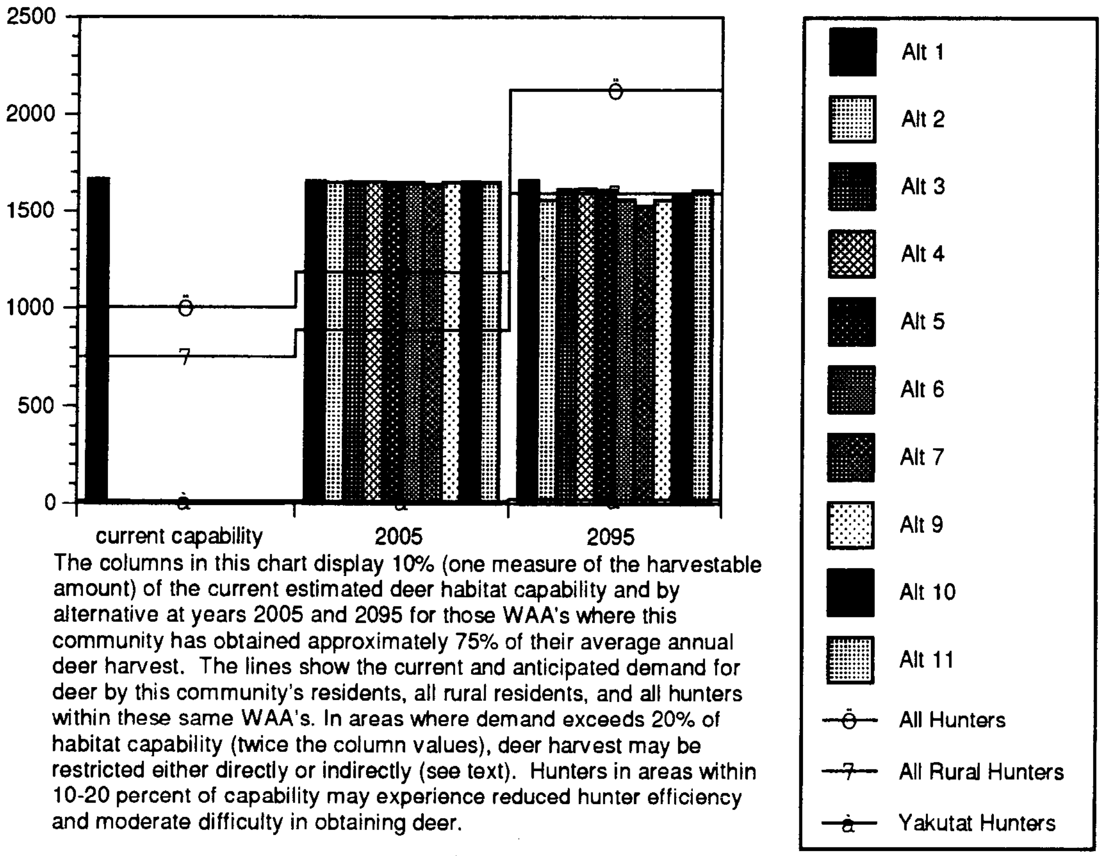
Deer account for only a small fraction of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier 1988). The following figure displays 10 percent of the estimated deer habitat capability within the WAA's where 75 percent of Yakutat's average annual deer harvest occurs. The deer habitat capability decreases are based on modeling of past and anticipated future harvest activity. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable. All alternatives should be able to provide habitat capability for deer hunted by Yakutat residents and all hunters in the short term. However, projected deer harvest in the long term for all hunters and for all rural hunters in Alternatives 2, 6, 7, 9 and 10 exceeds 10 percent of habitat capability and all alternatives may have future inadequate habitat capability for the total deer hunted. At some point, a restriction in deer hunting may be necessary.

The highest use areas for Yakutat households are within Wilderness and LUD II designations that will not change by alternative. With little harvest activity, Alternative 1 would have the least effect on Yakutat's subsistence uses outside

Wilderness and LUD II. Alternatives 7 and 9 could impact subsistence uses with timber harvest activity within development LUD's. Alternatives 2, 3, 4, 5 and 6 allocate portions of Yakutat's use area in recreation LUD's, offering some habitat maintenance. Alternatives 4 and 5 have longer rotations which would maintain a level of older forest within the development LUD's. Alternatives 3, 10 and 11 prescribe additional Old-growth Habitat LUD's within Yakutat's use areas.

Hunters from Yakutat already travel long distances for access to deer hunting. Alternatives which may increase access from the ferry system may decrease their cost of hunting. But with this additional access would likely come an increase in competition from hunters of other communities. In some cases, this competition could cause Yakutat hunters to travel farther. But in their highest use areas, competition may not increase because access is already limited and unlikely to expand.

Deer Availability and Anticipated Demand in Areas Used by Yakutat Residents



The columns in this chart display 10% (one measure of the harvestable amount) of the current estimated deer habitat capability and by alternative at years 2005 and 2095 for those WAA's where this community has obtained approximately 75% of their average annual deer harvest. The lines show the current and anticipated demand for deer by this community's residents, all rural residents, and all hunters within these same WAA's. In areas where demand exceeds 20% of habitat capability (twice the column values), deer harvest may be restricted either directly or indirectly (see text). Hunters in areas within 10-20 percent of capability may experience reduced hunter efficiency and moderate difficulty in obtaining deer.

Logging Camps

Community has many different meanings. For some it is strictly a geographic location; for others, community is the camaraderie, spirit, and feeling of family among people who live and work together. The fact that a logging camp's geographic location may change from year to year does not diminish the feelings of "community." The men, women, and children who live in the camps are an important part of the people who make up Southeast Alaska.

The structure of the floating logging camps found today are not much different from those 50 years ago--mobile homes sitting atop log rafts connected by chains and slippery boardwalks have replaced handmade wooden structures. Tug boats tow the camps from logging site to logging site. After the initiation of the long-term timber contracts in the early 1950s, it became economically efficient to build upland camps that might remain in place for five years or more. Upland camps are largely made up of trailers and other portable facilities.

Land camps are allowed by the timber sale contracts with the Forest Service, but the companies are responsible for all State permits, such as clean water, waste, discharge, tideland, etc. Setting up a logging camp is like starting a small town for 150-175 loggers and their families. The camps provide water and sewer systems, generators for electrical power, docks; a ship mooring system, a log storage area, log sort yards, and an airstrip (Sturgeon and Sessions, 1994).

Forest Service timber sale contracts stipulate that when work is finished the entire camp must be dismantled and removed. Alder and other vegetation quickly overtake the campsites, making it hard to tell the camps were there. Lack of private land is the key factor that prevents most camp sites from becoming permanent towns. When land does become available, camps often become towns, such as what happened in Thorne Bay, Coffman Cove, and Hollis (Finney, 1996).

Both floating camps and most upland camps are therefore temporary, even though some stay in the same place for a long time. One of the oldest logging camps in Southeast, Gildersleeve Logging, has hauled anchor seven times since 1983 when it moved from Whale Pass where it had been for sixteen years. Traditionally, loggers move to new logging sites along with the camp, often returning to the lower 48 for the winter.

With the trends changing toward smaller sales, camps may have more frequent moves, changing some aspects of camp life. Some loggers are choosing to remain in one place, commuting by plane, auto, or boat to active logging sites. These recent changes in the timber industry (*Juneau Empire*, July 10, 1996) have brought changes to the ways of camp life. More single men are living in bunkhouses, and fewer families are found in some camps (Thomas, 1995). It is expected that camps will be smaller and move more often if the trend for shorter-duration sales continues, with floating camps more prevalent than land-based camps (Lunde, personal communication, 1996).

The logging camps are not included in the community analysis because of a lack of data. Little quantitative local or State data is available for most Southeast logging communities due to their mobility and lack of classification as a town. The State of Alaska community profiles lists some logging camps, but often the information is out-dated before it is printed. The State Demographer (Williams, 1996, personal communication) indicates that the State is making an attempt to collect more data from the camps.

Some camp residents stated in public comments that logging camps should be included in the community analysis. In response to these comments, we are including a description of the logging camps which are currently in operation or recently closed have been included. There is more information on some camps or companies than others, but their combined stories should present an accurate picture of what logging camps and people in these communities contribute to Southeast Alaska.

Corner Bay

Corner Bay camp is located on Tenakee Inlet almost directly across from Tenakee Springs. It began as a camp in the mid-1970s and has several different operators with nearly continuous use. The Corner Bay camp was originally an Alaska Pulp Company (APC) camp. Around 1988 the Silver Bay Logging company moved in, replacing the camp with their own facilities from their previous operation at Eight Fathom Bight. While not currently (July 1996) in operation, there is a caretaker in residence and 15-20 trailers, cookhouse, shop, and school ready for use. The operators of the Appleton Cove Timber Sale are authorized to use Corner Bay when the sale is sold. There is also a Forest Service bunkhouse at Corner Bay about 500 feet from the camp which is used by Forest Service employees doing field work, surveys, etc.

Craik Logging

The Subsistence Inventory and Report for the Lab Bay FEIS (Impact Assessment 1993) contains information from field notes from interviews with residents which is the source for this description.

Craik Logging is a subcontractor to the Ketchikan Pulp Company for felling trees, transporting them to the water's edge, and placing them in the water. Since its inception, the Craik Floating Logging camp has moved from Margarita Bay, to Calder Bay, to Sumez Island, and is scheduled to move into Polk Inlet next. Although the average length of stay is three years, actual time depends on the size of the sale. Currently (July 1996) most of the Craik loggers have returned to the lower 48 to wait for logging to resume.

The unique characteristics of Craik Logging are attributed to its owner/operator, Larry Craik. He began developing Craik in 1985 or 1986 when he purchased a small floating logging camp. He eventually added other floats and built new individual family housing units to replace the old ones. The floats are tied together, with floating walkways between. The current composition of the camp demonstrates an emphasis on employing men with families who wish to live in a small floating camp context.

All residents and employees of Craik Logging consider it a community and their home, although most have "homes" elsewhere.

Cube Cove

Cube Cove is located on the west coast of Admiralty Island, 26 miles north of Angoon, on Native Corporation lands. The area was first settled as a logging camp, which it remains today. The current population is approximately 166, mostly non-Native. The 1990 median household income was $51,280 with a zero percent unemployment rate (ADCRA 1995). There are two schools with six certified teachers. Health care is provided by logging camp staff or after a flight to Angoon.

The majority of the workforce is in the timber industry, with some employed by the school and other professions. Planes and boats provide transportation to the Cove, although there are not plane or boat facilities. The community operates its own electrical system and has a community septic system used by one third of the population. Residents derive water from surface sources, and all homes are fully plumbed (ADCRA 1995).

Teen-aged life was the focus of an article in the Juneau Empire ("Timber Town Teens," June 16, 1996). Even though school classes are limited, students believe they are getting a good education. They like the one-on-one attention which ensures they "get it, no matter how long it takes." Students know that there will be no class reunions in the future, as native corporation logging operations are expected to finish around 2001.

Dora Bay

Dora Bay is located on the southeast coast of Prince of Wales Island, extending four miles of Cholmondeley Sound. It lies 40 miles southeast of Craig. Dora Bay was named in 1886 by Lt. Comdr. R. Glover, USN, for the steamer Dora, one of Alaska's most famous vessels with a record of over 40 years of service in northern waters.

The 61 residents of Dora Bay are mostly non-Native logging employees working for a native corporation logging and export facility. All employment is with the corporation. With the export facility providing stable employment, the 1990 median household income was $61,704 with no unemployment (ADCRA 1995).

Currently (1996) the Polk Inlet floating school is in Dora Bay. There is no health clinic in Dora Bay, but alternative health care is provided by Craig or Klawock. All the homes in Dora Bay are plumbed, with surface water collection and septic tanks or leachfield systems. Prince of Wales Island has a system of logging roads which connect to the State Ferry at Hollis and an airstrip and seaplane base at Klawock.

False Island

False Island is located on southeast Chichagof Island on the north side of Peril Strait. It was a large logging camp in the early 1970s. In the 1980s, it served as a Youth Conservation Corps camp. It lay dormant for awhile before it was reopened in 1990 as a camp for an APC sale. APC moved in 20 trailers and the George Woodbury School with 150-175 people living in the camp. The camp was closed after the APC mills closed. It is now available to other companies for sales in the area. Currently (1996) it has a caretaker and a permanent Forest Service camp there with cookhouse, bunkhouses, dock, and shop.

Freshwater Bay

Freshwater Bay is located on the east coast of Chichagof Island, north of Tenakee Springs. It was named "Novaya Gaven," meaning "new harbor," by the Russians in 1848. The Bay was renamed in 1869 by Comdr. R.W. Meade, USN.

Freshwater Bay is currently (July 1996) unoccupied and is not expected to be reestablished as a logging camp in the near future. In 1994 there were 74 residents (ADCRA 1994), 68 in 1995 (ADCRA 1995), and none listed in the 1996 profiles (ADCRA 1996). Employment in the logging industry was the focus of the economy for the mostly non-Native logging community. The 1990 census reported an unemployment rate of 16.7 percent and a median household income of $31,875 (ADCRA 1995).

There were no state-operated schools or health clinic within the community boundaries. Alternative health care was provided by logging camp staff or after a flight to Tenakee Springs. Access is primarily by float plane and boat.

Gildersleeve Logging Camps

The Gildersleeve logging camps have served as the home and operating quarters in bays and inlets all over Prince of Wales Island since 1953. The camp has moved at least 15 times, splitting the camp into smaller section and rejoining again as the location and size of timber sales changes. The location of the camps includes; Thorne Bay, Neets Bay, south and north Whale Pass, Fire Cove, Margarita Bay, Cholmondely Sound, Point Johnson, Kena Cove, Cabin Creek, Grace Harbor, Polk Inlet, and Tolstoi Bay.

The full camp is a four-acre island of lashed rafts which is towed by commercial tug from place to place as new timber sales open. The camps are self-sufficient, ‘compressed’ communities with all the good and bad found in other communities, including water and sewage treatment facilities, a post office, school, and store (Thomas, 1995). Access, depending on the location of the camp, can be by State Ferry if connected to the road system, and floatplanes. Health care is not always provided directly within the camp, but alternative health care is available by surrounding communities.

Hobart Bay

Hobart Bay is on the southeast mainland on the east shore of Stephens Passage, south of Juneau. The bay was named in 1889 by Lt. Comdr. Mansfield of the U.S. Navy. The site was first settled as a logging camp and continues today as a relatively large camp operated by the Goldbelt Native corporation; employment is in logging-related activities or through the local school. The population is 58 with a 1990 median family income of $57,369 (ADCRA 1994).

All homes in Hobart Bay are plumbed, and a central distribution system provides water to residents. A community septic tank serves most household, although outhouses are also used. Access is primarily by floatplane (ADCRA 1995).

Labouchere Bay

The logging camp at Labouchere Bay (also called Lab Bay), near Port Protection and Point Baker, operated from the late 1970’s until 1994. The Bay was named by local traders around 1880 for the Hudson Bay Company steamer *Labouchere*. Due to no timber sales in the area, the land camp was deactivated and most buildings moved to Naukati or other locations. Currently (1996) there is only a watchman there. KPC retains the right to use this site as a camp for future logging activity in the area.

The State of Alaska has selected a small amount of land in the Lab Bay area, but for recreational use only (Impact Assessment. 1993). There are no plans for any private land disposal. So, while Lab Bay may be used as a camp again, it is unlikely that a permanent community will develop (personal communication, KPC, in Lab Bay DEIS, p. 3-259).

Before it was deactivated, there were as many as 148 residents in the primarily non-Native logging community. Logging was the primary employer in Lab Bay, although there were some jobs in retail, sales, and educational services. The 1990

Glossary

census reported an unemployment rate of 2.8 percent and a median family income of $46,250 (1990 U.S. Census).

Access to Lab Bay is by the Prince of Wales road system, the Klawock airstrip and seaplane base, and the Ferry out of Hollis. Scheduled floatplane flights also arrive at Point Baker, north of the Bay.

Natzuhini Camp

Natzuhini is a small logging camp of approximately 60 residents located about 5 miles north of Hydaburg on the Hydaburg Road. Residents of the camp work logging Sealaska Native Corporation lands on the northwest side of Hetta Inlet. The camp was established in 1986 and has had residents every year except 1989.

Smith Cove (Skowl Arm) Camp

Smith Cove Camp (referred to by ADF&G deer data as Skowl Arm Camp) is a small logging/construction camp of approximately 40 residents located on the northeastern shore of Skowl Arm. The camp is comprised of 15-20 mobile home trailers and has a floating store with a post office.

Whitestone Logging Camp

Whitestone Logging Camp is a land camp adjacent to Hoonah on Chichagof Island. Apart from the historical use of the area by Tlingits, the camp was first settled for logging operations. The camp is primarily non-Native families of loggers, though nearby Hoonah is a Native community. Children from Whitestone attend school in Hoonah.

Logging of Native Corporation lands is the main source of employment in Whitestone, with some jobs available in other professional services. As Native logging endeavors begin to slow down, Whitestone could compete for Forest Service timber sales. The population is 203 with a 1990 median family income of $50,417 (ADCRA 1995).

Piped water from Hoonah, individual wells, or holding tanks supply water to the camp and all homes are fully plumbed. Piped sewage, septic tanks and leach field are used for disposal. Access is by the airport and State Ferry at nearby Hoonah. There are no state-operated schools or health clinic directly within the community, but nearby Hoonah provides these services (ADCRA 1996).

Chapter 4

List of Preparers

This list of preparers contains those people who have been involved in preparing the Final Environmental Impact Statement (FEIS). Please refer to the Supplement and Revised Supplement to the Draft EIS for those people involved in the past. Many others who were involved in reviewing documents, updating the database, or verifying information were important to the process, but were not directly involved in conducting the analysis or writing the document, and are not listed here.

The three Forest Supervisors for the Tongass National Forest are the responsible officials for preparing the Forest Plan and FEIS, and they provided the overall leadership throughout the process. They are:

Gary Morrison, Chatham Area
Abigail Kimbell, Stikine Area
Bradley Powell, Ketchikan Area

Beth A. Giron Pendleton ***TLMP Co-Team Leader***

Contributions made

Responsible for the public participation and coordination of activities leading to the Revision of the Tongass National Forest Land Management Plan.

Education

B.S. Wildlife Biology, University of Vermont
M.S. Wildlife and Fisheries Sciences, South Dakota State University
M.A. Journalism and Communications, University of Wyoming

Forest Service: 6 years

TLMP Co-team leader, 1995-present
Planning Staff Manager, Wildlife, Fish, and Rare Plants Staff, Forest Service National Headquarters, 1992-1995
Program and Partnership Manager, Wildlife, Fish, and Rare Plants Staff, Forest Service National Headquarters, 1991-1992

Steven Kessler ***TLMP Co-Team Manager, Assistant IDT Leader, Fish Biologist***

Contributions made

Member of Leadership Team managing the Revision process
Member of the Fish Habitat Analysis Team of the Alaska Anadromous Fish Habitat Assessment
Summarized fish habitat situation on the Tongass, and evaluated consequences of the alternatives on fish. Participated in the development of the Forest-wide GIS database. Coordinated development of Land Use Prescriptions, Forest-wide Standards and Guidelines, and Monitoring Plan. Managed public scoping database, and analyzed public comments.

4 List of Preparers

Education
B.S. Biological Sciences, University of Arizona, 1974
M.S. Ecology and Evolutionary Biology, University of Arizona, 1978

Forest Service: 16 years
TLMP Co-Team Manager, 9/95-present
Assistant TLMP Co-Team Manager and Fish Biologist 1994-1995
Assistant TLMP Leader and Fish Biologist 1992-1994
Fish Biologist, Tongass NF, Tongass Forest Plan Revision Interdisciplinary Team, Juneau, Alaska, 1987-1992
Forest Fish Biologist, Wenatchee National Forest, 4 years
Fish Biologist, Tongass National Forest, Chatham Area, Juneau Ranger District, Yakutat Work Center, 2 years
Fish Biologist, Tongass National Forest, Chatham Area SO, 1 year

Other relevant employment
Planner, Alaska Department of Fish and Game, FRED Division (on IPA assignment from Forest Service to ADF&G), 1982
Fish Technician, USDI, Bureau of Land Management, Boise, Idaho, Summer 1979
Hydrology Technician, USDI Bureau of Land Management, Worland, Wyoming, Summer 1978
Research and Teaching Assistant, University of Arizona, 1975-1978
Instructor, Pima Community College, Tucson, Arizona, 1977-79

Robert C. Aiken ***Transportation Planner***

Contributions made
Coordinated transportation and facilities input, including log haul costs, future road density estimates, log transfer facility inventory, and facility needs

Education
B.S. Forest Engineering, Oregon State University, 1980

Forest Service: 15 years
Transportation Planner, Tongass National Forest, Stikine Area, 1984-present
Forester, Siuslaw National Forest, 1980-84

Other relevant employment
Cooperative Education Student, Siuslaw National Forest, 2 years
Forestry Aid, Siskiyou National Forest, 2 seasons

Debbie Anderson ***TLMP Secretary***

Contributions made
Word processing
Planning Record/Datalib entry

Education
B.S. Occupational Therapy, University of Kansas, 1969
M.A. Elementary Education, UAS-Juneau, 1990

Forest Service: 7.5 years
Secretary, TLMP Revision IDT, Sept. 1991 to present
Secretary, Forestry Sciences Lab, Juneau
Clerk, Personnel and Planning Units, Regional Office, Juneau, AK

David Arrasmith ***Economist/Analyst, Planning Staff Officer, Ketchikan Area***

Contributions made
Socioeconomic analysis
Coordination of TLMP planning with the Ketchikan Area
FORPLAN analysis

Education
B.S. Agricultural Economics, University of California Davis, 1981

Forest Service: 13 years
Planning Staff Officer, Ketchikan Area, 3 years
Spotted Owl EIS Team, Portland, Or., 1 year
Economist/Analyst Alaska Region, 2 years
Economist/Sociologist Eldorado National Forest, 7 years

John T. Autrey ***Archaeologist***

Contributions made
Heritage Resource Management

Education
A.B. Major: Anthropology, Minor: Geography, University of Northern Colorado, 3/10/1973
A.M. Major: Social Science: Anthropology, University of Northern Colorado, 12/8/1973

Forest Service: 12 years
Ketchikan Area, Tongass National Forest, Area Archaeologist, 1987-Present
Kaibab National Forest, Assistant Forest Archaeologist, 3 years
Chatham Area, Tongass National Forest, Archaeological Technician, 2 years

James F. Baichtal ***Forest Geologist***

Contributions made
Blue River Lava Flow and North Prince of Wales and Dall Island Karst Special Areas and Standard and Guidelines for Cave Resource Management.

Education
Associate Science Degree, LCC, Longview, WA, 1977
Bachelor of Science in Geology, Washington State University, 1980
Master of Science in Geology, Washington State University, 1982 Thesis topic: Geology of Waldron, Bare, and Skipjack Islands, San Juan County, Washington.

Forest Service: 8 years
Forest Geologist, Ketchikan Area, Tongass National Forest, July 1990-Present
Cave resources in Central Oregon on the Deschutes National Forest.
Member, National Speleological Society and the Glacier Grotto in Alaska.
Resource Geologist, Umpqua NF, Roseburg, OR, 2.5 years

Engineering Geologist, Ochoco NF, Prineville, OR, 3.5+ years
Engineering Geologist, U.S. Army Corps of Engineers, Ft. Worth, TX, 1.5 years
Physical Science Aid, Snoqualmie NF, Naches, WA, summers of 1978/79.
Instructor, Geology, Local Community Colleges.
Instructor, geology field camp, two summers for Paleontology Lab, Washington State University
Detail White Sands Missile Range for 6 weeks in 1986 to the COE to head up a large drilling foundation investigation.
Detailed to the Wallowa-Whitman NF for 2 weeks in 1987 to head Forest personnel with rock source management and foundation design for a boat landing in Hells Canyon.

Other relevant employment
Operated a Geologic Consulting business in and around Roseburg, Oregon.

Michael Condon ***Planning Staff Officer, Stikine Area***

Contributions made
Coordination of TLMP planning with the Stikine Area

Education
B.S. Business Administration/Economics
Graduate study in Forestry and Business Administration

Forest Service: 21 years
Fire Management
Land Management Planning

John Day ***FORPLAN Analyst***

Contributions made
FORPLAN modeling
FORPLAN analysis

Education
B.S. Forest Management, Colorado State University
M.S. Operations Research/Forestry, Colorado State University

Forest Service: 7.5 years
FORPLAN analyst, TLMP Revision IDT, 5.5 years
TM/LMP Systems Section, Washington Office (Detached), Ft. Collins, Colorado, 2 years

Eugene J. DeGayner ***Wildlife Biologist/Resource Information Manager***

Contributions made
Wildlife analysis
Coordinate GIS activities
Oversee the development of a forest-wide data base for the Revision

Education
B.S. Wildlife Biology, University of Minnesota, 1980
M.S. Wildlife Biology, University of Minnesota, 1982

Forest Service: 10 years
Regional Wildlife Ecologist, 1995-present
Forest Wildlife Biologist, Tongass NF, Stikine Area, 9/92 to 1995
Wildlife Biologist, Tongass National Forest, Ketchikan Area, 6 years

Ronald L. Dunlap ***Fish Biologist***

Contributions made
Fisheries Analysis

Education
B.S. Fish and Wildlife Management, Michigan State University
M.S. Biology, Michigan Technological University

Forest Service: 17 years
Fish Biologist, TLMP Revision
Assistant Regional Fisheries Program Manager, Alaska Region
Forest Fish Biologist, Huron-Manistee NF
Forest Fish Biologist, George Washington NF
District Biologist, Kenton Ranger District, Ottawa NF

Pamela J. Finney ***Public Affairs Specialist***

Contributions made
Develop, implement, and evaluate two-way strategic communication programs that inform and involve people, including groups, government agencies, and all interested public in the Tongass Land Management Plan. Serve as Media specialist for team. Produce public information on the planning process, decision-making, and effects of alternative management activities.

Education
B.S. Forestry and Communication, Oregon State University, 1974

Forest Service: 19 years
Public Affairs Specialist, TLMP team 1995-present
Public Affairs Specialist, National Headquarters of Forest Service 1991-1995
Public Affairs Specialist, Alaska Regional Office 1988-1991
Visitor Center Director, Juneau Ranger District 1985-1988
Interpreter/Information Specialist, Juneau Ranger District 1981-1985
Public Information Officer, Mt. Hood National Forest, Oregon 1979-1980
Forest Interpreter, Alaska Region 4 years

4 List of Preparers

Gary Fisher — ***Resource Information Manager***

Contributions made
GIS analysis and map production

Education
B.S. Forest Management, Northern Arizona University
M.S. Forest Information Systems, University of Minnesota

Forest Service: 4.5 years

Other relevant employment
Private industry timber scaler and cruiser, 3.5 years
Independent forestry contractor/consultant, 3 years

Rick Griffen — ***Resource Information Manager - GIS***

Contributions made
Maintenance of the TLMP information database
Systems Manager for the RISC-based computer system
GIS database management and analysis

Education
B.S., M.S. Wildlife Management; Humboldt State University, 1983

Forest Service: 10 years
TLMP Revision IDT, 1989 - present
Sitka Supervisor's Office, Tongass NF, 1.5 years
Hoonah Ranger District, Tongass NF, .5 year

Paul E. Hennon — ***Forest Pathologist***

Contributions made
Prepared sections on forest health

Education
Ph.D. Botany and Plant Pathology Department, Oregon State University

Forest Service: 16 years
Investigating yellow-cedar decline
Ecology and management of heart rots and dwarf mistletoe

Lynn L. Humphrey — ***Recreation Planner***

Contributions made
Recreation and Tourism Analysis
Roadless Area Analysis
Wild and Scenic Rivers Analysis

Education
B.S. Forest Biology, Colorado State University, 1979

Forest Service: 16 years

Recreation Planner, Tongass NF, 1992-present
Lands, Minerals, Timber, Recreation Specialist, Juneau Ranger District, 1986-1991
Computer Programmer Analyst, Alaska Regional Office, 1984-1986
Computer Programmer, Southern Forest Experiment Station, 1981-1984
Inventory Forester, Southern Forest Experiment Station, 1979-1981

Chris Iverson ***Wildlife Ecologist***

Contributions made
Wildlife and Viability Issues including:
Coordinated species assessments and workshops
Facilitated Viability panel assessments
Prepared wildlife resource analyses

Education
B.S. Biology (minor chemistry), Central Michigan University, 1977
M.S. Wildlife Ecology, Oklahoma State University, 1981

Relevant Work Experience
Wildlife Ecologist, Tongass Land Management Planning Team, 1995-present
Regional Ecology Program Leader, 1992-Present
Forest Wildlife Biologist, Stikine Area, Tongass National Forest, 1989-1991
Nongame and Endangered Species Coordinator, Indiana Dept. of Natural Resources, 1981-1988

John Morrell ***Lands Specialist***

Contributions made
Lands analysis
Law enforcement input

Education
B.S. Forestry, University of Montana, Missoula, 1967
M.S. Forestry, California State University, Humboldt, 1976
Master of Forest Resources, University of Washington, 1977

Forest Service: 17 years
Lands Forester, Tongass NF, Chatham Area, 7 years
Resource Assistant, Thorne Bay RD, 2 years
Resource Assistant, North Prince of Wales RD, 2 years
Forester/Recreation Assistant, Packwood RD, 2 years
Forester, Packwood RD, 1 year
Forestry Technician, Packwood RD, 3 months

Other relevant employment
Research Assistant, University of Washington/PNW Experiment Station, 1.5 years
Recreation Technician, BLM, Ukiah, CA, 3 months

4 List of Preparers

Bruce Rene ***Natural Resource Planner***

Contributions made

Provide guidance on and facilitate: 1) the documentation of the National Forest Management Act planning process, and 2) the analysis and documentation required by the National Environmental Policy Act

Education

B.A., Humanities, Shimer College 1967
M.A., English, University of Kentucky, 1970
MBA, Business Administration, University of Texas, 1976

Forest Service: 17 years

Documents Coordinator, 5 years
Assistant Forest Planner & Environmental Coordinator, Stanislaus NF, 11 years

Julie Schaefers ***Economist/GIS analyst***

Contributions made

Coordination of the Socio-economic affected environment and effects analysis
GIS analysis for recreation, roadless, visuals and publication of the map packet.

Education

B.S. Forest Recreation Resources, Oregon State University, 1989.
M.S. Agriculture and Resource Economics, Colorado State University, 1994.

Forest Service: 8 years

TLMP Economist and GIS analyst
Cooperative Education Student on Willamette NF
Various Ranger District assignments

John C. Sherrod ***Planning Staff Officer, Chatham Area***

Contributions made

Coordination of the TLMP planning with the Chatham Area
Task force for development of the Forest Monitoring Plan
Assisted IDT in formulating procedures and processes.
Assisted in conducting public hearings and open-houses

Education

B.S. Forestry, University of Georgia, 1960
M.S. Forest Resources, University of Idaho, 1980

Forest Service: 33 years

Planning Staff Officer on the Tongass, Chugach, and Helena National Forests, 17 years
Planning Team Leader on the Willamette, Gallatin, and Custer National Forests, 6 years
Ranger District assignments on four Districts on the Custer and Colville National Forests, 10 years

John Short ***Forest Landscape Architect, Ketchikan Area***

Contributions made
- Scenery affected environment and effects analysis
- Directed and helped implement recreation place, recreation site, and trail inventory, and directed its input into ARC/INFO data base.
- Implemented visual resource inventory for Ketchikan Area and directed its input into ARC/INFO data base.
- Assisted in developing Roadless inventory and Roadless Area descriptions.
- Assisted in revising Roadless chapter for supplemental draft.

Education
- B.S., Journalism, minor in Landscape Architecture, Cornell University, 1967
- M.L.A, Landscape Architecture, Cornell University, 1975

Forest Service: 15 years
- Forest Landscape Architect, Ketchikan Area. Involved in visual resource management, timber sale planning, visual and recreation inventories, recreation planning, recreation site planning, accessibility coordination.

Other relevant employment
- Landscape architect, City Planning Department, Ithaca, NY, 1975, 6 months

Annette Untalasco ***Computer Specialist***

Contributions made
- Formatting and editing of document

Education
- B.S. Environmental Health, 1975

Work experience
- various clerical/administrative

Carole Lee Walk ***Administrative Assistant for Research***

Contributions made
- Administrative support

Education
- B.S., Education, Drake University

Forest Service 6 years
- Administrative Assistant, TLMP Revision
- Business Management Assistant, Juneau Ranger District
- Secretary, Washington Office

4 List of Preparers

Bill Wilson ***Timber Planner***

Contributions made
Timber analysis

Education
B.S. Forestry, McNeese State University, 1968

Forest Service: 26 Years
Group Leader, Silviculture, Inventory, and Plans, Alaska Region
Revision IDT Member, Tongass National Forest, (1987-5/89)
Regional Office Timber Planner, Alaska Region, 8 years
District and Supervisors Office Timber Assistant, Lincoln NF, 3 years
District Timber Assistant, Kiabab NF, 1 year
Supervisors Office Timber Assistant, Prescott NF, 4 years
Inventory Forester, Southern Forest Experiment Station, 3 years
Forestry Aid, Mt. Hood NF, 1 year

The following individuals with the Forest Service Pacific Northwest Research Station did not actually prepare the document, but located, assembled, analyzed, and interpreted scientific information that was made available for use in the Forest Plan and FEIS.

Fred Everest ***TLMP Co-Policy Group Leader***

Contributions made
Co-lead Policy Group
Fisheries Analysis

Education
B.S. and M.S. Fisheries Science, Humboldt State University
Ph.D. Forest Sciences (fisheries specialty), University of Idaho, 1969

Forest Service
Pacific Northwest Research Station, 1977-present
Siskiyou National Forest, 1972-1977

Doug Swanston ***TLMP Co-Team Leader***

Contributions made
Co-managed science team
Karst and cave analysis

Education
Ph.D. Michigan State University

Forest Service
Team Leader for Watershed Management Research in coastal Alaska, Pacific Northwest Research Station
Research Geologist, Pacific Northwest Research Station. Dr. Swanston has over 70 publications to his credit relating to landslide problems and land management concerns.

Charles G. "Terry" Shaw III ***TLMP Co-Team Manager for Research***

Contributions made
Manage science input to the Revision, including assessments and panels. Will be responsible for publication of science documents

Education
B.S. Forestry, Washington State University, 1970
Ph.D. Plant Pathology, Oregon State University, 1974

Forest Service
Research Plant Pathologist for Pacific Northwest Research Station, 1977-1986
Project Leader for Rocky Mountain Research Station project on Pest Impact Assessment Technology. This project was west-wide in the Forest Service and provided input on how to best incorporate information on pest impact into forest plans. Dr. Shaw has some 50 published papers dealing with forest conditions in Southeast Alaska.

4 List of Preparers

Stewart Allen ***Research Social Scientist***

Contributions made
Socioeconomic analysis.

Education
B.A. Psychology and Journalism, University of Utah, 1976
M.A. Social and Environmental Psychology, Claremont Graduate School, 1978
Ph.D. Forestry, University of Montana, 1980

Work Experience
Research Social Scientist, Forest Service, 1994-present
Private consultant, 1985-1994
Assistant Professor, University of Idaho, 1986-1988
Montana Department of Natural Resources & Conservation, 1980-1984

John Caouette ***Statistician***

Contributions made
Participated in the development of a statistically defensible TIMTYP map.

Education
B.S. Mathematics, University of Minnesota, 1987
M.S. Applied Mathematics and Statistics, University of Minnesota, Duluth, 1994

Forest Service, 2 years
Statistician, Forestry Sciences Lab, 1 year.
Forestry Technician, Forestry Sciences Lab, 1 year.

Other relevant employment
Research Assistant, Natural Resources Research Institute, Duluth, Minnesota, 1 year

Kent Julin ***Research Forest Ecologist***

Contributions made
TIMTYP map
Forested Wetlands
Monitoring Plan

Education
B.S. Forest Resources Management, Humboldt State University, 1981.
M.S. Forest Ecology, University of Washington, 1981.
Ph.D. Forest Ecology, University of Washington, 1988.

Forest Service
Research Forest Ecologist, PNW Station, 1995 - present
Forestry Aide, Shasta NF, 1979-1980
Forestry Technician, Klamath NF, 1978

Other relevant work experience
Senior Environmental Scientist, Harding Lawson Associates, 1989-1995
Research/teaching assistant, College of Forest Resources, University of Washington, 1984-1988.

Guy C. Robertson ***Economist***

Contributions made

Analysis of economic outputs associated with Tongass National Forest resource dependent industries (timber, recreation, commercial fishing and mining)
Economic impact analysis of alternative upon employment and income in S.E. Alaska.
Economic efficiency analysis of alternatives using net present value accounting

Education

Currently enrolled, College of Forest Resources Ph.D. program in Forest Economics, University of Washington, Seattle, Washington (9/92-present).
Monbusho (Japan Ministry of Education) Scholar, Department of Forestry, Tokyo University of Agriculture and Technology, Tokyo, Japan. (1/92-8/92).
Japan Regional M.A. Program, Jackson School of International Studies, University of Washington, Seattle, Washington (9/88-4/91). MA degree received June 1991.
Carleton College, Northfield, Minnesota. Bachelor of Arts degree in philosophy received June 1983.

Forest Service: 1 year

Research Economist, PNW Research Station, Seattle Lab, USDA Forest Service (10/95-present).
Research Economist, PNW Research Station, Seattle Lab, USDA Forest Service (6/95-9/95).
Research Assistant, Center for International Trade in Forest Products (CINTRAFOR), College of Forest Resources, University of Washington, Seattle, Washington (9/92-6/94, 9/94-6/95).
Assistant Economic Analyst, PNW Research Station, Seattle Lab, USDA Forest Service (6/94-9/94).

Other relevant employment

Occasional Consulting for the Japan Wood Products Research Center, Seattle Office (3/95-present).
Researcher/Translator, Comline International News Service, Tokyo, Japan (6/91-8/92 [1/92-8/92 half-time]).
English Instructor, CECIL International, Kokura, Japan (7/85-8/88).

4 List of Preparers

Other Federal Agency personnel assigned to TLMP team.

Chris Meade ***Environmental Scientist, U.S. Environmental Protection Agency***

Contributions made
Environmental review, fish habitat and water quality, Monitoring and Evaluation Plan

Education
Forestry major, Paul Smiths College, 1979-81
B.S. in Natural Resources Management, University of Alaska-Fairbanks, 1981-85
Master of Public Administration, University of Alaska-Anchorage, 1986-87

Relevant Work Experience
U.S. Environmental Protection Agency, 1990-present
U.S. Peace Corps, Sapo National Park, Liberia, 1987-89

Richard Enriquez ***Fish and Wildlife Biologist, USDI Fish and Wildlife Service***

Contributions made
Environmental review and comment.

Education
B.S. Fish and Wildlife Conservation, New Mexico State University, 1974
M.A. Secondary and Adult Education - Biology, University of New Mexico, 1988

Relevant Work Experience
USDI Fish and Wildlife Service, 1983-present
Forest Service, Wildlife Biologist, 1977-1983
Bureau of Land Management, Wildlife Biologist, 1974-1977

Chapter 5

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Cross, Glenn	

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Culp, Wanda	Hoonah Traditional Tribal Council
Dahlin, Elwood	
Dam, William	Federal Lands Advisory Commission
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Espinoza, Laurie	Sunnyside School
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Fishman, Rob	Indiana University School of Law
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Garland, Teresa	Greater Ketchikan Chamber of C
Gates, Paul	U.S. Dept. of Interior
Gentry, Don	Atikon Forest Products, Inc.
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Jahnke, Randy	Cleveland Users Coalition
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Kaz, Dave	SEACC

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Perry, Lorraine	Grandma's Inc.
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Chapter 5170, “Fire Management Cooperation”

Chapter 5180, “Fire Reports”

Chapter 5190, “Management”

Title 5400, *Landownership Manual*

Chapter 5420, “Land Purchases and Donations”

Chapter 5430, “Exchanges”

Chapter 5450, “Procedures”

Chapter 5460, “Right-of-Way Acquisition”

Chapter 5470, “Reservations and Outstanding Rights”

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Chapter 7

Glossary

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

These definitions apply to Forest Service land management and planning. Meanings may differ when used in another context. Glossary definitions are not legal unless otherwise noted. Definitions were shortened, paraphrased or adapted to fit local conditions and for ease of understanding.

A

Access The opportunity to approach, enter, and make use of public lands.

Access management Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

Acquired Land Lands in Federal ownership which were obtained by the Government through purchase, condemnation, gift, or by exchange.

Active channel As defined for purposes of the riparian standards and guidelines . . . includes stream channels*, secondary channels*, and braided channels*. For the Alluvial Fan Process Group, it also includes gravel outwash lobes. (Words marked by a * have further definitions within the glossary.)

Activity fuel loading The amount of burnable debris left after logging.

Adaptive Management A continuous process of action-based planning, monitoring, research, evaluation, and adjustment with the objective of improving implementation and achieving desired management goals and objectives.

Adfluvial fish Species or populations of fish that do not go to sea, but live in lakes, and enter streams to spawn.

Administrative site Lands used as headquarters or administrative facility by a Federal agency.

AFHA See Anadromous Fisheries Habitat Assessment

Aggradation The process of building up a land surface by deposition.

AHMU Aquatic Habitat Management Unit.

AHRS See Alaska Heritage Resource Survey.

Airshed Geographical areas which, because of topography, meteorology, and climatic conditions, share the same air mass. Air is managed by airshed.

Alaska Heritage Resource Survey (AHRS) The official list of cultural resources in the State of Alaska, maintained by the Office of History and Archaeology, Alaska Division of Parks and Outdoor Recreation.

Allowable Sale Quantity (ASQ) The maximum quantity of timber that may be sold in each decade from suitable lands covered by the Forest Plan.

Alluvial fan A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

Alluvium Recent soil deposits resulting from modern rivers, including the sediment laid down in river beds, flood plains, lakes, and at the foot of mountain slopes and estuaries.

Alpine Parts of mountains above tree growth.

Alternative An option proposed for decision making.

Ambient air That air, external to buildings, encompassing or surrounding a specific region.

Ambient Air Quality Standard The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.

Amenity Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value typically describes those resource properties for which monetary values (or market values) are not or cannot be established.

Anadromous fish Fish which mature and spend much of their adult life in the ocean, returning to inland waters to spawn. Salmon and steelhead are examples.

Anadromous Fisheries Habitat Assessment An assessment conducted in 1994 within the Tongass National Forest (published in 1995) to study the effectiveness of current procedures for protecting anadromous fish habitat and to determine the need for any additional protection.

Analysis area An area of land which has the same timber management costs and responses to timber management activities.

ANCSA The Alaska Native Claims Settlement Act of December 18, 1971. Public Law 92-203, 92nd Congress, 85 Stat. 688-716.

ANILCA The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551.

Appropriate suppression action The planned strategy for suppression action (in terms of kind, amount, and timing) on a wildfire which most efficiently meets fire management direction under current and expected burning conditions.

> **Critical protection** Areas where human life or habitation are present have priority over all others. Immediate and continuous efforts are made to minimize loss of life and damage to property.
> **Full protection** Valuable resources, such as commercial timber stands and historic structures exist; however, no human life or habitation exist in these areas. Immediate and aggressive action is taken to limit the number of acres burned.
> **Modified action** Uninhabited; with resources of lesser value. Land managers consider tradeoff of acres burned versus suppression expenses. Fires during critical burning months are attacked, but a lower level of protection is provided when the risks of large, damaging fires is less.
> **Limited action** Areas where the cost of fighting the fire is greater than the fire damage. Suppression efforts are limited to keeping a fire within a designated area or protecting critical sites within the areas.

Appropriation of land The act of selecting, devoting, or setting apart land for a particular use or purpose, such as appropriating land for public buildings and military reservations or other public uses (Black, 1979).

Aquaculture Maintaining, enhancing, and rehabilitating fish stocks through improvements and facilities, including the rearing of anadromous juvenile fish, generally in fresh water, for release into salt water for maturing, to become available as a common property resource.

Aquatic ecosystem	A stream channel, lake or estuary bed, the water itself, and the biotic communities that occur therein.
Aquatic farm (or Aquafarming)	Growing, farming, or cultivating aquatic products in captivity or under positive control. Current State of Alaska law (AS 16.40.100 - 16.40.199, July 1, 1990), does not allow the aquatic farming of finfish, but does allow the farming of shellfish.
ARC/INFO	ARC/INFO is the name of the Geographic Information System (GIS) software used for the Revision database.
Area of potential effects	The geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.
Arterial road	Roads usually developed and operated for long-term land and resource management purposes and constant service.
Associated grave goods	The items placed with human remains at the time of interment.
ASQ	See Allowable Sale Quantity.
Atmospheric dispersion	The lofting and distribution of particulate matter from wood smoke into the atmosphere over time.
Augmentation funds	The funds used to finance timber purchaser constructed or reconstructed road without regard to whether the funds are contributed or supplemental.
Available timberlands	Timberland not withdrawn from use in production of timber products as a result of administrative statue or regulation.

B

Background The distant part of a landscape. The seen, or viewed, area located from three or five miles to infinity from the viewer. (See “Foreground” and “Middleground”.)

Bank The continuous margin along a river or stream where all upland vegetation ceases.

Bankfull width The width of the wetted channel when the water surface is at the same elevation as the active floodplain.

Beach fringe The area inland from salt water shorelines which is typically forested.

Beachlog salvage The salvage of logs that have been washed-up on beaches. Special provisions in ANILCA allow beachlog salvage in Wilderness and National Monuments if it can be conducted without roads or use of vehicles on uplands.

Bedload Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water. The particles of this material have a density or grain size which prevents movement far above or for a long distance out of contact with the streambed under natural flow conditions.

Benchmark An analysis of the supply potential of a particular resource, or set of resources, subject to specific management objectives or constraints. Benchmarks define the limits within which alternatives can be formulated.

Benthic Pertaining to the sea bottom or to organisms that live on the sea bottom.

Best Management Practices (BMP's) Land management methods, measures or practices selected by an agency to meet its non-point source control needs. BMP's include, but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMP's can be applied before, during and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. BMP’s are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. BMP’s are found in Forest Service Handbook 2509.22.

Biogeographic provinces Twenty-one ecological subdivisions of Southeast Alaska that are identified by generally distinct ecological, physiogeographic, and biogeographic features. Plant and animal species composition, climate, and geology within each province are generally more similar within than among adjacent provinces. Historical events (such as glaciers and uplifting) are important to the nature of the province and to the barriers that distinguish each province.

Biological diversity The variety of life forms and processes, including the complexity of species, communities, gene pools, and ecological functions, within the area covered by a land management plan.

Biological potential The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

Biomass The total quantity, at a given time, of living organisms of one or more species per unit area or all of the species in a community.

Blowdown	See windthrow.
BMP's	See Best Management Practices.
Board foot	A unit of timber measurement equaling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long and 12 inches wide.
Bole	Trunk of the tree. A tree stem once it has grown to substantial thickness—roughly to that capable of yielding poles, sawlogs, or veneer logs.
Boulders	Rounded or angular rocks greater than 12 inches in size.
Braided streams or channels	A stream flowing in several dividing and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment deposited by the stream.
BTU	British thermal unit. The quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

C

Canopy gap Natural openings created in the overstory of old-growth conifer forests from the loss of a single or small group of trees from windthrow, insects, or disease. Gaps are also created in second growth conifer stands to increase light penetration to the understory by cutting all of the trees in a small area to maintain or increase the number of understory plant species.

Catastrophic event Events resulting from a great and sudden calamity or disaster. In the case of forest stands such events may include windstorms, wildfire, floods, snowslides, and insect outbreaks. Whether a disturbance event is called catastrophic is dependent on the context within which the event occurs, the scale of the event, and the effects of the event.

Capability The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity.

Capital investment cost Costs generally associated with construction such as trails, roads, and physical structures.

Carrying capacity The estimated maximum number of animals that can be sustained over the long term within a specified area.

Cave Cave is legally defined under federal law as "any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or human-made. Such term shall include any natural pit, sinkhole or other feature which is an extension of the surface," (Federal Cave Resource Protection Act of 1988). Speleologists use "cave" to refer to all parts, regardless of size, of an underground system that links openings and chambers and that may connect the system to the surface. Included in the term caves are tree molds and lava tubes associated with lava flows, erosional caves, and those formed by dissolution of bedrock.

CFL See Commercial forest land.

CFR Code of Federal Regulations.

Channel A natural waterway of perceptible extent that periodically or continuously contains moving water. it has a definite bed and banks which serve to confine the water.

Channel migration Movement of a stream or river channel within a flood plain area (or an alluvial fan) usually over an extended period of time.

Channel sideslope The area from the stream channel to the side-slope break. See also Side-slope break.

Channel type A means of distinguishing parts of a stream system into segments which have fairly consistent physical and biological characteristics. For descriptions, see "Channel Type Field Guide," Forest Service publication R10-MB-6.

Class (streams) See Stream class.

Class II area (Air)	Geographic area having air quality exceeding the National Ambient Air Quality Standards, which is designated for a moderate degree of protection from future air quality degradation. Moderate increases in new pollution may be permitted.
Clearance	Cultural resources: Certification by the Forest Supervisor documenting that the requirements of 36 CFR 800 have been fully met for each undertaking.
Clearcut	Harvesting method in which all trees are cleared in one cut. It prepares the area for a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class in planning.
CMAI	See Culmination Mean Annual Increment.
Coarse filter	An approach used for wildlife conservation management and analysis which focuses on the characteristics of entire ecosystems and landscapes. (See also “fine filter.”)
Coarse gravel	Rounded rocks generally 3/4 of an inch to 3 inches in size.
Cobbles	Rounded rocks between 3 and 12 inches in size.
Colluvial	Soil and material produced by the disintegration and weathering of rocks, including cliff debris, material of avalanches, and alluvium. This material accumulates at the foot of a slope.
Commercial forest land (CFL)	Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.
Commodities	Resources with monetary (market) or commercial value; all resource products which are articles of commerce, such as timber and minerals.
Common variety	Deposits of sand, stone, gravel, and others of widespread occurrence not having distinct special value. These deposits are used generally for construction and decorative purposes and are disposed of under the Materials Act of 1947.
Condemnation	In real property law, the process by which property of a private owner is taken for public use, without his/her consent, but upon the award of payment for just compensation.
Confined streams	Streams that are confined within their channel banks; they are controlled by stream incision, geomorphic landform characteristics, and local geological conditions.
Confluence	The point where two streams meet.
Connectivity	A measure of the extent that forest areas between or outside reserves provide habitat for breeding, feeding, dispersal, and movement.
Contributed funds	Funds used to pay for a portion of the work or materials needed to construct a road only to the standard needed for a timber sale, which could have properly been paid for by purchaser credits, if available.

Control (Nick) points	Points in streams which are not easily erodible.
Convey	To pass or transmit the title to property from one to another (Black 1979).
Conveyance	An instrument by which some estate or interest in lands is transferred from one person to another (Black 1979); a transfer of legal title to land.
Corridor (transportation)	A linear strip of land defined for the present or future location of transportation or utility rights-of-way within its boundaries. For planning purposes, potential and proposed corridors are depicted on the Plan map to show approximate corridor routes and widths. Actual corridor routes and boundaries for new systems will be identified through site-specific transportation and/or utility project planning.
Corridor (habitat)	Habitats, often linear, that facilitate dispersal and movement of wildlife between larger patches of suitable habitat. (Also see "connectivity.")
Corridor (Wild & Scenic Rivers)	Wild, scenic and recreational river corridors are generally comprised of the area within 1/4 mile either side of the ordinary high water mark of the river. River corridor boundaries may be changed as a result of specific river planning following inclusion of the River in the National Wild and Scenic Rivers system.
Cost Efficiency	The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values, but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.
Created opening	Openings in the Forest canopy created by silvicultural practices including shelterwood regeneration cutting, clearcutting, seed tree cutting, or group selection cutting.
Critical habitat	Specific areas designated as critical by the Secretary of Interior or Commerce for the survival and recovery of species listed as Threatened or Endangered pursuant to the Endangered Species Act.
Crown	The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.
Cubic foot	Equivalent to a cube of wood with 1-foot sides. The cubic foot volume is a measure of the total sound wood in a tree and is a more accurate depiction of wood volume than the board foot measure. Forest Service policy is that cubic foot measure will be the basis for timber sales by Fiscal Year 1995 (WO Amendment 2400-92-4, 9/30/92).
Cull logs	Trees that do not meet certain merchantability specifications.
Culmination of Mean Annual Increment (CMAI)	The point at which a tree (or stand) achieves its highest average growth, based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan.
Cultural descendant	A person who, although not necessarily a direct descendant of a particular deceased person, is associated with a cultural religious tradition to which the human remains of the deceased person has significance.
Cultural resources	See Heritage Resources.
Cumulative effects	See Effects.

Cumulative watershed effects (CWE)	The effects on a watershed's streams and lakes which result from the incremental impact of individual actions within a watershed when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative watershed effects can result from individually minor but collectively significant actions taking place over a period of time.

D

DBH
See Diameter at Breast Height.

Dead
A standing tree that is completely dead. May be in various stages of decay.

Debris flows
The movement of material resulting from the decay and disintegration of rocks, earth, and other materials.

Debris slides
The rapid downslope movement of a mixture of soil, rock, and forest litter with or without a relatively high water content. Also known as debris avalanches.

Debris torrents
Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris. Debris torrents are usually confined within the stream channel until they reach the valley floor where the debris spreads out, inundating vegetation and forming a broad surface deposit.

Decision criteria
The rules, standards or guidelines used to evaluate alternatives. They are measurements or indicators that are designed to assist a decision maker in identifying a preferred choice from an array of possible alternatives.

Decks
Cut timber, sawlogs, or cull logs that have been removed from logging units and stacked.

Degradation
The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

Demand
The amount of goods or services that will be consumed if offered over a given range of prices at a particular point in time.

Demographic
Pertaining to the study of the characteristics of populations, such as size, growth, density, distribution, and vital statistics.

Departure
A timber harvest level that cannot be continued at that level forever.

Detrimental soil disturbance
The condition where established threshold values of soil properties are exceeded and result in significant change or impairment to long-term soil productivity. (See also, Significant change and Significant impairment.)

Detritus
Material, produced by the disintegration and weathering of rocks, that has been moved from its site of origin.

Developed recreation
That type of recreation that occurs where modifications (improvements) enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

Development LUD's
Land use designations that permit commercial timber harvest (Timber Production, Modified Landscape, and Scenic Viewshed) and convert some of the old-growth forest to early-to mid-successional, regulated forests.

Diameter at Breast Height (DBH)
The diameter of a standing tree at a point four feet, six inches from ground level.

Digitize	The act of placing spatial information into a computer.
Discharge velocity	The speed of water outflow from a stream or river over a given period of time.
Discount rate	The rate used to adjust future benefits or costs to their present value.
Dispersal	The movement, usually one way, of plants and animals from their point of origin to another location where they subsequently produce offspring.
Dispersed recreation	That type of recreation use that requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with it. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking, and among others.
Dispersion	To disperse the effects of timber harvest by distributing harvest units more or less uniformly throughout a drainage so that increased runoff and sediment from disturbed sites will be buffered by lower levels of runoff and sediment production from surrounding undisturbed lands.
Dissected landforms	A physical, recognizable form or feature of the earth's surface such as a mountain, hill, or valley, having a characteristic shape, that in part is the result of several shallow or deeply incised drainage channels.
Dissolved oxygen	The amount of free (not chemically combined) oxygen in water.
Distance zone	Areas of landscapes denoted by specified distances from the observer (foreground*, middleground*, or background*). Used as a frame of reference in which to discuss landscape characteristics of management activities. (Words marked by a * have further definitions within the Glossary.)
Disturbance	A force that results in changes in the structure and composition through natural events such as wind, fire, flood, avalanche, or mortality caused by insect or disease outbreaks or by human caused events (e.g., timber harvest).
Diversity	See Biological diversity.
Down	A tree or portion of a tree which is dead and laying on the ground.
Draft Environmental Impact Statement (DEIS)	The version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA) and released to the public and other agencies for review and comment.
Duff layer	The general term for vegetation material covering the mineral soils in forests including the fresh litter and well-decomposed organic material and humus.
Dust, fugitive or Fugitive dust	Particulate matter composed primarily of soil which is uncontaminated by industrial activities. Examples are emissions from haul roads and wind erosion.
Dying	A standing tree partially dead above ground and likely to die in the future.

E

Easement	An interest or right in land owned by another that entitles its holder to a specific limited use.
Ecological provinces	See Biogeographic provinces.
Ecosystem	A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).
Ecosystem management	The use of an ecological approach to land management to sustain diverse, healthy and productive ecosystems. Ecosystem management is applied at various scales to blend long-term societal and environmental values in a dynamic manner that may be modified through adaptive management.
Ecotone	A transition or junction zone between two or more naturally occurring diverse plant communities (ecosystems).
Edge Effect	The effect of adjoining vegetative communities on the population structure along the margin, which provides for greater numbers of species and higher population densities than either adjoining community. Edge may also result in negative effects, since habitat along the edge is different than within the patch, reducing the effective area of the habitat patch.
Effect	In Cultural Resources, the potential of an undertaking to alter the characteristics that may qualify a property for inclusion in the National Register of Historic Places.
Effects	**Direct.** Results of an action occurring when and where that action takes place. **Indirect.** Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future. **Cumulative.** Results of collective past, present, and reasonably foreseeable future actions.
EIS	See Environmental Impact Statement.
Emergent	A plant rooted in shallow water and having most of its vegetation above water (cattails).
Encumbrance	A claim, lien, charge, or liability attached to and binding real property (Black 1979).
Endangered species	Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.
Endemic	Restricted to a particular locality. For example, a particular species or subspecies may occur on only one or a very few islands.
Enhance	To improve, reinforce, enrich or strengthen the existing condition, value, or beauty of a resource.
Entitlement	Right to benefits, income or property which may not be abridged without due process (Black 1979).

Environmental analysis	An analysis of alternative actions and their predictable short- and long-term environmental effects, incorporating the physical, biological, economic, social and environmental design arts and their interactions.
Environmental Impact Statement (EIS)	A document prepared by a federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form, and then in a final form. An impact statement includes the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts which cannot be avoided by the action, (3) the alternative courses of actions, (4) the relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.
Ephemeral channels	A stream that flows in direct response to rainfall and snowmelt but not during dry seasons. Its channel is above the level of the water table.
Equipment fires	Those wildfires originating from the use of equipment in forest operations such as logging, yarding, chainsaws, land clearing, road building, etc.
Erosion	The wearing away of the land surface by running water, wind, ice, gravity or other geological activities.
Escapement	Adult anadromous fish that escape from all causes of mortality (natural or human-caused) to return to streams to spawn.
Estuary	An ecological system at the mouth of a stream where fresh water and salt water mix, and where salt marshes and intertidal mudflats are present. The landward extent of an estuary is the limit of salt-intolerant vegetation, and the seaward extent is a stream's delta at mean low water.
Evaluation	A process for interpreting monitoring data and determining whether changes in management direction are warranted.
EVC	See Existing Visual Condition.
Evapotranspiration	The sum total of water lost from the land by evaporation and plant transpiration. Transpiration is loss of water in vapor form from a plant.
Even-aged management	The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees in forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.
Exchange	A trading of public lands (surface or subsurface estates) that usually do not have high public value for lands in other ownerships which do have value for public use, management, and enjoyment.
Executive Order	An order or regulation issued by the President or some administrative authority under his direction.

Existing data search

A systematic check and evaluation of available records, documents, and informant sources to gather information pertinent to cultural resources within a given area.

Existing Visual Condition (EVC)

EVC ratings are established to give the land manager an indication of the current level of visual quality and visual evidence of management activities. EVC classes are as follows:

Type 1. Appears to be untouched by human activities, except for trails needed for access; only ecological changes have occurred.
Type 2. Changes in the landscape are not noticed unless pointed out.
Type 3. Changes in the landscape are noticed as minor disturbances, but the natural appearance of the landscape remains dominant.
Type 4. Changes in the landscape are easily noticed and perceived as disturbances, but resemble natural patterns.
Type 5. Changes stand out as a dominant impression on the landscape, yet are shaped to resemble natural patterns from 3-5 miles or more distant.
Type 6. Changes are in glaring contrast to the landscape's natural appearance; excessive visual alteration has occurred.

F

Facility Structures needed to support the management, protection, and utilization of the National Forests, including buildings, utility systems, dams, and other construction features. There are three types of facilities: recreation, administrative, and permitted.

Falldown The difference between the number of acres planned for timber harvest and those actually harvested, usually experienced as a reduction in acres. Falldown results from many factors, including unmapped unsuitable timber land, newly available information, and project-level consideration of site-specific issues and non-timber resource needs. See also Management Implementation Reduction Factor.

Feasible Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, technical, and safety factors. In evaluating feasibility, the following are considerations: 1) the effectiveness and practicality of the measures being considered; and, 2) the long- and short-term costs of the measures and the effect of those costs on long- and short-term economic viability of projects or programs.

Fen A tract of low, wet ground containing sedge peat, relatively rich in mineral salts, alkaline in reaction, and characterized by slowly flowing water. Vegetation is generally sedges and grasses, often with low shrubs and sometimes a sparse cover of trees. Sphagnum mosses are absent or of low cover. Unlike peatlands (commonly referred to as bogs or muskegs), fen's contribute to stable stream flows, provide nutrient input to streams and often contribute to fish rearing habitat.

FHAT See Fish Habitat Assessment Team.

FHIP See Forest Habitat Integrity Program.

Fine filter An approach used for wildlife conservation management and analysis which focuses on individual species and their habitat needs. (See also "coarse filter.")

Fire Management Action Plan A plan which provides detailed information for, and guides the implementation of, fire management activities for the approved alternative for the Forest Plan.

Fire severity How hot a fire is for how long. The hotter a fire is and the longer it burns, the more severe it is.

Fire suppression All the work of extinguishing or confining a fire, beginning with its discovery.

Fiscal Year (FY) October 1 to September 30. The Fiscal Year is referred to by the calendar year which begins on January 1. For example, October 1, 1996, to September 30, 1997, is referred to as Fiscal Year 1997.

Fish Habitat Assessment Team The team that conducted the analyses for the Anadromous Fisheries Habitat Assessment.

Fish Passage The ability of both adult and juvenile fish to move both up and down stream.

Fish User Day (FUD) A recreation visitor day spent fishing or viewing fish.

Flash flooding A very rapid responding, relatively high streamflow overtopping the banks in any reach of a stream.

Flood plain That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages in response to a 100-year storm event.

Fluvial Of, or pertaining to, streams and rivers.

Foodfish Fish consumed by humans.

Footslope The inner, gently inclined surface at the base of a hill or mountain slope. The surface profile is dominantly concave, and is the transition zone between upslope erosional sites and downslope depositional sites.

Forbs A grouping/category of herbaceous plants which are not included in the grass, shrub or tree groupings/categories; generally smaller flowering plants.

Foreground A term used in visual management to describe the stand of trees immediately adjacent to a scenic area, recreation facility or forest highway. The area is located less than 1/4 mile from the viewer. (See Background and Middleground.)

Forest Development Transportation Plan The plan for the system of access roads, trails, and airfields needed for the protection, administration, and utilization of the National Forests and other lands administered by the Forest Service, or the development and use of resources upon which communities within or adjacent to the National Forests are dependent (36 CFR 212.1). The plan also addresses permanent or temporary road closures necessary for resource protection or public safety.

Forest Facility Master Plan The plan which depicts the development and management of the Forest's facilities. This includes current volume of business and projections for the future, locations for needed skills to perform program work, existing administrative sites and proposed locations of new sites, and management strategies concerning consolidation or sharing services between units (FSM 7312.1).

Forest Habitat Integrity Program A method of classifying watersheds based on specific resource attributes. The program was developed by the State of Alaska in 1983 based on VCU values developed for the 1979 Tongass Land Management Plan.

Forest health An expression of the relationship among biotic and abiotic influences on the forest (i.e., insects, diseases, atmospheric deposition, silvicultural treatments, harvesting practices, natural disturbance process) and the ability to achieve management objectives for a given forest unit now or in the future, and sustain long-term site productivity.

Forest Plan Source of management direction for an individual Forest specifying activity and output levels for a period of 10-15 years. Management direction in the plan is based on the issues identified at the time of the plan's development.

Forested land Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.

Forested wetland A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

Forest-wide Standards & Guidelines — A set of rules and guidance that directs management activities and establishes the environmental quality, natural renewable and depletable resource requirements, conservation potential, and mitigation measures that apply to several land use designations.

FORPLAN — The forest planning model. A linear programming software package used to analyze planning decisions regarding land use patterns, capital investment, and timber harvest scheduling.

Fragmentation — An element of biological diversity that describes the natural condition of habitats in terms of the size of discrete habitat blocks or patches, their distribution, the extent to which they are interconnected, and the effects of management on these natural conditions. Also the process of reducing the size and connectivity of stands within a forest.

Free use permit — A permit that allows the removal of timber or other resources from public lands free of charge.

FSH — Forest Service Handbook.

FSM — Forest Service Manual.

FUD — See Fish User Day.

Fuel — The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees, dead woody materials.

Fuel loading — The volume of the available or burnable fuels in a specified area.

Function — A term in ecology referring to the interreactions and influences between plant and animal species within an area (how each species uses its environment), and to natural processes of change or disturbance (such as wind or aging).

FY — See Fiscal Year.

G

Genetic descendant A person known or reliably assumed to have a genetic relationship to a deceased person.

Geographic provinces Subdivisions of Southeast Alaska used to define natural diversity, including areas with distinctive regional climate, physiography, and geology. Seven geological provinces have been identified on the Tongass.

Glacial refugia The areas of Southeast Alaska that were not covered by glaciers during the last ice age.

Glacial rivers and streams Rivers and streams that receive their main flow characteristics from the presence and activities of ice and glaciers and their meltwater.

Glide or placid streams Grouping of channel types that have fairly consistent physical characteristics occurring on lowland landforms and are mostly associated with bogs, marshes, or lakes.

Goal A concise statement that describes a desired future condition normally expressed in broad, general terms that are timeless, in that there is no specific date by which the goal is to be achieved.

Goods and services The various outputs and on-site uses produced from forest resources.

Groundwater Water within the earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled; the upper surface level forms the water table.

Group Selection A harvesting method in which trees are removed in small groups at a time.

Guideline A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Guyline circle Guylines are cables to brace the tower (spar) used in cable logging systems. Using the tower as the center, the guyline circle is the area between the tower and where the guylines are anchored. For safety reasons, this area is usually cleared of all trees.

H

Habitat	The sum total of environmental conditions of a specific place occupied by a wildlife or plant species or a population of each species.
Habitat capability	The estimated maximum number of fish or wildlife that can be supported by the amount and distribution of suitable habitat in an area.
Habitat conservation area	See Old growth habitat reserve.
Hard snags/soft snags	Terminology used to described the state of the decay process in dead trees. Hard snags are dead trees which have little decay and are generally still hard wood. Soft snags are dead trees which have a considerable amount of decay and are generally soft, broken wood.
Haul out	Areas used by marine mammals for resting and other social/biological activities which occur in the intertidal zone.
HCA	See Habitat conservation area
Heritage Resources	The physical remains of districts, sites, structures, buildings, networks, events, or objects used by humans in the past. They may be historic, prehistoric, architectural, or archival in nature. Heritage resources are non-renewable aspects of our national heritage.
Historic property	Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. The term includes artifacts, records, and remains that are related to and located within such properties.
Horizontal distance	Distance measured in a flat (horizontal) manner at zero angle.
Human remains	The physical remains of human bodies.
Humus	Substance of organic origin that is fairly but not entirely resistant to further bacterial decay.
Hunter Day	One hunter day is equivalent to one person hunting for any length of time during a 24 hour period.
Hydrologic cycle	The complete cycle through which water passes, commencing as atmospheric water vapor, passing into liquid and solid form as precipitation, thence along or into the ground surface, and finally again returning to the form of atmospheric water vapor by means of evaporation and transpiration. Also called Water Cycle.
Hydrophyte	Plants typically found in wet habitats.

I

IDT See Interdisciplinary Team.

Ignition The initiation of combustion.

Implementation For cultural resources, that point in an undertaking when the proponent has full and complete authorization to proceed with the undertaking.

Improvements Includes any structures of a permanent nature placed upon the land, which tend to increase its value.

Industrial wood All commercial roundwood products, except fuelwood.

Infrastructure The facilities, utilities, and transportation systems needed to meet public and administrative needs.

Inherent capability Recreation capability for the physical, social and managerial setting for recreation, based on remoteness from modern human development and activity, modification of the land, and social factors such as crowding.

Integrated Pest Management (IPM) A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

Intensity How hot a fire is. Specifically, a measure (in BTU's per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.

Inter To place in a grave or tomb.

Interception The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus stemflow and throughfall.

Interdisciplinary Team (IDT) A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Interest A general term to denote a right, claim, title, or legal share in real estate (Black 1979).

Interior old-growth forest The region of a forested stand that has a stable microclimate relative to light, wind, humidity, moisture regime, etc. Natural forest ecotones (see glossary) "seal" a forests edge and stabilize these microclimate features. Ecotones created by management such as the old growth - clearcut edge may have "edge" effects that extend into a forest for several hundred feet (estimated 2-3 tree heights) before stable "interior forest" conditions are achieved and microclimatic effects of the edge are no longer evident.

Invertebrate population That population of creatures without a backbone. Context would depict whether land invertebrates, shore invertebrates, or water invertebrates.

Invertebrates Animals without a backbone.

IPM See Integrated Pest Management.

Irretrievable commitments Applies to losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is allocated to a no-harvest prescription. If the allocation is changed to allow timber harvest, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible commitments Decisions causing changes which cannot be reversed. For example, if a roadless area is allocated to allow timber harvest and timber is actually harvested, that area generally cannot, at a later date, be allocated to Wilderness. Once harvested, the ability of that area to meet Wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as minerals and cultural resources.

Issue A point, matter, or section of public discussion or interest to be addressed or decided.

Beginning of Glossary

K

Karst A type of topography that develops in areas underlain by soluble rocks, primarily limestone. Dissolution of the subsurface strata results in areas of well-developed, surface drainage that are sinkholes, collapsed channels, or caves.

L

Lacustrine wetland Includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salinities of less than 0.5 percent. Typically, there are extensive areas of deep water and there is considerable wave action.

Land allocation The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

Land exchange The conveyance of non-Federal land or interests to the United States in exchange for National Forest System land or interests in land.

Land Use Designation (LUD) (As used in the 1979 Tongass Land Management Plan:) General management direction applied to a Value Comparison Unit or group of Value Comparison Units. These four land use designations are defined as follows.

LUD 1. Forest Service recommended Wilderness areas, most of which became Wilderness through the 1980 Alaska National Interest Lands Conservation Act. In general, these undeveloped areas are managed for solitude and primitive types of recreation, and contain unaltered habitats for plants and animal species. These areas are managed as directed in the 1964 Wilderness Act and ANILCA, as amended.

LUD 2. Lands under this designation are managed in a roadless state to retain their wildland character. Primitive recreational facilities can be built and habitat improvements for fish and wildlife are permitted. Timber harvest on these lands is limited to salvage operations to protect other resources.

LUD 3. These lands are managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives.

LUD 4. These lands are managed to provide opportunities for intensive development of resources. Emphasis is primarily on commodity, or market resources and their use. Amenity values are also provided for. When conflicts over competing resource uses arise, conflicts would most often be resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.

Land Use Designation (LUD) (As used in the 1996 Tongass Land Management Plan Revision:) A defined area of land specific to which management direction is applied. (See also Land Use Prescriptions.)

Land Use Prescriptions Specific management direction applied to a defined area of land (land use designation as defined in the Revision) to attain multiple use and other goals and objectives.

Land Utilization Project (LUP)
A unit designated by the Secretary of Agriculture for conservation and utilization under Title III of the Bankhead-Jones Farm Tenant Act (USDA Forest Service, undated, Land Areas of the National Forest System).

Landform
Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes. Major forms included are plains, plateaus, and mountains; minor forms are hills, valleys, slopes, eskers, and dunes.

Landslides
The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water-saturated.

Large Woody Debris (LWD)
Any piece of relatively stable woody material, having a diameter of four inches or greater and a length greater than three feet, that intrudes into a stream channel. Formerly called large organic debris.

Leasable minerals
Generally includes minerals such as coal, oil, gas, phosphate, sodium, potassium, oil shale, sulfur, and geothermal steam.

Lease
An authorization (usually long-term) to possess and use public lands for a fixed period of time.

Leave strips
The result of timber harvest activities where blocks of timber are left after harvest has occurred.

Locatable minerals
Includes minerals such as gold, silver, lead, zinc, copper, and mercury.

Log Transfer Facilities (LTF)
Formerly referred to as Terminal Transfer Facilities, Log Transfer Facilities include the site and structures used for moving logs and timber products from land-based transportation forms to water-based transportation forms (or vice versa).

Logging slash
The wood residue left on the ground after harvesting. It includes unused logs, uprooted stumps, broken or uprooted stems, tops, branches, and leaves.

Logging systems
Tractor. A system of log transportation in which logs are pulled from the woods to a landing by means of a crawler tractor, skidder, or similar ground-based equipment.
High-lead. A system of cable logging in which the working lines are elevated at the landing area by a rigged wooden tree or portable steel spar.
Skyline. A system of cable logging in which all or part of the weight of the logs is supported during yarding by a suspended cable.
Balloon. A system of cable logging in which the weight of the logs is counteracted by the lift provided by a lighter-than-air balloon.
Helicopter. A system of transporting logs from the woods to a landing as an external load on a helicopter.

Long-term Sustained Yield Timber Capacity (LTSY)
The highest uniform wood yield from suitable-scheduled lands that may be sustained in perpetuity consistent with the Forest Plan.

Lows
Atmospheric disturbances that can properly be considered as storms, for they bring changeable, unsettled weather that normally includes widespread, abundant, and often intensive precipitation.

LTF
See Log Transfer Facilities.

LTSY See Long-term Sustained Yield Timber Capacity.

LUD See Land Use Designation.

LUP See Land Utilization Project.

LWD See Large Woody Debris.

M

Macrophytes	Any plant species that can be readily observed without the aid of optical magnification.
Major culvert	A culvert that provides an opening of more than 35 square feet in a single installation or in a multiple installation in which the smallest opening is more than 19 square feet.
Managed stand	A stand of trees in which stocking level control is applied to achieve maximum growth.
MAI	See Mean Annual Increment.
Management Area	Combinations of adjacent Value Comparison Units having common management direction, as defined in the 1979 Tongass Land Management Plan.
Management concern	An issue, problem or a condition which constrains the range of management practices identified by the Forest Service in the planning process.
Management direction	A statement of multiple-use and other goals and objectives, the associated land use prescriptions, and standards and guidelines for attaining them.
Management Implementation Reduction Factor (MIRF)	An adjustment made to the timber outputs of the FORPLAN computer model to account for anticipated effects on timber availability that cannot be accounted for in the computer model. (See also Falldown.)
Management Indicators	Plant or animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent.
Management practices	The activities applied to a defined area of land (land use designation as defined in the Revision) to attain multiple-use and other goals and objectives.
Management prescription	Management practices and intensity selected and scheduled for application on a specific area (e.g., a land use designation) to attain multiple-use and other goals and objectives.
Management requirement	Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water and diversity, to be met in accomplishing National Forest System goals and objectives. (See 36 CFR 219.17)
Mariculture	The cultivation of plants and animals in saltwater, with no freshwater component. Mariculture does not include anadromous fish farming.
Marine systems	Of, or belonging to, or caused by, the sea.
Maritime climate	Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation.

Mass-wasting	A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also, mass movement.
MBF	Thousand Board Feet.
MCF	Thousand Cubic Feet.
Mean Annual Increment (MAI)	The total increment to a given age in years, divided by that age.
Memorandum of Understanding (MOU)	An agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.
Microclimate	The temperature, moisture, wind, pressure, and evaporation (climate) of a very small area that differs from the general climate of the larger surrounding area.
Middleground	The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape. The area is located from 1/4 to 3-5 miles from the viewer. (See Foreground and Background.)
Mineral development	The activities and facilities associated with extracting mineral deposits.
Mineral entry	Filing a mining claim on public land to obtain the right to mine any minerals it may contain. Also the filing for a mill site on Federal land for the purpose of processing off-site minerals.
Mineral exploration	The search for valuable minerals on lands open to mineral entry.
Mineral lease	A lease which authorizes the development and production of leasible minerals from public lands.
Mineral production	The extraction of mineral deposits.
Mineral rights	The rights of one who owns the mineral estate (subsurface).
Mineral soils	Soils consisting predominantly of, and having its properties determined by, mineral matter. These soils usually contain less than 20 percent organic matter, but can contain an organic surface layer up to within 20 inches of the surface.
Mineral withdrawal	A formal designation by the Secretary of Interior which precludes entry or disposal of mineral commodities under the mining and/or mineral leasing laws.
Mining claims	A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.
MIRF	See Management Implementation Reduction Factor.
Mitigate	To lessen or make minimal the severity. For cultural resources, to lessen or minimize an adverse effect upon a cultural resource listed on or eligible for the National Register of Historic Places. The two categories of mitigation most often used are project modification and data recovery.

Mixed conifer In Southeast Alaska, mixed conifer stands usually consist of the following species: western hemlock, mountain hemlock, Alaska yellow-cedar, redcedar, and Sitka spruce. Shorepine may occasionally be present depending on individual sites. Redcedar is not usually in mixed conifer stands on the Chatham or Stikine areas.

MMBF Million Board Feet.

MMCF Million Cubic Feet.

Modal Relating to the statistical mode.

Model An idealized representation of reality developed to describe, analyze, or understand it; a mathematical representation of the relationships under study (e.g., FORPLAN, wildlife habitat capability models).

Moderately well-drained soil Water in these soils is removed from them somewhat slowly, so that the profile is wet for a small, but significant, part of the time.

Modification See Visual Quality Objectives.

Moisture regime The variation of moisture content in a specified portion of soil during the year.

Monitoring Gathering information and observing results of management activities to provide a bass for the periodic evaluation of the Forest Plan.

Mop-up Following suppression activities to stop the spread of the fire, the business of extinguishing the fire is called mop-up.

MOU See Memorandum of Understanding.

Multiple-aged stands An intermediate form of stand structure between even- and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

Multiple use The management of all the various renewable surface resources of the National Forest System so that they are used in the combination that will best meet the needs of the American people; harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources.

Muskeg See Peatland.

N

National Cooperative Soil Survey (NCSS)
A program consisting of a joint effort of cooperating Federal agencies, land-grant universities, and other state and local agencies to map soils, collect soil data, interpret the maps and data, and promote their use. Federal leadership is provided by the National Resource Conservation Service.

National Environmental Policy Act of 1969 (NEPA)
An act declaring a National policy to encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Fire Management Analysis System (NFMAS)
A broad umbrella process to help fire managers identify the most efficient fire program meeting the direction in the Forest plan. This includes information for the planning record on program composition, annual programmed costs, emergency fire fighting costs, expected resource impacts, and net value change.

National Forest Management Act (NFMA)
A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest Plans.

National Forest System (NFS) Land
Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, or Purchase Units, or other lands under the administration of the Forest Service.

National Register of Historic Places
A register of cultural resources of national, state, or local significance, maintained by the Department of the Interior.

National Wild and Scenic River System
Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition.

Native selection
Application by Native corporations formed under authority of the Alaska Native Claims Settlement Act of 1971 (ANCSA - Public Law 92–203, 85 Stat. 688) and by Native individuals (under Section 14(h)(5), ANCSA) to the USDI Bureau of Land Management (BLM) for conveyance of a portion of lands withdrawn under ANCSA in fulfillment of Native entitlements established under ANCSA. Native village corporations had three years from the date of ANCSA (December 18, 1971) to make their selections and regional corporations had four years. Native individuals who met the criteria had two years from the date of ANCSA to make application under Section 14(h)(5). BLM regulations allowed Native corporations formed under ANCSA to select in excess of their entitlements to ensure sufficient land would be available to meet full entitlement. Remaining lands in excess of entitlement which have been selected but not conveyed will revert back to unencumbered National Forest System land status after full entitlement is reached.

Net public benefit
The overall long-term value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index.

Beginning of Glossary

Net sawlog volume — Trees suitable in size and quality for producing logs that can be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

Net willingness-to-pay — The amount that a person would have paid for an activity above and beyond what the person actually did pay for that activity.

NIC — See Non-interchangeable Components.

No action alternative (Alternative 9) — The most likely condition expected to exist in the future if current management direction were to continue unchanged.

No adverse effect — When the effect on a cultural resource would not be considered harmful to those characteristics that qualify the property for inclusion in the National Register.

Noncommercial species — Tree species that have no economic values at this time nor anticipated timber value within the near future.

Non-declining even flow — A policy governing the volume of timber removed from a National Forest, which states that the volume planned for removal in each succeeding decade will equal or exceed that volume planned for removal in the previous decade.

Non-development LUD's — Land use designations that do not permit commercial timber harvest and generally maintain the integrity of the existing old-growth ecosystem.

Nonforest land — Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc.

Non-interchangeable Components — Non-interchangeable components (NIC's) are defined as increments of the suitable land base and their contribution to the allowable sale quantity (ASQ) that are established to meet Forest plan objectives. NIC's are identified as parcels of land and the type of timber thereon which are differentiated for the purpose of Forest plan implementation. The total ASQ is derived from the sum of the timber volumes from all NIC's. The NIC's cannot be substituted for each other in the timber sale program.

> **NIC I. Normal Operability**: This is volume scheduled from suitable lands using existing logging systems. Most of these lands are expected to be economic under projected market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchaser to gain a profit from his/her investment and labor. This is the best operable ground.
>
> Normal operability includes those systems most frequently used on the Tongass. These systems are tractor, shovel, standard cable and some helicopter.
>
>> **Tractor** - Tractor logging includes all ground wheel or track system used for skidding logs to a landing. Shovel yarding is included; however, tractor or rubber-tire skidding used in conjunction with swing operations are not included.
>> **Standard Cable** - The most typical logging systems used on the Tongass. Included in the standard cable system component are highlead uphill, highlead downhill, slackline, running skyline, and flyer.
>> **Standard Helicopter** - Helicopter yarding with yarding distances up to three quarters of a mile.

NIC II. Difficult and Isolated Operability: This is volume scheduled from suitable lands that are available for harvest using logging systems not in common use in Southeast Alaska. Most of these lands are presently considered economically and technologically marginal.

Difficult operability includes those systems used on the Tongass which have significantly higher cost. These may include balloon, long-span skyline, multi-span, or helicopter with yarding distances greater than three-quarters of a mile. This category also includes lands which have limited access as a result of being isolated by prior harvest activities or other management activities.

Long Span Cable - Cable systems which require longer than average yarding distances. Typical long span cable systems considered are standing skylines and multispan.
Access Limitation - Logging systems required for areas with access limitation concerns. The logging system could be highlead cable when access to timber and roading is difficult. Typical harvest systems are helicopter and swing operations.
Isolated Operability - This class is comprised entirely of isolated stands. These are small stands of isolated timber which are extremely difficult to harvest. The harvest system could vary, but would be more costly due to the location of the stand. Typical harvest systems are helicopter with average yarding distances greater than one mile.

Nonmarket value

Products derived from National Forest resources that do not have a well-established monetary (market) value, for example, wilderness, wildlife. (Noncash economic benefits.)

Nonpoint source (pollution)

Unlike point sources of water pollution, nonpoint sources are diffuse and can come from any land area. Nonpoint sources of water pollution originate from many undefinable sources such as agricultural and urban runoff, runoff from construction activities, and runoff from forestry practices. Nonpoint source pollutants are generally carried over or through the soil and ground cover via storm flow processes. The following activities are potential nonpoint sources of pollution; reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvest operations, surface drainage, and road construction and maintenance from which there is natural runoff. Best Management Practices are recognized as control mechanisms for nonpoint source pollution.

Nunatak

An isolated hill or peak which projects through the surface of a glacier.

O

Objectives	The precise steps to be taken and the resources to be used in achieving goals.
Off-Highway Vehicle (OHV)	Any vehicle which is restricted by law from operating on public roads for general motor vehicle traffic. Includes motorbikes, minibikes, trailbikes, snowmobiles, dunebuggies, all-terrain vehicles, and four-wheel drive, high clearance vehicles (FSM 2355.01). Sometimes referred to as Off-Road Vehicle or “ORV”.
OHV	See Off-Highway Vehicle.
Old-growth forest	Ecosystems distinguished by the later stages of forest stand development that differs significantly from younger forests in structure, ecological function, and species composition. Old-growth forest is characterized by a patchy, multi-layered canopy; trees that represent many age classes; large trees that dominate the overstory, large standing dead (snags) or decadent trees; and higher accumulations of large down woody material. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.
Old-growth associated species	Plant and animal species with habitat relationships that exhibit a strong association with old-growth forests.
Old-growth habitat reserve	A contiguous unit of old-growth forest habitat to be managed to maintain the integrity of the old-growth forest ecosystem.
Open road density	The length of forest development roads open for public access and use per unit area of land; usually expressed as miles of open road per square mile of land.
Operability	See Non-interchangeable Components.
Operation and maintenance costs	Costs associated with operating and maintaining facilities, program management, and support costs associated with management of other resources.
ORACLE	A relational database management system software package.
Order three inventory	A level of soil surveys made for extensive land uses that do not require precise knowledge of small areas or detailed soils information. Such survey areas are usually dominated by a single land use and have few subordinate uses. This information can be used in planning for range, forest, recreational areas, and similarly extensive land uses and in community planning.
Order four inventory	A soil survey level made for extensive land uses that require general information for broad statements concerning land-use potential and general land management. This information can be used in locating, comparing, and selecting suitable areas for major kinds of land use in regional land-use planning, and in selecting areas for more intensive study and investigation.
Ordinary high water mark	The mark along the bank or shore up to which the presence and action of the nontidal water are common and usual, and so long continued in all ordinary years, as to leave a natural line impressed on the bank or shore and indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics. (Consult 11 AAC 53.900 — Alaska Code.)

Organic soils	Soils which contain a high percentage (greater than 15 percent) of organic matter throughout the soil depth.
ORV	Off-Road Vehicle. (See Off-Highway Vehicle.)
Other forest land	Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions.
Output	The measurable goods, end products, or services resulting from management activities that are purchased, consumed, or used directly by people.
Overflow	High runoff which overflows natural stream and river banks. Also known as flooding.
Overmature	The stage at which a tree declines in vigor and soundness, for example, height growth has usually stopped and probability of mortality is high.
Overselection	Unconveyed lands selected in excess of entitlement. Overselections by the State of Alaska are authorized in Section 906 (f), ANILCA. They are authorized for Native Corporations organized under ANCSA in Federal Regulations (43 CFR 2650).
Overstory	The portion of trees in a forest which forms the upper most layer of foliage.

P

Palustrine wetland Includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 percent.

Parent material The unconsolidated, and more or less chemically weathered, mineral or organic matter from which soils develop.

PAOT See Persons-at-one-time.

Partial cut Any cutting in which only part of the stand is harvested. This may include thinning, selection, shelterwood, or an overstory removal.

Partial retention See "Visual Quality Objectives."

Parts per million (PPM) A measurement of concentration indicating the quantity of a substance per unit volume of a solution.

Parturient Of or relating to giving birth.

Payments to states A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that state. This is returned to the State for use on roads and schools.

Peak flow The highest discharge of water recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flows. Also called maximum flow.

Peatland A wetland type (also called "muskeg") in Southeast Alaska that has developed over thousands of years in depressions, or flat areas on gentle to steep slopes. These bogs have poorly drained, acidic, organic soils materials that support vegetation that can be either sphagnum moss or herbaceous plants or sedges, rushes, and forbs or may be a combination of sphagnum moss and herbaceous plants. These vegetation types may have a lesser abundance of shrubs and stunted trees.

Personal use Personal use refers to the green or dried timber that residents may harvest free of charge for personal use, and not for sale, from National Forests in Alaska. The amount of material granted to any one person in one year shall not exceed 10,000 board feet of saw timber and 25 cords of wood or an equivalent volume in other forms (36 CFR 223.10).

Persons-at-one-time Used to measure how many people at one time can use a recreation facility.

pH The degree of soil acidity or alkalinity.

Plan of operations A plan of operations is required from anyone whose proposed operations, under the 1872 Mining Law, would cause, "significant surface disturbance." See 36 CFR 228, Subpart A.

Plan period The period of time a Forest Plan is in effect, normally 10 years, but no longer than 15 years.

Planning area The area of the National Forest System controlled by a decision document.

Planning horizon The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

Planning period Generally one decade. The time interval within the planning horizon that is used to show incremental changes to yields, costs, effects, and benefits.

Planning records A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

Plant association Climax forest plant community type representing the endpoint of succession.

Plant communities An assemblage of plants that, in general, occur together on similar site conditions.

Point source (pollution) A point at which pollution is added to a system, either instantaneously or continuously. An example is a smokestack.

Pole An immature tree between 5 and 9 inches diameter breast height.

Pollution The presence of matter or energy whose nature, location, or quantity produces undesired environmental effects.

Pond log value Selling value minus manufacturing costs. Pond log values are the price a timber buyer would pay for a log at the mill site.

Poorly drained soils Water in these soils is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Population The actual number of animals or plants present in an area at a certain time that share a common gene pool.

Population viability Probability that a population will persist for a specified period of time across its range despite normal fluctuations in population and environmental conditions.

Positive control The condition that exists when fish and other mobile species are enclosed in an escape-proof barrier for rearing and other clams (bivalves) or aquatic plants are managed for cultivation in unenclosed water.

Potential yield The maximum, perpetual, sustained-yield harvest attainable through intensive forestry on regulated areas considering the productivity of the land, conventional logging technology, standard cultural treatments, and interrelationships with other resource uses and the environment.

PPM See Parts per million.

Practicable In reference to the Alaska Coastal Management Program, consistent with enforceable policies of approved management programs unless compliance is prohibited based upon the requirements of existing law applicable to the Federal agency's operations.

Present Net Value (PNV) The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

Prescribed fire — A wildland fire burning under planned conditions to accomplish specific land and resource objectives. It may result from either a management or natural ignition.

Preservation — A technique of conservation which maintains the resource in or on the ground in perpetuity.

Prevention of Significant Deterioration (PSD) — The process incorporated in the Clean Air Act which requires emission limitations for certain new or modified sources. (See also Class II Area.)

Primary stream production — Results from photosynthesis by green plants. In streams, includes production from algae and aquatic plants, and from non-stream sources such as leaf litter.

Primary succession — Vegetation development initiated on newly formed soils or upon surfaces exposed for the first time (as by landslides or retreating glaciers) which have, as a consequence, never borne vegetation before. Any succession beginning on a bare area not previously occupied by plants or animals.

Priority use — A Forest Service commitment to the holder of a permit for outfitting and guiding to give priority consideration to granting the holder a specific amount of available future use.

Process Group — A combination of similar channel types based on major differences in landform, gradient and channel shapes. (A full description of process groups is located in Appendix D of the Forest Plan.)

Productive old growth — Old-growth forest capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

Programmatic Environmental Impact Statement — The document disclosing the environmental consequences of a program or plan which guides or prescribes the use of resources, allocates resources, or establishes rules and policies in contrast to disclosure of the environmental consequences of a site-specific project.

Programmed timber harvest — Timber harvest that occurs on suitable forested lands and that is chargeable to (contributes to) the Allowable Sale Quantity.

Project — One or more site-specific activities designed to accomplish a specific on-the-ground purpose or result.

Proponent — An agency, institution, or individual applying to perform an activity on National Forest System lands under authority of a mining plan of operation, contract, license, special use authorization, or other agreement.

PSD — See Prevention of Significant Deterioration.

Public issue — A subject or question of widespread public interest relating to management of the National Forest System.

Public participation — Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service planning.

Purchase unit A unit designated by the Secretary of Agriculture or previously approved by the National Forest Reservation Commission for purposes of Weeks Law acquisition (USDA Forest Service, undated, Land Areas of the National Forest System).

Purchaser road credit Credit earned by the purchaser of a National Forest timber sale by construction of contract-specified roads. Earned "effective" purchaser credit may be used by the purchaser as payment for National Forest timber removed.

R

Real dollar value

A monetary value which compensates for the effects of inflation.

Reburial and reinterment

The replacement of disinterred human remains into the ground or otherwise disposing of such remains in a manner likely to approximate the wishes of the deceased (e.g., placement in burial caves, legal cemeteries, surface mortuary structures, or cremation where traditionally practiced).

Reconstruction

Road or trail construction activities which take place on an existing road or trail and raises the standard of the road or trail. This can include relocation of the facility in a completely new location.

Recreation capacity

The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the resources.

Recreation Opportunity Spectrum (ROS)

A system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area and the relative density of recreation use. The seven classes are:

Primitive. An unmodified environment generally greater than 5,000 acres in size and located generally at least 3 miles from all roads and other motorized travel routes. A very low interaction between users (generally less than 3 group encounters per day) results in a very high probability of experiencing solitude, freedom, closeness to nature, tranquillity, self-reliance, challenge, and risk. Evidence of other users is low. Restrictions and controls are not evident after entering the land unit. Motorized use is rare.

Semi-Primitive Non-motorized. A natural or natural-appearing environment generally greater than 2,500 acres in size and generally located at least 1/2 mile (greater or less depending on terrain and vegetation, but no less than 1/4 mile) but not further than 3 miles from all roads and other motorized travel routes. Concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a high probability of experiencing solitude, freedom, closeness of nature, tranquillity, self-reliance, challenge, and risk. There is a minimum of subtle on-site controls. No roads are present in the area.

Semi-Primitive Motorized. A natural or natural-appearing environment generally greater than 2,500 acres in size and generally located within 1/2 mile of primitive roads and other motorized travel routes used by motor vehicles; but not closer that 1/2 mile (greater or less depending on terrain and vegetation, but no less than 1/4 mile) from better-than-primitive roads and other motored travel routes. Concentration of users is low (generally less than 10 group encounters per day), but here is often evidence of other users. There is a moderate probability of experiencing solitude, closeness to nature, and tranquillity along with a high degree of self-reliance, challenge, and risk in using motorized equipment. Local roads may be present, or along saltwater shorelines there may be extensive boat traffic.

Roaded Natural. Resource modification and utilization are evident, in a predominantly naturally-appearing environment generally occurring within 1/2 mile (greater or less depending on terrain and vegetation, but no less than 1/4 mile) from better-than-primitive roads and other motorized travel routes. Interactions between users may be moderate to high (generally less than 20 group encounters per day), with evidence of other users prevalent. There is an opportunity to affiliate with other users in developed sites but with some chance for privacy. Self-reliance on outdoor skills is only of moderate importance with little opportunity for challenge and risk. Motorized use is allowed.

Roaded Modified. Vegetative and landform alterations typically dominate the landscape. There is little on-site control of users except for gated roads. There is moderate evidence of other users on roads (generally less than 20 group encounters per day), and little evidence of others or interactions at campsites. There is opportunity to get away from others but with easy access. Some self-reliance is required in building campsites and use of motorized equipment. A feeling of independence and freedom exists with little challenge and risk. Recreation users will likely encounter timber management activities.

Rural. The natural environment is substantially modified by land use activities. Opportunity to observe and affiliate with other users is important as is convenience of facilities. There is little opportunity for challenge and risk and self-reliance on outdoor skills is of little importance. Recreation facilities designed for group use are compatible. Users may have more that 20 group encounters per day.

Urban. Urbanized environment with dominant structures, traffic lights and paved streets. May have natural appearing backdrop. Recreation places may be city parks and large resorts. Opportunity to observe and affiliate with other users is very important as is convenience of facilities and recreation opportunities. Interaction between large numbers of users is high. Outdoor skills, risk, and challenge are unimportant except for competitive sports. Intensive on-site controls are numerous.

Recreation places
Identified geographical areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Recreation Visitor Day (RVD)
A measure of recreation use of an area. One recreation visitor day consists of 12 hours of recreation use of a site or area. Recreation visitor days are used to measure recreation production or output capacity.

Reducing soil condition
An environment in the soil conducive to the removal of oxygen and chemical reduction of ions caused by saturated soil conditions.

Reforestation
The natural or artificial restocking of an area usually to produce timber and other wood products, but also to protect watersheds, prevent soil erosion, and improve wildlife, recreation and other natural resources. Natural reforestation includes site preparation to reduce competing vegetation and provide a mineral seed bed for seed provided by seed trees. Artificial reforestation is the planting of seedlings, cuttings or seeds by hand or mechanical means and may include site preparation.

Beginning of Glossary

Regeneration treatment — Treatments and activities that relate to the re-establishment of stands of trees. Includes planting, seeding, and preparing the ground for seeding from adjacent stands where ground preparation is not necessary.

Regulated volume — The quantity of timber in the allowable sale quantity that is based on the growth and yield projections for growing stock.

Rehabilitation — Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time.

Research design — A statement of work to be done toward a particular goal. The research design details what will be done, how it will be done, what is required to do it, and why it is important or useful to do the work .

Research Natural Area (RNA) — An area in as near a natural condition as possible, which exemplifies typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for scientific and educational purposes; commercial and most public uses are not allowed.

Reserve — A general term for an area of land recognized for, and managed to preserve or maintain, specific natural features. Wilderness is one common example. In the context of wildlife or fish habitat management, or biological diversity, an area set aside for the maintenance and perpetuation of its habitat or ecosystem features. (See also Old-growth habitat reserve and Non-development LUD's.)

Reserve trees — Live or dead trees that are retained for various resource objectives such as wildlife, structural diversity, etc.

Resident fish — Fish that are not migratory and complete their entire life cycle in fresh water.

Resource values — The tangible and intangible worth of forest resources.

Responsible official — The Forest Service employee who has the delegated authority to make a specific decision.

Restoration — The long-term placement of land back into its natural condition or state of productivity.

Retention — The amount of commercial forest land removed from the timber base to protect other resource values.

Revegetation — The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding.

Riffles — Shallow rapids in an open stream, where the water surface is broken by waves caused by wholly or partially submerged obstructions.

Right-of-Way — An easement, license, or permit to pass through another person's land. It does not grant an estate of any kind, only the right to use.

Riparian area — The area including a stream channel, lake or estuary bed, the water itself, and the plants that grow in the water and on the land next to the water.

Riparian corridor The floodplain and associated riparian soils, vegetation, and wetlands.

Riparian ecosystem Land next to water where plants that are dependent on a perpetual source of water occur.

Riparian management area Land areas delineated in the Forest Plan to provide for the management of riparian resources. Specific standards and guidelines, by stream process group, are associated with riparian management areas. Riparian management areas may be modified by watershed analysis.

Riverine wetland A category in wetland classification which includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent.

RNA See Research Natural Area.

Road density The number of road miles per square mile of land area.

Roadless area An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Road Maintenance Level Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria (FSH 7709.58, section 12.3).

Maintenance Level 1. Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.

Maintenance Level 2. Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration.

Maintenance Level 3. Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Maintenance Level 4. Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.

Maintenance Level 5. Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-laned and paved, or aggregate surfaced with dust abatement.

Road management objectives Define the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria.

ROS See Recreation Opportunity Spectrum.

ROS existing The ROS setting in place, regardless of the official inventory.

ROS inventoried A general inventory of the physical, social and managerial setting for recreation, based on remoteness from modern human development and activity, modification of the land, and social factors such as crowding. (See Recreation Opportunity Spectrum.)

Rotation The planned number of years between the formation or the regeneration of a crop or stand of trees and its final cutting at a specified stage of maturity.

Rotation age The age of a stand when harvested at the end of a rotation.

RPA Forest and Rangeland Renewable Resources Planning Act.

RPA Assessment and Program The RPA Assessment is prepared every ten years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The RPA Program is prepared every five years to chart the long-term course of Forest Service management of the National Forests, assistance to State and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) (16 U.S.C. 1601).

Rubble All accumulations of loose angular rock fragments, commonly overlying outcropping rock.

Rural development Rural Development is the management of human, natural, technical, and financial resources needed to improve living conditions, provide employment opportunities, enrich the cultural life, and enhance the environment of rural America. In the National Forest System, rural development is accomplished through partnerships.

S

Saleable minerals Include common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. In general, these minerals are of wide-spread occurrence and are of relatively low unit value. They are generally used for construction materials and for road building purposes.

Salvage harvest Removal of dead or dying trees resulting from insect and disease epidemics or wildfire.

Saturated soils Soil condition where all the spaces between soil particles are filled with water.

Sawlogs (Sawtimber) That portion of a tree that is suitable in size and quality for the production of dimension lumber, collectively known as sawtimber.

Scoping Determination of the significant issues to be addressed in an environmental impact statement.

Scree An accumulation of loose stones or rock debris lying on a slope or at the base of a cliff.

Scrub-shrub wetland Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.

Second growth Forest growth that has regenerated naturally or has been planted after some drastic interference (for example, clearcut harvest, serious fire, or insect attack) with the previous forest growth.

Secondary channel Lateral channel with an axis of flow roughly parallel to the mainstem and fed by the mainstem.

Secondary stream production Results from consumption by animals of materials produced in primary production in streams; this includes production of macroinvertebrates and some fish species.

Secondary succession The process of reestablishing vegetation after normal succession is disrupted by fire, cultivation, lumbering, windthrow, or any similar disturbance.

Sediment Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Seed tree Small number of seed-bearing trees left singly or in small groups after timber harvest to provide seed for regeneration of the site.

Selection cutting A silvicultural system used to create or maintain uneven-aged stands, usually by the periodic removal of groups of trees or individual trees. It is undertaken to provide periodic harvests while maintaining full residual stand growth rates. It attempts to develop a balanced uneven-aged stand structure, including the encouragement of regeneration by providing the cultural measures needed for tree growth and seedling establishment. The selection system refers to the programs used to create or maintain the stand, while the selection method refers to the way in which the stand is regenerated. The cutting usually involves a mixture of regeneration and improvement cuts. Note that selection cutting is not the same thing as selective cutting (logging). See also Selective cutting.

Selective cutting

A system in which groups of trees or individual trees are removed periodically from the forest based on economic criteria aimed at maximizing logging revenues rather than the need to ensure satisfactory regeneration or to maintain stand growth rates and quality of timber production.

The term is often used synonymosly with selection cutting, but this is seldom correct, since the management goals of the two systems differ. Selective cutting provides periodic revenues from the forest but is not specifically designed to improve the growing conditions of the trees remaining.

The practice of selective cutting has historically resulted in the selection of all the biggest and best trees for cutting, leaving behind a silvicultural slum of damaged trees and degraded ecosystem functions. See also High grade; Selection cutting.

Sensitive species

Plant or animal species which are susceptible or vulnerable to habitat alterations or management activities resulting in a viability concern for the species long-term persistence. Sensitive species may be those species under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the Regional Forester as needing special consideration to assure viable populations and to prevent their being placed on Federal or state lists.

Sensitive travel route

A road system or marine water way which receives a moderate to high degree of use by the public, both Alaskan residents and tourists.

Sensitivity level

A measure of the people's concern for the scenic quality of the National Forest applied to travel routes, use areas, and water bodies.

Sensitivity zone

A body of land which has been classified on the basis of cultural and environmental data, as having a high, medium, or low likelihood for containing cultural resources.

Settlement sale

The disposition of timber or other national forest products, cut, damaged or destroyed in conjunction with an authorized occupancy of a right-of-way or other use of National Forest Land. In wilderness it would be the sale of timber removed from an inholding access road or privately developed hatchery site. Also, the compensation of the United States for property taken or rendered unusable for other purposes incidental to some lawful use of National Forest land. When timber has a value, clearing the land for some use other than growing timber constitutes a forced sale.

Shelterwood harvest

The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

SHPO

See State Historic Preservation Officer.

Side-slope break

The abrupt change (usually decreases) in slope gradient defining the upper limit of channel incision.

Significant change

(Soils) Change in productivity of the land as indicated by changes in soil properties that are expected to result in a reduced productive capacity over the planning horizon. Based on available research and current technology, a guideline of 15 percent reduction in inherent soil productivity potential is used as a basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with areal extent limits, will serve as an early warning signal of reduced productive capacity. A more stringent basis than 15 percent can be used where appropriate and documented.

Significant impairment (Soils) Changes in the productivity of the land as indicated by changes in soil properties which would result in significant changes in the inherent productive capacity that last beyond the planning horizon.

Significant surface disturbance (Mining operations) changing the above-ground environment so much that returning that site to the condition it was in before the change is difficult or impossible. Road construction, use of mechanical earthmoving equipment including backhoes and bulldozers, construction of buildings, and cutting of timber are all examples of activities that are considered to cause significant disturbance to surface resources. An evaluation of proposed operations must be made on a case-by-case basis to determine if disturbance is considered significant. For example, a mining activity in an alpine area may result in significant disturbance that takes years to reclaim while the same activity conducted at a lower elevation where natural conditions are not as severe may result in a disturbance that would take only a few months to successfully reclaim.

Silvicultural system A management process whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the process. (See single-tree selection, shelterwood cutting, group selection, even-aged management, uneven-aged management, two-aged management, and clearcut.)

Silviculture The science and art of growing and tending crops of forest trees to attain the desired level of marketable and unmarketable products.

Single-tree selection A cutting method to develop and maintain uneven-aged stands by removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

Site index A measure of the relative productive capacity of an area for growing wood. Measurement of site index is based on height of the dominant trees in a stand at a given age.

Site preparation Removing unwanted vegetation and debris from a site and preparing the soil before reforestation.

Site-potential tree height The average height of a given species of tree when mature on a given site.

Site productivity Production capability of specific areas of land.

Skyline logging See “Logging systems”.

Slash Debris left after logging, pruning, thinning, or brush cutting, and large accumulations of debris resulting from windstorms. It includes logs, bark, branches, and stumps.

Slope distance Distance measured along the contour of the ground.

Slough A section of an abandoned river channel containing stagnant water and occurring on a flood plain or delta.

Smolt A young silvery-colored salmon or trout which moves from freshwater streams to saltwater.

Snag A non-living standing tree usually greater than 5 feet tall and 6 inches in diameter at breast height. The interior of the snag may be sound or rotted.

Soil conservation practices Practices that are mechanisms used to protect soil quality while managing for other resource goals and objectives. They can be administrative, preventive or corrective measures. They are identified during project planning and design.

Soil drainage The rapidity and extent of the removal of water from the soil, in relation to additions especially by surface runoff and by flow through the soil to underground spaces.

Soil mass movement See mass movement.

Soil productivity The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil quality standards Standards that are a combination of 1) "threshold" values for severity of soil property alteration, or significant change in soil properties conditions, and 2) areal extent of disturbance.

Soil Resource Inventory (SRI) An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

Somewhat poorly drained soil Water in the soil is removed from the soil slowly enough to keep it wet for significant periods but not all of the time.

Special habitats Structural elements of ecosystems. These may include, but are not limited to: snags, spawning gravels, fallen trees, aquatic reefs, caves, seeps, and springs.

Special Interest Areas A designation for areas possessing unique or unusual scenic, historic, prehistoric, geodesic scientific, or other characteristics.

Special Use Authorization A permit, term permit, temporary permit, lease, or easement that allows occupancy or use of, or rights and privileges on National Forest System lands.

Special Use Permit Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

Specified Road Those roads including related transportation facilities and appurtenances, listed in timber sale contracts for construction or reconstruction by the timber purchaser in accordance with locations and specifications provided by the Forest Service. Those Forest Development roads planned for recurrent land management uses and for which the timber sale contract species the location, standards, and specifications.

Speleothem Any secondary mineral deposit or cave formation that is formed by the action of water. Examples are stalagmites, stalactites, flow stone, bacon rind drapery, helictites, soda straws, and crystal growths.

Split lines The process of separating the direction of timber harvest yarding into opposite directions.

SRI See Soil Resources Inventory.

Stabilization The process of arresting the deterioration of a damaged cultural resource in order to prevent further damage from occurring. Stabilization may include reconstructing portions of the cultural resource.

Stand A group of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the trees in adjoining areas.

Standard A course of action or level of attainment required by the forest plan to promote achievement of goals and objectives.

State Historic Preservation Officer (SHPO) The official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act of 1966, as amended, to administer the State Historic Preservation Program.

State selection (from National Forest System lands) Application by Alaska Department of Natural Resources to the USDI Bureau of Land Management for conveyance of a portion of the 400,000 acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under authority of Section 6(a) of the Alaska Statehood Act of 1959 (Public Law 85-508, 72 Stat. 340). For lands to be conveyed, State selections must be approved by the USDA Forest Service, Regional Forester, Alaska Region under criteria of the Statehood Act. Until approved by the Regional Forester, the State application is not considered a valid selection. The State can select up to 25 percent in excess of its remaining entitlement.

Strata The aggregation of areas with similar resource conditions into broad categories for analysis purposes. The term is most commonly used for categorizing forested areas.

Stratigraphic Depositional units or layers of sediment distinguished by composition or appearance that are associated with archaeological and historic sites.

Stream bed The substrate plane bounded by the stream banks, over which the water column moves. Also called the stream bottom.

Stream bank The portion of the channel cross section that restricts lateral movement of water at normal water levels. The bank often has a gradient steeper than 45 degrees and exhibits a distinct break in slope from the stream bottom. An obvious change in substrate may be a reliable delineation of the bank.

Stream class A means to categorize stream channels based on their fish production values. There are four stream classes on the Tongass National Forest. They are:

Class I. Streams and lakes with anadromous or adfluvial fish habitat; or high quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II. Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III. Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV. Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on

downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.
Non-streams. Rills and other watercourses, generally intermittent and less that 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

Streamflow The discharge of water from a watershed that occurs in a natural stream channel.

Stream order First order streams are the smallest unbranched tributaries; second order streams are initiated by the point where two first order streams meet; third order streams are initiated by the point where two second order streams meet, and so on.

Structure A term in ecology referring to the arrangement of plant communities or ecosystems across a landscape and how they are connected, and to variations in tree heights and diameters within a stand or between stands.

Subsistence Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Subspecies An aggregate of similar populations of a species generally inhabiting a geographic subdivision of the range of the species and differing taxonomically (e.g. different size or color) from other populations of the species.

Substrate The size of rock in the bed (bottom) of rivers and streams.

Suitable forest land Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

Supplemental Funds Funds or materials used to finance the additional cost of a road to a higher standard than is needed for a timber sale, and which cannot be legally paid for by purchaser credits.

Suppression The act of extinguishing or confining a fire.

Surface rights All rights in the surface of the land except oil, gas, and other mineral or subsurface rights.

Suspended sediment The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

Sustained yield The amount of renewable resources that can be produced continuously at a given intensity of management.

Swale A slight, marshy depression in generally level land. A depression in glacial ground moraine.

T

Taxa For the purposes of this Plan and FEIS, taxa are animal species or sub-species.

Temporary facility Any structure or other human-made improvement which can be readily and completely dismantled and removed from the site when the authorized use terminates.

Temporary roads Low-level roads constructed for a single purpose and short-term use. Once use of the road has been completed, it is obliterated, and the land it occupied is returned to production.

Tentatively suitable forest land Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Terrestrial ecosystems Plant communities that are not dependent on a perpetual source of water to grow.

Thinning The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand for wildlife or other purposes. Thinning may be done at two different stages:

> **Precommercial.** Removing trees that are too small to make a merchantable product to improve tree spacing and promote more rapid growth.
> **Commercial.** Removing trees that have reached sufficient size to be manufactured into a product to improve tree spacing and promote more rapid growth.

Threatened species A plant or animal species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

Threshold The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

Tiering Elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.

Timber A general term for the major woody growth of vegetation in a forest area.

Timber classification Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource. The following are definitions of timber classifications used for this purpose.

> **Nonforest.** Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

Forest. Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.
Suitable. Land to be managed for timber production on a regulated basis.
Unsuitable. Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.
Commercial forest. Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

Timber dispersion When an opening created from a final timber harvest is no longer considered an opening for the purpose of scheduling adjacent timber harvest. This is often expressed as the maximum amount of disturbance in a watershed at any given time.

Timber harvest schedule The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan.

Timberlands Forest lands producing or capable of producing crops of industrial wood. Areas qualifying as timberland can produce more than 20 cubic feet per acre per year of industrial wood at culmination of mean annual increment.

Timber production The purposeful growing, tending, harvesting, and regeneration of trees for industrial or consumer use.

Timber Stand Improvement (TSI) All noncommercial intermediate cuttings and other treatments to improve composition, condition, and volume growth of a timber stand.

Timed meander A proven floristic survey method where the surveyor enters the field, records the time, and records all species, while moving through the unit in a meandering search path covering all habitat variations. If after a certain time no new species are found, the survey is considered complete.

Tongass Resource Use Cooperative Survey(TRUCS) A study done to gather information on subsistence uses of the Forest.

Top filing The filing of a future selection application by the State of Alaska, subject to valid existing rights, for lands which are not available for selection on the date of filing. If otherwise valid, these applications become an effective selection, without further action by the state, upon the date included lands become available for selection. Top filings for the State of Alaska are authorized by Section 906(e), ANILCA.

Total stream discharge Total water outflow from stream or river.

Traffic Service Level (TSL) Describes a road's significant traffic characteristics and operating conditions. The levels reflect a number of factors, such as speed, travel time, traffic interruptions, freedom to maneuver, safety driver comfort, convenience, and operating costs. These factors, in turn, affect design elements such as number of lanes, turnout pacing, lane widths, type of driving surface, sight distances, design speed, clearance, horizontal and vertical alignment, curve widening, and turnarounds.
TSL A. Reflects transportation efficiency and mobility with few interruptions to flow and a stable smooth driving surface.
TSL B. Generally would have alignment more influenced by topography, more interruptions but still usually a stable smooth driving surface.

TSL C. One could expect much more sinuous alignment to reduce construction costs with a surface that may not be stable under all traffic or weather conditions.
TSL D. Generally constructed for a single purpose and traffic is discouraged for other purposes; surface and alignment is rough and irregular; very low speeds are anticipated to be able to safely negotiate the road.

Transportation and Utility System (TUS) Significant corridors, with their associated sites used to accommodate public transportation and energy transmission needs.
Avoidance Area. An area where the establishment and use of transportation or utility corridors and sites is not desirable given the land use designation emphasis. A search for "windows" should be exhausted before TUS facilities are considered in avoidance areas. When practical, these areas should be avoided through site-specific analysis during project-level planning. Avoidance areas often include Congressionally and administratively designated areas. Although special environmental and procedural considerations may be required for these areas, these special designations do not preclude consideration and use as a TUS. Avoidance areas are designated through the allocation of lands to management prescriptions specifically identified as TUS avoidance areas in their standards and guidelines.
Exclusion Area. A large area (large enough to cause significant barriers) which legislatively precludes transportation and utility systems. Due to special authorities provided in Title XI, ANILCA, there will be no exclusion areas on the Tongass.
Window. An area potentially available for the location of transportation or utility corridors and sites.

Transportation/Utility corridor A linear strip of land identified for the present location of transportation or utility rights-of-way within its boundaries (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning).

Travel management Providing for the safe, environmentally responsible, and customer responsive movement of vehicles and people to and through public lands (social attributes).

TRUCS See Tongass Resource Use Cooperative Survey.

Trust A right of property, real or personal, held by one party for the benefit of another (Black 1979).

TSI See Timber Stand Improvement.

TSL See Traffic Service Level.

TTRA Tongass Timber Reform Act of 1990.

Turbidity An expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a water sample; turbidity in water is caused by the presence of suspended matter such as clay, silt, finely divided organic and inorganic matter, plankton, and other microscopic organisms.

TUS See Transportation and Utility System.

Two-aged management A silvicultural method in which the majority of the trees in a harvest unit are cut in one entry, and the rest are left as residual trees, either singly or in patches. The residual trees remain unharvested to provide structural diversity and older-aged trees within the second-growth stand. See "Two-aged System" in the Timber Forest-wide Standards & Guidelines for guidance.

Type conversion The act of converting a plant community from one vegetative type to another. In forestry, it is the act of changing the existing dominant tree species from one type to another.

U

Ultramafic soil A soil that is very low in silica and rich in iron and magnesium.

Unconfined streams Streams that, due to lack of stream incision, and effects of geomorphic landform characteristics and local geologic conditions, result in streams overflowing their banks, changing flows to other channels, and establishing new channels during flood conditions.

Understory vegetation Grass, small trees, shrubs, and other plants found beneath the overstory (the trees comprising the forest).

Undertaking In cultural resources, any project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal Agency or be licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106, National Historic Preservation Act of 1966, as amended.

Uneven-aged management The application of actions needed to maintain high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree and group selection.

Unprogrammed timber harvest Timber harvest that occurs on unsuitable forested lands and is not chargeable to (does not contribute to) the Allowable Sale Quantity.

Unsuitable lands Forest land not managed for timber production because: 1) Congress, the Secretary, or the Chief has withdrawn it; 2) it is not producing or capable of producing industrial wood; 3) technology is not available to prevent irreversible damage to soils productivity, or watershed conditions; 4) there is no reasonable assurance, based on existing technology and knowledge, that it is possible to restock lands within 5 years after final harvest; 5) there is, at present, a lack of adequate information about responses to timber management activities; or 6) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan.

Unsuppressed A fire that remains unextinguished or unconfined. The spread has not been halted.

Upland Not immediately adjacent to a stream.

Utility volume Logs that do not meet minimum requirements for sawtimber but are suitable for the production of usable chips.

Utilization standards Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (DBH), top of the tree inside the bark (top DIB), and the percentages of “soundness” of the wood.

V

VAC	See Visual Absorption Capability.
Valid	Having legal strength or force, executed with proper formalities, incapable of being rightfully overthrown or set aside (Black 1979).
Valley	An elongated, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.
Valley bottom	A general term for the nearly level to gently sloping part of a valley. Also referred to as the valley floor.
Value Comparison Unit (VCU)	First developed for the 1979 Tongass Land Management Plan as distinct geographic areas that generally encompass a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. There are 926 units established to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.
VCU	See Value Comparison Unit.
Vegetation release	The freeing of vegetation (grass, forbs, brush, trees) by eliminating the competition for nutrients, water, and sunlight. Once competition for these items has been eliminated, subdued, or stagnated, vegetation will display vigor and growth.
Veneer log	A log considered suitable in size and quality for producing veneer which is a thin sheet of wood of uniform thickness.
Very poorly drained soils	Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites and are frequently ponded.
Viable population	For forest planning purposes a fish or wildlife population which has the estimated number and distribution of reproductive individuals to insure its continued existence is well distributed in the National Forest.
Viewshed	An expansive landscape or panoramic vista seen from a road, marine water way or specific viewpoint.
Visual Absorption Capability (VAC)	The capability of the landscape to visually absorb management activities. Landscapes are rated with high, moderate or low abilities to absorb management activities. These ratings reflect the degree of landscape variety in an area, viewing distance and topographic characteristics. As an example, steep, evenly sloped landscapes viewed in the foreground to middleground are typically given a low VAC rating.
Visual Quality Objective (VQO)	A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape. **Inventory VQO.** Derived through application of the USDA Visual Management System. Uses three elements to determine the inventory: Sensitivity levels, distance zones and landscape variety class. Provides a benchmark and illustrates the optimum objective based on current use patterns and sensitivity.

Adopted VQO. The VQO to be achieved as a result of management direction identified in the approved forest plan. Adopted VQO's represent the visual resource objective for the Forest Land Management Plan period, normally 10 years. (FSH 2309.22, R-10 Landscape Management Handbook.)
Preservation. Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.
Retention. Management activities are not evident to the casual Forest visitor.
Partial Retention. Management activities may be evident, but are subordinate to the characteristic landscape.
Modification. Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).
Maximum Modification. Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

V-Notches

A deeply incised valley along some waterways that would look like a “V” from a frontal view. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

Volume strata

Divisions of old-growth timber volume derived from the interpreted timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium, and high) are recognized in the Forest Plan for each Administrative Area.

VQO

See Visual Quality Objective.

W

WAA
See Wildlife Analysis Area.

Watershed
The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

> **Third order watershed.** A watershed where there are (generally) two major branches to the mainstream of the watershed. (Also see Stream order.)
>
> **Fourth order watershed.** A watershed which contains at least two third order watersheds.

Watershed analysis
A systematic procedure for characterizing and evaluating ecological processes within a watershed, for use in ecosystem management and project planning. Forest Plan Appendix J characterizes watershed analysis from an aquatic perspective.

Water table
The upper surface of the ground water or that level below which the soil is saturated with water.

Well-drained soils
Water is removed from the soil readily, but not rapidly.

Wetlands
Areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include peatlands, muskegs, marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs.

WFUD
See Wildlife and Fish User Day.

Wild and Scenic Rivers
Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act. Wild and scenic rivers may be classified and administered under one or more of the following categories:

> **Wild river areas.** Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
>
> **Scenic river areas.** Rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
>
> **Recreational river areas.** Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness
Areas designated by congressional action under the 1964 Wilderness Act or subsequent Acts. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historic value as well as ecologic and

	geologic interest. On the Tongass National Forest, Wilderness has been designated by ANILCA and TTRA.
Wildfire	Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.
Wildlife Analysis Area	A division of land used by the Alaska Department of Fish and Game for wildlife analysis (WAA).
Wildlife and Fish User Day (WFUD)	One Wildlife and Fish User Day (WFUD) consists of 12 hours of recreation viewing or utilizing fish or wildlife.
Windfirm	Trees not likely to be blown over by the wind. These are usually trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features or other trees.
Windthrow	The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There are generally three types of windthrow - endemic where individual trees are blown over; catastrophic where a major windstorm can destroy hundreds of acres; and management related, where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.
Windthrow management area	A managed area designed to minimize windthrow within an adjacent no-harvest area.
Winter range	An area, usually at lower elevation, used by big game during the winter months; usually smaller and better-defined than summer ranges.
Withdrawal	The withholding of an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws for the purpose of limiting activities under those laws in order to maintain other public values in the area.

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