Organized Village of Kake
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(Federally Recognized Tribal Government serving the Kake, Alaska area)

February 28, 2019

Sonny Perdue, Secretary of Agriculture
U.S. Department of Agriculture
1400 Independence Avenue, SW
Washington, DC 20250

Dear Honorable Secretary Perdue:

On behalf of the Organized Village of Kake (OVK), a Tribal Cooperating Agency, please accept this cover letter, track-changes and comments in the preliminary Draft Environmental Impact Statement (DEIS) Word document, and associated attachments referenced in the DEIS as OVK's official comments. The hurried and poorly written DEIS indicates how rushed this rulemaking is and needs to take more time to reflect all the concerns of the indigenous people who actually live in the Tongass National Forest and face the most adverse impacts from the proposed action. (the summary of 144,000 comments was only shared 3 weeks ago). As track-changed on page D-5, timber does not employ Kake and it hasn't in over 20 years. Government, education, and tourism are the main sustainable employment opportunities in Kake.

Our future generations are the basis of the Kake Lingit stewardship of our lands since time immemorial. With increased threats to and from their environment, our children will bear the impacts of this rule-making process. The protection of the ecological integrity of these lands for future generations should be the most important aspect of the Alaska Roadless Rule process; these lands are worth more intact and standing than fragmented and cut down. As explained at the Cooperating Tribal Agency meeting on 2/14/2019 in Juneau, an overwhelming majority (approx. 95%) of the comments received by the USFS from Southeast Alaskans supported application of the roadless rule on the Tongass

Alternatives
OVK from the beginning supported Alternative 1 and still supports the no-action alternative.

- Alternative 1 (no action) or Alternative 2 should be the only alternatives considered for the preferred alternative since they are the only alternatives consistent with public input as documented by the Forest Service.
    - Official written scoping comment summary, public scoping comment summary (attached)

- Alternatives 2, 3, and 4 should be changed so they do NOT exempt any roaded roadless lands extensions near communities where a majority of the public comments express support for the roadless rule; i.e., no lands should be exempted within 50 miles of a community that commented in support of the roadless rule.

    - OVK requests co-management authority over all management activities allowed within Kake territory under all Alternatives (see attached OVK Community Use Area map).
    - The traditional use areas of communities such as Kake, that commented heavily in support of the no action alternative, should receive complete roadless protections under all alternatives.
    - For Kake, this encompasses all the lands from Seymour Canal to Cape Decision, with documented traditional use areas including lands on: Admiralty Island, the mainland around Hobart Bay, Port Houghton, Farragut Bay, and Windham Bay, Kupreanof Island, Keku

Islands, and all roadless portions of Kuiu Island, including Port Camden, Saginaw, Kadake Bay and Creek, Three-mile Arm, Rocky Pass, and East Kuiu (see attached map).

- Alternative 3, 4, and 5 should be modified to include all roadless rule protections for T77/TNC ecological priority areas. The ecological value of Kake's traditional use areas is documented through traditional ecological knowledge, as well as the conservation assessment conducted by the Nature Conservancy, and the Tongass 77 (T77) proposal to protect the most productive salmon producing watersheds still at risk from logging on the Tongass National forest. The following watersheds in Kake's traditional use areas are also T77/TNC 'ecological priority areas'; many of them were allocated by the Forest Service to 'Development LUDs' and at risk of being opened to industrial timber harvest and roadbuilding under Alternatives 3, 4, 5, and 6.
    - Mainland between Port Houghton and Farragut Bay, the center and south of Kupreanof Island, Port Camden and east Kuiu, Security Bay, Washington Bay, and Bay of Pillars.
    - These areas must absolutely receive roadless protections.

- **Alternative 6 should be eliminated** because it does not meet the stated purpose and need and is unnecessary since the applicable mining laws and regulations (and not the roadless rule) govern access to mining claims on the Tongass.
- The DEIS should be consistent about how it treats LUD II lands across each alternative. Right now, some alternatives appear to include LUD II lands as having 'roadless' protections, while other alternatives do not. What is the purpose of these different management designations? This is misleading and makes it difficult to compare the effects between alternatives.
    - DEIS (2-4): Alternatives 2 and 4 designate LUD II acreage as Alaska Roadless Areas; Alternative 3 removes LUD II areas from roadless designation as a means of "eliminating confusion and ensuring congressional intent". The Forest Service lacks authority to change permanent Congressional designations for lands "chosen for special management because of their critical importance for fish and wildlife habitat and their high value to tourism and recreation." These lands must be managed in a roadless state to retain wildland character." **Why is the FS removing Roadless protections from lands for which the congressional intent is for the lands to be "maintained in a roadless state** to preserve their wilderness character"?

Cultural heritage

- The FS should undertake a study of the written and oral history of the Alaska Native communities directly affected by this proposed Alaska Roadless Rule to ensure it is consistent with the traditional uses of the land as desired by the adjacent communities to these areas.
    - The community of Kake and OVK, since time of contact, have advocated for the conservation and use of all resources on our traditional lands. Our uses are well documented throughout the 1800's and in government documents starting in 1912, historical Tongass proceedings such as the Hanna hearings of 1944, through today as we try and protect what we have left in and around Kake.
- The Idaho Roadless Rule identifies certain areas as "Special Areas of Historic or Tribal Significance." The AKRR should do the same for areas around Alaska Native communities, places of importance for our cultural or subsistence uses and resources. These areas should include restrictions for commercial timber harvest (with allowances for roads and harvest for cultural purposes).
    - In Kake, we depend on Red and Yellow cedar stands that surround the remaining road system around the village. Red and Yellow cedar trees are an important cultural resource and are experiencing mass die-off due to climate change and environmental stressors. It is crucial to protect this habitat from more intensive stressors, such as increased roadbuilding or industrial logging.

Specific Areas

- There are traditional use areas around Kake of particular importance to our culture and spirituality, our customary & traditional (subsistence) harvest, and customary use; increased protections are needed for all these areas. No commercial logging and no roadbuilding should be allowed in the following high-value subsistence and demonstrated traditional use areas. These areas are essential to the Tribe's ability to "Strengthen Tribal Community and Culture" of Tribal citizens, which is our stated mission. These lands need to be maintained in a roadless state to preserve and enhance our subsistence areas and traditional uses of the land.
- These areas are:
    - Keku Islands (VCU 3980)
    - Kadake Bay and Creek (VCU 4210)
    - Three-mile Arm (VCU 4190, 4280)
    - Port Camden (VCU 4200)
    - Rocky Pass (VCU 4280)
    - East Kuiu Roadless Area (VCUs 4160, 4170, 4180)
    - Security Bay (VCU 4000)
    - Rowan Bay (VCU 4020)
    - Saginaw Bay (VCU 3990)
    - Washington Bay (VCU 4010)
    - Bay of Pillars (VCU 4030)
    - Seclusion Bay (VCU 4180)
    - No Name Bay (VCU 4170)
    - Reid & Alvin Bays (VCU 4160)
    - All of central and Southern Kupreanof Island (VCUs 4270, 4280, 4290, 4400, 4380, 4360, 4350, 4320, 4300, 4310, 4330, 4340).
    - Mainland around Windham Bay, Port Houghton, Hobart Bay, and Farragut Bays (VCUs 4830, 680, 690, 700, 710, 760, 770, 790, 800, 840, 830, 820, 850, 860, 870, 890, 880, 900)
    - The Legislated LUD II lands on Kupreanof and Kuiu Islands should remain protected from logging and roadbuilding according to their congressionally designated intent.
- Protecting the remaining productive, intact, old growth habitat of Kake's traditional use areas is essential for the continued viability of Kake's subsistence harvest, ability to adapt to climate change, and cultural traditions.
    - We are observing the effects from previous clear-cuts and industrial logging in low salmon runs and small deer populations that are very slow to rebound.
- Central North Kupreanof would experience an increase in suitable old growth timber acreage under every alternative. However, considering the recovering nature of the area from past clearcutting and the vicinity to Kake, we request that this area receive full protection from additional road buildings under any new iteration of the rule.

Requests for an Alaska Roadless Rule

OVK reaffirms its support for the no action alternative because it is the best option for Kake and our Tribal citizens. However, if any action alternative is selected as the preferred alternative, the following provisions should be incorporated into the alternatives:

- OVK requests that the Forest Service update the 1995 Tongass inventory used to define inventoried roadless areas and include approximately 350,000 acres that were excluded from the 2001 rule due to assumed logging development that did not occur
- The road connection between Kake and Portage Bay should be completed to increase ferry services and subsistence harvest opportunities for community members. We urge the Forest Service to maintain the roads they already have and build those that are important for community uses, not those used for industrial logging.

- Any iteration of an Alaska Roadless Rule needs to include provisions for workforce development of local youth and utilization of local labor for Forest Service projects on adjacent lands, such as restoration, wildlife and timber thinning, stream and habitat restoration in the Petersburg Ranger district. Collaborative partnerships and indigenous resource stewardship contracts should be prioritized.
- Microsales should be developed to support local small-scale timber operators and sawmills.
- Carbon credits have been heavily discussed in the region with the ANC's, where is this in the DEIS?

Any questions or concerns you have with this letter and associated attachments please contact the OVK Executive Director Dawn Jackson at ed@kake-nsn.gov or (907) 785-6471 ext. 111.

Gunalcheesh,

Joel Jackson per

Joel Jackson
President

Attachments

- Goldschmidt Haas (1998) Haa Aani map of Kake's traditional use areas (historically attached to OVK's comments with USFS the past 3 decades at least)
- Scoping meeting summary(s)
- OVK Community Use Area map
- OVK Letter to Forest Supervisor Stewart (Sept. 7, 2018)
- OVK Comments on Proposed Rule (Oct. 10, 2018)
- OVK Res. No. 2018-24
- Letter to Sec. Perdue seeking Government-to-government Consultation (Feb. 5, 2019)
- OVK request for extension ~ AK Specific Roadless Rule (Jan. 31, 2019)
- Dawson studies
- Alaska DOT letter closing out Kake Access Project (2016)

Rulemaking for Alaska Roadless Areas

Preliminary Draft Environmental Impact Statement

February 2019

Lead Agency:	USDA Forest Service
Cooperating Agency:	State of Alaska; Angoon Community Association; Central Council Tlingit and Haida Indian Tribes of Alaska; Hoonah Indian Association; Hydaburg Community Association; Organized Village of Kake; and Organized Village of Kasaan.
Responsible Official:	Sonny Perdue U.S. Secretary of Agriculture
For Further Information:	Visit the Forest Web site at: https://www.fs.usda.gov/roadmain/roadless/alaskaroadlessrule or Contact: Mary Snieckus Alaska Roadless Program Leader akroadlessrule@fs.fed.us https://www.fs.usda.gove/project/?project=54511

Abstract

Following receipt of a petition from the State of Alaska, in June 2018, the USDA Secretary directed the Forest Service to begin working to develop an Alaska state-specific roadless rule under the Administrative Procedures Act. The state-specific roadless rule would establish a land classification system designed to conserve roadless area characteristics on the Tongass National Forest while accommodating timber harvest and road construction/reconstruction activities that are determined to be needed for forest management, economic development opportunities, and the exercise of valid existing rights or other non-discretionary legal authorities.

This Preliminary Draft Environmental Impact Statement (PDEIS) responds to the Secretary's direction by analyzing six alternatives for amending the Plan, including the No Action Alternative. Three key issues are identified: 1) the protection of roadless area characteristics from road development and timber harvest activity; 2) the Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors; and 3) the protection of terrestrial and aquatic wildlife habitat and biodiversity from road development and timber harvest activities. The six alternatives provide a range of options for addressing these issues. Direct, indirect, and cumulative effects of the alternatives are compared and disclosed in Chapters 2 and 3.

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Executive Summary

The Forest Service has prepared an environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations. This Preliminary Draft EIS (PDEIS) discloses the potential environmental consequences that might result from the proposed action and alternatives.

Background

Inventoried Roadless Areas

Inventoried Roadless Areas (IRAs) in the Alaska Region include 9.2 million acres (57 percent) of the Tongass National Forest. Including Wilderness, Land Use Designation (LUD) II designated areas, and National Monument areas, the Tongass National Forest is currently more than 90 percent undeveloped and unavailable for timber harvest and road building. Developed areas cover about 1.3 million acres, or about 8 percent, of the Tongass. Southeast Alaska residents (approximately 73,000) are, for the most part, surrounded by land that has many of the characteristics of wilderness. Routine travel and ordinary outdoor recreation activities typically require a higher degree of skill, risk-taking, and self-reliance than is usually required of adventurous backcountry visitors on other National Forests.

Several characteristics of IRAs on the Tongass are unique relative to other areas in the National Forest System (NFS). 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 IRAs exceeding 1 million acres, and thus represent large, unfragmented wildlife habitats and exceptional opportunities for solitude. Many of the Tongass IRAs represent wildlife habitats, ecosystems, and visual character, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forests, ice fields, and glaciers that exist nowhere else in the NFS. Many of these areas are remote and difficult to access for primitive recreation and many contain other important resources, such as timber, minerals, and salmon-producing streams.

The Roadless Area Conservation Rule (2001 Roadless Rule) was adopted into regulations at Title 36 of the Code of Federal Regulations (CFR) Part 294 (36 CFR 294), Subpart B (66 *Federal Register* [FR] 3244) during January 2001. The 2001 Roadless Rule applies nationwide (except Idaho and Colorado), and incorporates inventories conducted from 1979 to 2002. It provides management direction for IRAs on 44.7 million acres of National Forests (approximately 30 percent of total National Forest System [NFS] lands) by prohibiting road construction and reconstruction and timber cutting, sale, or removal in those IRAs, with certain exceptions.

Since its promulgation, the application of the 2001 Roadless Rule in Alaska experienced extensive litigation. In 2001, the State of Alaska filed a complaint, challenging the U.S. Department of Agriculture's (USDA) promulgation of the 2001 Roadless Rule and its application in Alaska. The USDA and the State of Alaska reached a settlement in 2003, and the USDA subsequently issued a rule temporarily exempting the Tongass National Forest from the Roadless Rule. In 2011, a federal court (District of Alaska) set aside the Tongass National Forest's exemption and reinstated the 2001 Roadless Rule on the Tongass National Forest. The Alaska District Court's ruling was initially reversed by a three-judge panel of the Ninth Circuit, but the District Court's ruling was ultimately upheld in a 6–5 en banc ruling of the Ninth Circuit in 2015. Consequently, the 2001 Roadless Rule remains in effect in Alaska and the Forest Service continues to apply the 2001 National Rule to the Tongass and Chugach National Forests.

State of Alaska Petition

In January 2018, the State of Alaska submitted a petition requesting that the Secretary of Agriculture consider exempting the Tongass National Forest from the 2001 Roadless Rule. In June 2018, the USDA Secretary directed the Forest Service to begin working to develop an Alaska state-specific roadless. In August 2018, the Forest Service granted cooperating agency status to the State of Alaska. The Forest Service and the State of Alaska believe that the proposed action represents a unique opportunity to collaboratively resolve and provide certainty to the roadless issue in the State of Alaska. The Forest Service published a Notice of Intent (NOI) to prepare an EIS and initiate a public rulemaking process to address the management of inventoried roadless areas on the Tongass National Forest on August 30, 2018 (83 FR 44252). As stated in that NOI, the USDA proposes to develop a durable and long-lasting regulation for the conservation and management of roadless areas on the Tongass National Forest. The state-specific roadless rule would establish a land classification system designed to conserve roadless area characteristics on the Tongass National Forest while accommodating timber harvest and road construction/reconstruction activities that are determined to be needed for forest management, economic development opportunities, and the exercise of valid existing rights or other non-discretionary legal authorities.

Tongass Land and Resource Management Plan

The 16.7-million-acre Tongass National Forest was the first forest to complete a Land and Resource Management Plan (Forest Plan) under the National Forest Management Act (NFMA) in 1979. That Forest Plan was amended in 1986 and 1991 and revised in 1997. A final Supplemental Environmental Impact Statement (SEIS) was completed in 2003, which further evaluated roadless areas for their wilderness potential. The Forest Plan was amended in 2008 in response to a Ninth Circuit Court ruling and a 5-Year Plan Review completed in 2005.

The Forest Plan was subsequently amended in 2016 in response to a 2013 memorandum from the Secretary of Agriculture (Memorandum 1044-009, *Addressing Sustainable Forestry in Southeast Alaska* [U.S. Department of Agriculture [USDA] 2013]), which expressed the Secretary's intent for the Tongass National Forest to transition a young growth–based timber program in 10 to 15 years, more rapidly than considered in the 2008 Forest Plan. The Secretary asked that the Forest Service "[s]trongly consider whether to pursue an amendment to the Tongass Forest Plan. Such an amendment would evaluate which lands will be available for timber harvest, especially young growth timber stands, which lands should be excluded, and additional opportunities to promote and speed transition to young-growth management." Recognizing the importance of retaining expertise and infrastructure, the Secretary also stated that the Forest

Service "will continue to offer a supply of old growth timber while increasing the supply of young growth to provide industry in Alaska the opportunity to develop new markets, learn new skills, and acquire new equipment."

The current Tongass timber program is composed of a large-sale program, a small-sale program, and a firewood and personal-use program. The timber sale program has been in transition since the end of the long-term contracts. Many operators are in the process of developing direct markets for value-added products, such as molding, tongue-in-groove, paneling, and furniture. Most importantly, the Tongass has initiated a formal transition from predominantly old-growth harvest to predominantly young-growth harvest. The 2016 Forest Plan prescribes an average of 46 million board feet (MMBF) per year while transitioning to dominantly young growth harvest after about 16 years.

Purpose and Need

In response to the State of Alaska's petition for rulemaking, the USDA Forest Service and State of Alaska agree the controversy surrounding the management of Tongass National Forest roadless areas may be resolved through state-specific rulemaking. A long-term, durable approach to roadless area management is needed that accommodates the unique biological, social, and economic situation in and around the Tongass National Forest. The Tongass National Forest is unique from other national forests in respect to the size of the Tongass National Forest; the large percentage of roadless areas that comprise the Tongass National Forest; it's communities are surrounded by federal lands (the Tongass National Forest comprises almost 80 percent of Southeast Alaska); as well as Alaska and Tongass National Forest-specific statutory considerations (e.g., Alaska National Interest Lands Conservation Act [ANILCA]), Tongass Timber Reform Act [TTRA]).

The USDA and Forest Service believe that the current 2001 Roadless Rule prohibitions on timber harvest and road construction/reconstruction can be adjusted for the Tongass National Forest in a manner that meaningfully addresses local economic and development concerns while balancing roadless area conservation needs. The application of the 2001 Roadless Rule on the Tongass National Forest continues to be controversial among select governments, industries, and non-governmental organizations that claim it is a substantial contributor to declining economic activity in communities that rely on the Forest's resources for employment and income. There is a need to consider options for a state-specific roadless rule that will better incorporate the economic interest concerns and statutory concerns while conserving roadless area characteristics. The list of project objectives is provided in Table ES-1.

Table ES-1
List of Project Objectives (the Purpose)

Project Objectives
• Provide opportunities for achieving multiple-use benefits (Organic Act/Sustainable Yield) while maintaining and enhancing economic benefits to local communities.
• Further accommodate the transition to a predominantly young growth timber program on the Tongass National Forest as described in the 2016 amendment of the Forest Plan.
• Enhance the ability of the Forest Service to provide a supply of timber from the Tongass National Forest 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 (TTRA)
• Create procedures that enable Agency managers to identify, evaluate, and conserve or enhance the characteristics of Alaska roadless areas through land management planning activities.
• Support community economic opportunity and long-term sustainability.

Key Issues

The following three Key Issues were identified for the Alaska state-specific roadless rulemaking effort and this DEIS and will be carried forward throughout the analysis.

Key Issue 1 – Protection of roadless area characteristics from road development and timber harvest activity.

The Tongass National Forest includes large undeveloped geographic areas, with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large blocks of unfragmented wildlife habitats, undeveloped or natural areas, and exceptional opportunities for primitive recreation and/or solitude. This large scale of roadless lands does not exist anywhere else in the NFS, except on the Chugach National Forest in Southcentral Alaska. The majority of the Tongass National Forest is in a natural condition, unlike most other national forests, and the Forest represents a significant portion of the world's remaining temperate rainforests.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism, inherent passive use values, and ecosystem services values they provide. Passive use values represent the value that individuals assign to a resource independent of their use of that resource and typically include existence, option, and bequest values. These values represent the value that individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation, carbon sequestration, and biological diversity.

Key Issue 2 – Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors.

The Tongass National Forest comprises approximately 80 percent of Southeast Alaska and therefore plays a critical role in supporting local and regional economy, promoting economic diversification, and also enhancing rural community well-being. The visitor industry, seafood industry, and resource extraction industries contribute to local jobs and income alongside public sector employment spanning federal, state, and local government. While the visitor and seafood industries have grown to become the greatest private-sector employers across Southeast Alaska, resource extraction remains important in some rural communities where jobs are limited and unemployment is oftentimes high.

The Forest Service manages land for the multiple-use and sustained yield of all renewable resources. There is fragmentation and disagreement among the public regarding the best management of federal lands for economic development purposes and to support the overall economic vitality of Tongass National Forest communities. Many believe the visitor industry and seafood industries have become the mainstay of Southeast Alaska's economy and therefore should have prominence in Forest Service land management decision-making. Others note that resource extraction, including forest products and the minerals industry, continue to provide important jobs and income sources in remote and isolated Southeast communities. Furthermore, Southeast Alaska residents, communities, and Native tribes consistently provide reminders of the value of the Tongass National Forest for subsistence uses, recreational hunting and fishing, and independent travelers and outdoor enthusiasts – and that these activities yield economic value as well.

Key Issue 3 – Protection of terrestrial and aquatic wildlife habitat and biodiversity from road development and timber harvest activities.

The Tongass includes large, undeveloped, and natural land areas that represent large, unfragmented blocks of wildlife habitat. This scale and size of contiguous habitat is not available elsewhere in the NFS, except on the Chugach National Forest. Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. The Tongass Forest Plan Conservation Strategy was developed to maintain the integrity of the old-growth forest ecosystem, and thereby conserve biodiversity across the Forest, by retaining intact, largely undisturbed habitat. In addition, because of its predominantly undeveloped nature, a number of wide-ranging species find optimal habitat in the more remote areas of the Forest.

Fish and the aquatic resources on the Tongass National Forest support major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. The Tongass includes high-value, intact watersheds that were

designated to be managed for intact ecological values and aquatic habitat productivity, and many commenters believe these areas should be protected so that they can continue to provide the clean water and fish habitats that are essential to the ecological and economic health of the Southeast Alaska communities and residents who rely on them.

Alternatives

With the exception of the timber land suitability determinations described below under Features Common to All Action Alternatives, none of the alternatives would make any changes to the 2016 Tongass Land and Resource Management Plan (Forest Plan) including the following:

- Goals and Objectives,
- Land Use Designations or Management Prescriptions,
- Forest-wide Standards and Guidelines,
- Plan Components developed under the 2012 Planning Rule
- Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition

None of the alternatives authorize any site-specific projects or other ground-disturbing activities. Specific projects that include tree cutting, road construction, and/or reconstruction must undergo site-specific environmental analysis when they are proposed as required by NEPA. None of the alternatives considered in this DEIS waive any applicable requirements regarding site-specific environmental analysis, public involvement, consultation with tribes and other agencies, or compliance with other applicable laws.

Activities that are not otherwise prohibited are permissible in roadless areas under all of the alternatives, including the no-action alternative (2001 Roadless Rule), if not restricted by other law, regulations, and/or policies.

Features Common to all Action Alternatives

Alternatives 2, 3, 4, 5, and 6 propose to modify the timber land suitability determinations made in the 2016 Tongass Forest Plan. Specifically, lands identified as tentatively suitable that were made unsuitable solely due to roadless designation in either the “Timber Priority” Alaska Roadless Area category or that were removed from roadless would be designated as suitable for timber production. This change to the Tongass suitability determinations does not preclude future suitability determinations.

Features Common to Alternatives 2, 3, 4, and 6

Roadless Area Designation Updates

Alternatives 2, 3, 4, and 6 propose to correct and modify IRA boundaries based on ownership changes and updated mapping. Updated roadless areas would be known as Alaska Roadless Areas (AKRAs) and the Alaska Roadless Rule would only apply to those identified lands. Corrections and modifications to AKRAs that apply to Alternatives 2, 3, 4, and 6 would entail:

- Removing about 107,900 acres from roadless areas that were either misidentified in 2001, had an ownership change since 2001 due to land exchanges, or resulted from corrections due to mapping alignment issues.
- Adding about 2,300 acres to roadless areas due to changes in ownership or boundary alignment issues.
- Removing about 95,600 acres from roadless areas that currently have roads, referred to as roaded roadless. These areas were identified in the 2008 Forest Plan amendment process and subsequently updated in the 2016 Forest Plan amendment process. Roaded roadless areas have been substantially altered due to road construction and/or timber harvesting and include significantly reduced roadless area characteristics.

Roadless Boundary Correction and Modification Provisions

Alternatives 2, 3, 4, and 6 propose to provide for administrative correction and modification provisions within the Rule to streamline future boundary changes. Administrative corrections would be limited to adjustments that remedy clerical errors, typographical errors, mapping errors, improvements in mapping technology, conformance to statutory changes, or incorporation of changes due to land exchanges. The Regional Forester may issue administrative corrections after a 30-day public notice and opportunity to comment period.

Modifications would be changes to AKRA boundaries not considered to be an administrative correction. The Regional Forester would provide at least a 45-day public notice and opportunity to comment period for all modifications.

Given the size, degree of change, level of public interest, or whether regulatory impact analysis is necessary, the Chief may decide that rulemaking is warranted.

Alaska Roadless Areas Management Categories

Alternatives 2, 3, 4, and 6 provide for a variety of management approaches within roadless areas through AKRA Management Categories which include LUD II Priority, Watershed Priority, Roadless Priority, and Timber Priority. The management categories prohibit tree cutting and road construction/reconstruction with a range of exceptions (including full exception for the Timber Priority category) and are applied by varying degrees across the alternatives. A brief description of each management category follows.

LUD II Priority (Alternatives 2, 4, and 6)

The LUD II Priority management category is to ensure that congressional intent is fully met and reduce management direction confusion. Confusion is reduced by eliminating similar but different regulatory direction from the Roadless Rule and maintaining only the statutory direction. These lands will be managed in a roadless state to retain their wildland character as defined in the TTRA (Title II, Section 201) and the National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291, 128 Stat. 3729, Section 3720(e)(4)).

Approximately 855,000 acres of the Tongass National Forest is congressionally designated as LUD II (826,000 acres currently designated as IRA under the 2001 Roadless Rule and 28,000 acres currently not designated as IRA). Alternatives 2 and 4 propose to designate all congressionally designated LUD II acres as LUD II Priority AKRAs. Alternative 3 proposes to remove all LUD II areas from roadless designation as a means of eliminating confusion and ensuring congressional intent. LUD II areas under Alternative 3 will retain their congressional protections. Alternative 6 proposes to utilize the LUD II Priority management category only for LUD II areas that are currently designated as IRA and designate them as LUD II AKRAs.

Watershed Priority (Alternative 2)

The Watershed Priority management category is more protective than the 2001 Roadless Rule and provides for activities specific to aquatic habitat improvement and protection. Approximately 3,214,000 acres in Alternative 2 would be managed under this management category. No other alternative would apply the Watershed Priority management category. These are areas identified as Tongass 77 (T77) Watersheds[1] and The Nature Conservancy (TNC)/Audubon Conservation Areas.

Roadless Priority (Alternatives 2, 3, 4, and 6)

The Roadless Priority management category is similar to the 2001 Roadless Rule but is less restrictive and provides for Alaska-specific concerns. Specifically, it provides for infrastructure development to connect and support local communities, and road construction for leasable minerals. The leasable minerals exception provides for geothermal, oil, gas, and/or coal development. Oil, gas, and coal development potential is low due to the low potential for these leasable minerals. In addition, the Roadless Priority management category adds exceptions for activities that are allowed under the 2001 Roadless Rule to provide clarity and be explicit that these activities are allowed. This management category is applied to Alternatives 2, 3, 4, and 6.

Timber Priority (Alternative 4)

The Timber Priority management category excepts timber harvest and road construction/reconstruction within AKRAs to facilitate timber management. This management category applies to approximately 860,000 acres and is only proposed in Alternative 4. In other action alternatives, this management category

[1] The Tongass 77 (T77) refers to value comparison units (VCUs), which approximate major watersheds located on National Forest System lands that Trout Unlimited, Alaska Program, identified as priority salmon watersheds. Four watersheds were removed from the T77 in 2014 as a result of the Sealaska Land Entitlement Finalization in the Carl Levin and Howard P. “Buck” McKeon National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291).

is not needed because the timber management opportunity areas have been removed from AKRAs.

Alternative 1 (No Action)

This alternative is the no action alternative as required by NEPA, and reflects continuation of current management pursuant to the 2001 Roadless Rule (see large-scale color map). This alternative would continue the general prohibitions on tree cutting, sale, and removal and road construction or reconstruction within IRAs, with some of those activities permitted under certain exceptions.

Under this alternative, the roadless areas consist of IRAs identified in the 2001 Roadless Rule. These IRAs as originally mapped encompassed approximately 9.34 million acres of NFS land on the Tongass National Forest, and the provisions of the 2001 Roadless Rule would apply to those IRAs. After adjusting the boundaries due to ownership and boundary alignment corrections, these IRAs encompass 9.20 million acres of NFS land.

Alternative 2

Alternative 2 maximizes roadless acres by designating 9.22 million roadless acres in three AKRA categories: LUD II Priority, Watershed Priority, and Roadless Priority (see large-scale color map). This alternative provides for additional timber harvesting potential while maximizing roadless area protections across the Tongass National Forest. Additional timber harvest opportunities are provided by dropping roadless area protection within roadless areas that have been determined to include roads (known as roaded roadless areas). This alternative maximizes roadless area protections by adding 137,000 acres to AKRAs and applying the Watershed Priority management category. The 137,000 acres of added roadless areas are the LUD II areas not designated as roadless in 2001, small islands and areas that are currently unroaded, and unroaded areas identified in the 2016 Forest Plan amendment process that were greater than 5,000 acres. The 137,000 acres were added to AKRAs to offset the impacts of dropping 113,000 acres from AKRAs. The additional roadless protections to unroaded islands also provide for long-term continued recreational and outfitter and guide opportunities of these islands.

The Watershed Priority management category would be applied to 3,214,000 acres of roadless areas identified as T77 Watersheds and TNC/Audubon Conservation Areas. The Watershed Priority management category provides limited exceptions as provided by the 2001 Roadless Rule and ensures activities needed for fisheries protection, maintenance, or improvement could occur.

Alternative 2 would convert a net of 18,000 old-growth acres and 10,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Alternative 3

This alternative designates 8.10 million roadless acres into one category of AKRAs: Roadless Priority (see large-scale color map). Alternative 3 provides for more additional timber harvest opportunities than Alternative 2 while maintaining roadless area protections as much as feasible. Additional timber harvest opportunities are provided through the dropping of roadless areas from roaded roadless areas and extending areas dropped from roadless protection to areas most likely to be considered for timber harvesting, areas adjacent to existing road systems. The areas removed from roadless protection were considered to be the

logical extensions of the existing road and harvest systems, which was generally defined as the nearest watershed boundary (ridgeline of a 14th-field hydrologic unit) from an existing road system. These areas were removed based on the premise that the logical extension from the existing infrastructure is the most likely location for future timber harvest and would have the least impact while providing for additional timber opportunities.

Alternative 3 also adds 108,000 acres to AKRAs. These added roadless areas are small islands and areas that are currently unroaded, and unroaded areas identified during the 2016 Forest Plan amendment process that were greater than 5,000 acres. The additional roadless protections to unroaded islands also provides for long-term continued recreational and outfitter and guide opportunities of these islands.

Alternative 3 proposes a net decrease of 1.10 million roadless acres, as compared to the no action alternative. Roadless protection would be removed from the 826,000 LUD II acres that are currently within an IRA. This change in management accounts for a large share of the drop in roadless area acres that would occur under this alternative. Alternative 3 proposes to remove all LUD II areas from roadless designation as a means of eliminating confusion and ensuring Congressional intent. LUD II areas under Alternative 3 would retain their congressional protections and would continue to be managed “in a roadless state to retain their wildland character” (USDA Forest Service 2016a).

Alternative 3 would convert a net of 68,000 old-growth acres and 12,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Alternative 4

Alternative 4 designates 8.98 million roadless acres into three categories of AKRAs: LUD II Priority, Roadless Priority, and Timber Priority (see large-scale color map). This alternative was developed to provide for a high level of timber management opportunities while maintaining protection for Scenic Viewsheds, T77 Watersheds, and TNC/Audubon Conservation Areas. This alternative manages the AKRAs in Timber Production and Modified Landscape LUDs, as identified in the Forest Plan, under the Timber Priority AKRA category and converts them to suitable timber lands. In addition, the roaded roadless and logical extension areas dropped from roadless protection under Alternative 3 would also be removed from roadless protection under Alternative 4.

Additionally, Alternative 4 adds 31,000 acres to AKRAs. These added roadless acres are LUD II areas that were not designated as roadless in 2001. No other lands would be added to AKRAs.

Alternative 4 proposes a net decrease of 224,000 roadless acres, as compared to the no action alternative. However, if the Timber Priority category lands are added to the non-roadless acres, the net decrease would be 1.08 million acres. Alternative 4 would convert a net of 158,000 old-growth acres and 15,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Alternative 5 (Full Exemption)

This alternative is the full exemption alternative, as requested in the State of Alaska’s petition. As such, it removes all 9.20 million acres of IRA acres on the Tongass from roadless protection.

Alternative 5 would add the following provision into the "Scope and Applicability" section of the 2001 Roadless Rule:

> "This subpart does not apply to road construction, road reconstruction, or the cutting, sale, or removal of timber in inventoried roadless areas on the Tongass National Forest."

The alternative would convert a net of 167,000 old-growth acres and 20,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Alternative 6

This alternative designates 6.91 million roadless acres into two categories of AKRAs: Roadless Priority and LUD II Priority (see large-scale color map). Alternative 6 maximizes timber management opportunities by removing Timber Production, Modified Landscape, and Scenic Viewshed LUDs identified in the Forest Plan from roadless protection, including T77 Watersheds and TNC/Audubon Conservation Areas within those development LUDs. In addition, areas with mineral potential as defined by the "minerals overlay" defined in the Forest Plan are removed from roadless protection.

Alternative 6 proposes a net decrease of 2.29 million roadless acres, as compared to the no-action alternative, and would convert a net of 167,000 old-growth acres and 17,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Comparison of the Alternatives

This section briefly compares the environmental consequences of the five alternatives with respect to the significant issues described in Chapter 1. This comparison is based on the effects analyses presented in Chapter 3.

Key Issue 1 – Protection of roadless area characteristics from road development and timber harvest activity.

Roadless area protection can be defined in terms of both the acres designated as roadless and the degree of protection provided by the specific variations of the roadless rule language. In terms of acres designated, Alternatives 1 and 2 provide the highest degree of protection with over 9.2 million acres designated and Alternative 5 provides the lowest with zero acres designated. Alternative 6 removes all roadless designations within development LUDs and has the second lowest number of acres designated roadless with 6.9 million acres. Alternatives 3 and 4 are intermediate in terms of the acres designated roadless. However, the roadless protection provided in development LUDs by Alternative 4 is much lower than for Alternative 3 because all Timber Priority AKRAs under Alternative 4 are in development LUDs. In addition, the removal of roadless protection from LUD II acres accounts for a large share of the drop in roadless area acres under Alternative 3. These acres would continue to retain their congressional protections and be managed in a roadless condition.

The roadless rule language under Alternative 1 would be unchanged from the 2001 Roadless Rule, the rule language would be modified under Alternatives 2, 3, 4, and 6, and it would be eliminated under Alternative 5. The proposed Roadless Priority and LUD II Priority categories would be very slightly more

permissive in terms of road construction, timber harvest, and mineral development, and would be slightly more permissive in terms of energy and transportation project development. The Watershed Priority category would be slightly less permissive relative to all of these development types and the Timber Priority category under Alternative 4 would be substantially more permissive in terms of these types of development, especially timber harvest and road construction.

As a result, Alternatives 1, 2, and 3 would provide the most roadless protection. Alternative 1 would protect the most acres and existing management direction would provide the highest degree of protection, with the existing general prohibitions remaining in place for all areas. Alternative 2 would offer similar levels of protection, with a small net gain in total roadless acres. The roaded roadless acres that would be dropped under this alternative have limited roadless characteristics, and increased protection would be added for Watershed Priority AKRA areas. Alternative 3 would offer the next most protection. Roaded roadless and logical extension areas would be dropped under this alternatives (as well as LUD II areas), and all AKRAs would be managed as Roadless Priority. Alternatives 4 to 6 would provide the least amount of roadless protection, with Alternative 5 removing all acres from roadless protection.

Key Issue 2 – Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors.

Support for Southeast Alaska resource-based industries and local/regional socioeconomic well-being is compared among the alternatives by industry/category in the following subsections.

Forest Products Industry

The 2016 Forest Plan established an average annual PTSQ of 46 MMBF prior to the young-growth transition. The old-growth contribution to the PTSQ is expected to start out high and decrease over time as more young growth becomes economic to harvest. During the first decade, an average of about 12 MMBF of young growth and 34 MMBF of old growth was expected to be sold. From Year 11 through Year 15 an average of about 28 MMBF of young growth and 18 MMBF of old growth were expected to be sold annually. Old-growth volume offered was projected to decrease until it reaches 5 MMBF per year (expected to occur about Year 16), at which point it is to be stabilized at 5 MMBF per year to support small operators and specialty products such as wood for musical instruments. Young growth sales are expected to continue to increase at a rapid rate after Year 16 and are expected to reach an upper limit of 98 MMBF about Year 18. If less than the average annual figure of 46 MMBF is sold in the early years of a decade, the Forest Plan allows the difference to be added to the sale quantity for the remainder of the decade. During the initial two years of the 2016 Forest Plan, the total volumes sold were 30.7 MMBF (fiscal year 2017) and 9.0 MMBF (fiscal year 2018), substantially lower than the PTSQ annual rate.

None of the action alternatives would result in changes to the PTSQ and the timber objectives of the Forest Plan would continue to require transitioning to

primarily young-growth harvest. Therefore, harvest levels are not expected to vary significantly among the alternatives. However, the alternatives do vary in terms of the amount and location of acres suitable for timber production. Greater acreage of suitable land would provide greater flexibility in the selection of future timber sale areas, as well as the potential for more flexibility in sale design, depending on the planning areas selected. This improved flexibility could, in turn, potentially improve the Forest Service's ability to offer economic sales that meet the needs of industry. This greater flexibility could be especially beneficial during the first two decades of the 2016 Forest Plan (the transition period), when most old-growth harvest would take place.

Under Alternative 1, about 230,000 acres of old growth and 334,000 acres of young growth are suitable for timber production. The young-growth suitable acres would increase only slightly (3 to 6 percent) under the action alternatives. For old growth, however, the suitable acreage increase would range from 8 percent for Alternative 2 to 72 percent for Alternatives 5 and 6. For Alternatives 3 and 4 the increase would be 29 percent and 69 percent, respectively. Suitable old-growth acres would be added in three broad categories or areas: roaded roadless (Alternatives 2 to 6); logical extension areas (Alternatives 3 to 6); and areas more distant from roads (Alternatives 4 to 6). The added suitable acres in areas where roads already exist or could be logically extended are generally considered relatively economic to harvest due to their locations along or near existing transportation systems. The additional more distant acres added under Alternatives 4 to 6 are further from transportation systems and less likely to be economic to harvest or improve the Forest's ability to offer economic sales.

Recreation and Tourism

Changes in land management have the potential to affect outfitter/guide operations that provide commercial recreation opportunities on the Forest. Impacts to existing outfitter/guide use are likely to be greatest where changes in roadless protections allow development in remote areas that are used for outfitter/guide activities dependent on high scenic integrity and undisturbed landscapes. Changes in roadless area protections could also affect outfitter/guide use in other adjacent or nearby areas as outfitter/guides displaced from one location seek other places to take clients. Some use areas are presently at capacity, which could serve to exacerbate potential displacement effects. Long-term changes in roadless area management could affect the Forest's ability to meet future outfitter/guide demand, especially for operators seeking more remote areas.

The outfitter/guide analysis prepared for this EIS used changes in suitable old-growth acres in conjunction with information on existing outfitter/guide use to help focus on potentially affected areas. The resulting analysis identified 15 outfitter/guide use areas where potential conflicts between existing outfitter/guide use and future management could occur. In most of these areas, existing outfitter/guide use occurs near areas where development has occurred in the past, either near or along shorelines and/or Forest road systems. Similarly, in most cases, harvest that could already occur in these areas (under Alternative 1) has the potential to conflict with existing outfitter/guide use. In most of these areas, by expanding the acres available for harvest, Alternatives 4 to 6 could add to these potential impacts by increasing the number and geographic extent of the acres affected.

Salmon Harvesting and Processing

None of the alternatives are expected to have a significant change to the commercial fishing or fish-processing industries over the planning period. Riparian Management standards and guidelines established in the 2016 Forest Plan would remain in place under all of the alternatives. While there would be some variation in the level of protection, these variations are not expected to affect the fishing industry. The future of the fishing industry in Southeast Alaska is more likely to depend upon occurrences outside of the Tongass National Forest such as hatchery production, offshore harvest levels, and changes in ocean conditions.

Mining and Mineral Development

Locatable minerals development is possible within roadless areas under all alternatives. The General Mining Act of 1872 authorizes and governs prospecting and mining for economic minerals on federal public lands, including roadless areas. Changes in roadless management are, therefore, not expected to affect existing or future locatable mineral exploration or mining activities on the Forest.

Roadbuilding is, however, currently prohibited for any new leasable mineral projects, including geothermal projects, within IRAs. Changes in management under Alternatives 2 to 6 would allow road development to differing degrees. However, the Tongass has no current leasable mineral activity and the anticipated demand for leasable minerals is expected to remain low. As a result, changes in roadless management are expected to have limited impacts on related economic activity.

Infrastructure Development

With some exceptions, federal and state road development is presently limited in IRAs. Exceptions include roads with reserved or outstanding rights, roads provided for by statute or treaty, or road development related to a Federal Aid Highway. Roadless protection would be removed to various degrees under the action alternatives with corresponding implications for regional highway development. In most cases, changes in roadless management, as well as changes in the number of acres managed as roadless, would be more permissive with respect to regional road systems.

None of the alternatives are expected to substantially affect the development of energy projects or related infrastructure. Removing roadless designations in areas under Alternatives 2 through 6 would simplify the process for projects but would not necessarily result in an increase in the number of projects developed. In areas where new roadless areas are added or expanded, the permitting process could be more complicated, but projects would not be prohibited.

Key Issue 3 – Protection of terrestrial and aquatic wildlife habitat and biodiversity from road development and timber harvest activities.

Old-Growth Habitat

Relative to old-growth habitat conservation, all of the alternatives would have old-growth harvest levels similar to the level predicted by the selected alternative

(Alternative 5) of the Forest Plan Final EIS (USDA Forest Service 2016b). There may be slightly more high-volume and large-tree productive old growth (POG) harvested under the action alternatives than was predicted for the Forest Plan selected alternative because of the increased options for creating positive timber sales. However, this is speculative and depends also on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under the action alternatives, is lower than the proportion in the Alternative 1 suitable acres.

Young Growth in Special Habitats

Young growth suitable for timber harvest occurs in a number of special habitats under the Forest Plan, including Riparian Management Areas, Beach and Estuary Fringe, and the Old-growth Habitat LUD. Young growth on specific portions of these areas may be harvested under required prescriptions and following specific guidelines. The suitable acres of young growth on these special areas will increase slightly under the action alternatives, but only slightly because the vast majority of existing young-growth stands are not in roadless areas. Therefore, little to no difference among the alternatives is expected.

Road Density

Although slightly more road miles may be developed under the action alternatives, the average road densities on NFS lands and the percent of Wildlife Analysis Areas with road density less than 0.7 miles per square mile are expected to be similar to that predicted under the selected alternative of the Forest Plan Final EIS. Although it is impossible to predict future road miles under the alternatives, it is likely that Alternatives 1 and 2 would be virtually the same, Alternative 3 would have slightly more road miles, and Alternatives 4, 5, and 6 would have the most road miles because they add the most remote suitable timber acres. This assumes that more distant areas would be harvested under Alternatives 4 to 6. Harvest in these areas is generally considered less likely to be economic due to the need to build roads.

Fish Habitat

Overall effects to fish habitat are expected to be negligible under all alternatives, because of the strong protections to fish habitats provided by Forest Plan LUDs, Forest-wide standards and guidelines including the riparian management strategy, and the lack old-growth harvest or associated road construction permitted in the T77 watersheds. Localized effects on fish habitat may occur, but these are expected to be minimal overall.

Species-Specific Effects

The transition to young-growth management would continue to slow the long-term decrease in deer habitat capability due to the reduction in POG harvest, under all of the alternatives. Because long-term POG harvest and road densities are expected to be similar to those under the selected alternative of the Forest Plan Final EIS, effects on old-growth dependent wildlife species are expected to be almost identical to those predicted under the selected alternative.

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ACRONYMS AND ABBREVIATIONS

2001 Roadless Rule	Roadless Area Conservation Rule
ADED	Alaska Department of Economic Development
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation & Public Facilities
AEL&P	Alaska Electric Light & Power
AFHA	Anadromous Fisheries Habitat Assessment
AKEPIC	Alaska Exotic Plants Information Clearinghouse
AKNHP	Alaska Natural Heritage Program
AKRA	Alaska Roadless Area
ANCSA	Alaska Native Claims Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
APA	Administrative Procedures Act
AP&T	Alaska Power & Telephone
BA	biological assessment
BBER	Bureau of Business and Economic Research
BCR	Bird Conservation Region
BE	biological evaluation
BLM	U.S. Departmet of the Interior, Bureau of Land Management
BMP	Best Management Practice
CA	Census Area
CDP	Census Designated Places
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMAI	culmination of mean annual increment
DEIS	Draft Environmental Impact Statement
DOL	Department of Labor
DPS	distinct population segment
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESI	Existing Scenic Integrity
ESU	evolutionarily significant unit
°F	degrees Fahrenheit
FCRPA	Federal Cave Resources Protection Act
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FEIS	Final Enviromental Impact Statement
Forest Plan	Tongass National Forest Land and Resource Management Plan
FPA	Federal Power Act
FRESH	Forest Resource Evaluation System for Habitat
FR	*Federal Register*
FSM	Forest Service Manual

Contents

GIS	geographic information system
GMU	Game Management Unit
GNA	Good Neighbor Authority
IDT	Interdisciplinary Team
IPEC	Inside Passage Electric Cooperative
IRA	Inventoried Roadless Area
LTF	log transfer facility
LUD	Land Use Designation
LWD	large woody debris
MBTA	Migratory Bird Treaty Act
MBF	thousand board feet
MIS	Management Indicator Species
MMBF	million board feet
MMI	mass movement index
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MW	megawatt
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act of 1976
NFS	National Forest System
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NPS	National Park Service
NRIS	Natural Resource Information System
NVUM	National Visitor Use Monitoring
OGR	old-growth reserve
P	Primitive
PNW	Pacific Northwest
POG	productive old growth
PTSQ	projected timber sale quantity
PWSQ	projected wood sale quantity
R	Rural
RARE	Roadless Area Review and Evaluation
RM	Roaded Modified
RMA	Riparian Management Area
RN	Roaded Natural
Roadless Rule	Roadless Area Conservation Rule
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RV	Residual Value
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act - A Legacy for Users
SATP	Southeast Alaska Transportation Plan
SDM	Size-Density Model
SEAPA	Southeast Alaska Power Agency

SEIS	Supplemental Environmental Impact Statement
SIO	Scenic Integrity Objective
SMS	Scenery Management System
SNAP	Scenarios Network for Alaska & Arctic Planning
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
T77	Tongass 77
TNC	The Nature Conservancy
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act of 1990
TWYGS	Tongass-wide Young-Growth Studies
U	Urban
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VCU	Value Comparison Unit
VMS	Visual Management System
WAA	Wildlife Analysis Area

Contents

Purpose of and Need for Action

The Forest Service has prepared this draft environmental impact statement (DEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations. This DEIS discloses the potential environmental consequences that may result from the alternatives considered for a proposed Alaska Roadless Rule.

Additional documentation that describes DEIS development, the analyses of the effects of the alternatives considered on forest resources, public involvement, and other relevant documents may be found in the planning record located at the Forest Service's Alaska Region Office, located in the Juneau Federal Building at 709 W. 9th Street, Juneau, Alaska.

Background

The Roadless Area Conservation Rule (2001 Roadless Rule) was adopted into regulations at Title 36 of the Code of Federal Regulations (CFR) Part 294 (36 CFR 294), Subpart B (66 *Federal Register* [FR] 3244) during January 2001. The 2001 Roadless Rule identified approximately 9.3 million acres (55 percent) of the Tongass National Forest as "inventoried roadless areas" (IRAs), based on the existing inventories of roadless areas. Maps of IRAs, for the Tongass National Forest, are available online here[1]. IRAs contain generally undeveloped areas that are typically 5,000 acres or greater in size. They could be smaller if they were adjacent to congressionally-designated wilderness. The 2001 Roadless Rule applies nationwide (except Idaho and Colorado), and incorporates inventories conducted from 1979 to 2002. It provides management direction for IRAs on 44.7 million acres of National Forests (approximately 30 percent of total National Forest System [NFS] lands) by prohibiting road construction and reconstruction and timber cutting, sale, or removal in those IRAs, with certain exceptions.

Since its promulgation, the application of the 2001 Roadless Rule in Alaska experienced extensive litigation. In 2001, the State of Alaska filed a complaint, challenging the U.S. Department of Agriculture's (USDA) promulgation of the 2001 Roadless Rule and its application in Alaska. The USDA and the State of Alaska reached a settlement in 2003, and the USDA subsequently issued a rule temporarily exempting the Tongass National Forest from the Roadless Rule. In 2011, a federal court (District of Alaska) set aside the Tongass National Forest's exemption and reinstated the 2001 Roadless Rule on the Tongass National Forest. The Alaska District Court's ruling was initially reversed by a three-judge panel of the Ninth Circuit, but the District Court's ruling was ultimately upheld in a 6–5 en banc ruling of the Ninth Circuit in 2015. Consequently, the 2001 Roadless

[1] https://www.fs.usda.gov/detail/roadless/2001roadlessrule/maps/statemaps/?cid=fsm8_037699

Rule remains in effect in Alaska and the Forest Service continues to apply the 2001 National Rule to the Tongass and Chugach National Forests.

In January 2018, the State of Alaska submitted a petition requesting that the Secretary of Agriculture consider exempting the Tongass National Forest from the 2001 Roadless Rule, in accordance with the Administrative Procedures Act (APA), section 553(e) and the USDA's rulemaking procedures in 7 CFR 1.28. In June 2018, the USDA secretary directed the Forest Service to begin working to develop an Alaska state-specific roadless rule under the APA. In August 2018, the Forest Service granted cooperating agency status to the State of Alaska. The Forest Service and the State of Alaska believe that the proposed action represents a unique opportunity to collaboratively resolve and provide certainty to the roadless issue in the State of Alaska. The Forest Service published a Notice of Intent (NOI) to prepare an environmental impact statement (EIS) and initiate a public rulemaking process to address the management of inventoried roadless areas on the Tongass National Forest on August 30, 2018 (83 FR 44252). As stated in that NOI, the USDA proposes to develop a durable and long-lasting regulation for the conservation and management of roadless areas on the Tongass National Forest. The state-specific roadless rule would establish a land classification system designed to conserve roadless area characteristics on the Tongass National Forest while accommodating timber harvest and road construction/reconstruction activities that are determined to be needed for forest management, economic development opportunities, and the exercise of valid existing rights or other non-discretionary legal authorities.

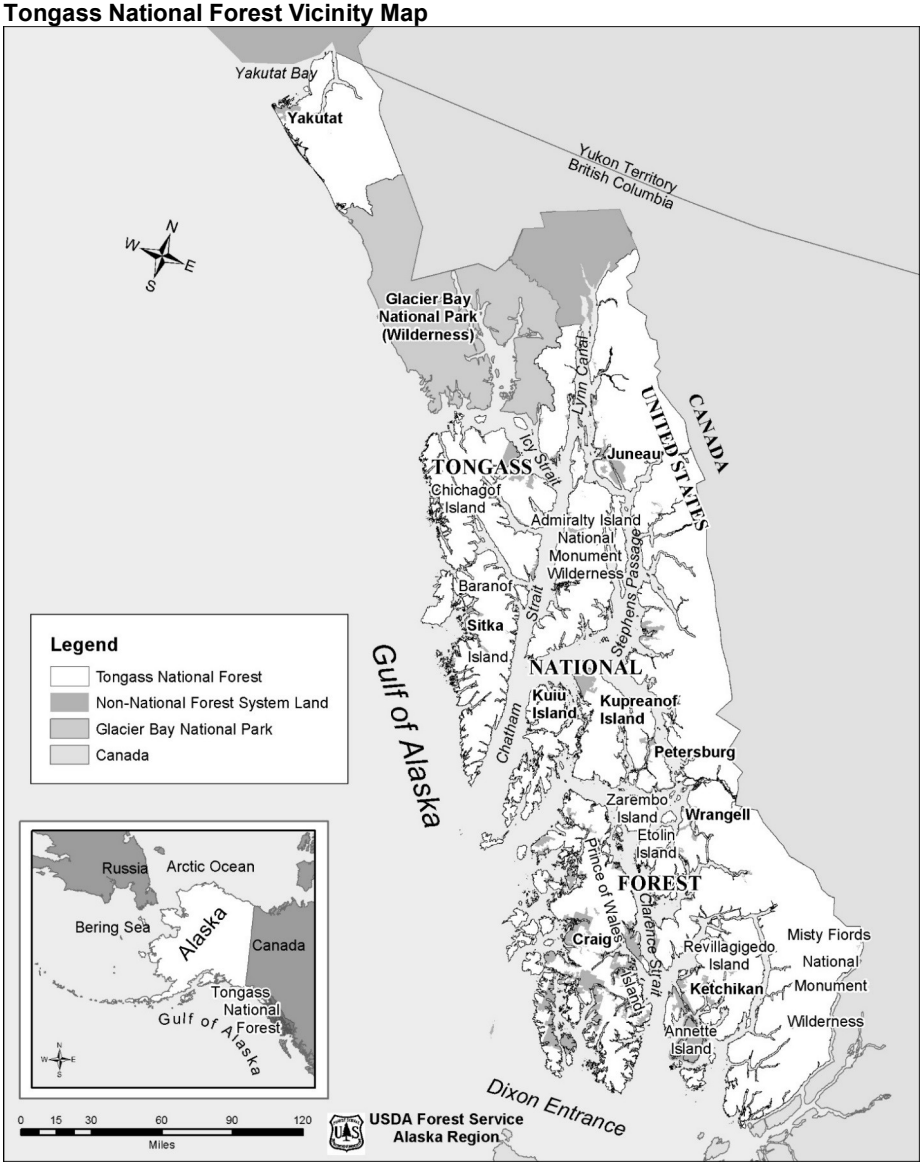
The proposed Alaska Roadless Rule will be programmatic and is intended to guide development of future site-specific actions within Alaska roadless areas. This proposed rule would not authorize any ground-disturbing activities, but rather it describes exceptions under which certain activities might be allowed within Alaska roadless areas. Before authorizing a land-use activity in roadless areas, the Forest Service must complete a more detailed and site-specific environmental analysis, pursuant to the NEPA and its implementing regulations. When a specific project or activity is proposed on NFS land, the Forest Service conducts site-specific analyses of the effects associated with that project or activity and makes a decision that authorizes implementation of that project or activity.

Planning Area

The 16.7-million-acre Tongass National Forest (hereafter Tongass or Forest) comprises approximately 7 percent of Alaska and 80 percent of percent of Southeast Alaska – Alaska's southeastern panhandle extending from the Dixon Entrance in the south to Yakutat Bay in the north, and bordered on the east by Canada and on the west by the Gulf of Alaska. The Tongass 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 Forest.

The Tongass includes a narrow mainland strip of steep, rugged mountains, and icefields and more than 1,000 offshore islands known as the Alexander Archipelago. Together, the islands and mainland have 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 government public lands comprise approximately 95 percent of Southeast Alaska, with about 80 percent in the Tongass National Forest and the majority of the remainder lands in Glacier Bay National Park and Preserve. The remaining land is held by the State government, Alaska Native Corporation, and other private ownerships. Most of the area of the Tongass is undeveloped. Approximately 74,000 people inhabit Southeast Alaska, primarily in 32 communities plus 2 seasonal communities located on islands or mainland coastal areas. Only eight of the

Figure 1-1
Tongass National Forest Vicinity Map



communities have populations greater than 1,000 persons. Most of these communities are surrounded by, or adjacent to, NFS land. Only three communities are connected to other parts of the mainland by road: Haines and Skagway in the north and Hyder in the south.

Purpose and Need

In response to the State of Alaska's petition for rulemaking, the USDA Forest Service, and State of Alaska agree the controversy surrounding the management of Tongass National Forest roadless areas may be resolved through state-specific rulemaking. A long-term, durable approach to roadless area management is needed that accommodates the unique biological, social, and economic situation in and around the Tongass National Forest. The Tongass National Forest is unique from other national forests in respect to the size of the Forest; the large percentage of roadless areas that comprise the Forest; its communities being surrounded by federal lands (the Tongass National Forest comprises almost 80 percent of Southeast Alaska); as well as Alaska and Tongass National Forest-specific statutory considerations (e.g., Alaska National Interest Lands Conservation Act [ANILCA]), Tongass Timber Reform Act [TTRA]).

The USDA and Forest Service believe that the current 2001 Roadless Rule prohibitions on timber harvest and road construction/reconstruction can be adjusted for the Tongass National Forest in a manner that meaningfully addresses local economic and development concerns while balancing roadless area conservation needs. The application of the 2001 Roadless Rule on the Tongass National Forest continues to be controversial among select governments, industries, and non-governmental organizations that claim it is a substantial contributor to declining economic activity in communities that rely on the Forest's resources for employment and income. There is a need to consider options for a state-specific roadless rule that will better incorporate the economic interest concerns and statutory concerns while conserving roadless area characteristics. The list of project objectives is provided in Table 1-1.

Commented [U1]:

Commented [U2]: The Organized Village of Kake (hereinafter OVK) would like to request a co-management option be evaluated and added to all alternatives in the Kake community use area (see attached OVK Community Use Area map). Details related to the scope of the authority and possible use of the 'Good Neighbor Authority' should be addressed in government to government consultation before June 2019.

Table 1-1
List of Project Objectives (the Purpose)

Project Objectives (Measurement Indicators, if possible)
• Provide opportunities for achieving multiple-use benefits (Organic Act/Sustainable Yield) while maintaining and enhancing economic benefits to local communities.
• Further accommodate the transition to a predominantly young growth timber program on the Tongass National Forest as described in the 2016 amendment of the Forest Plan.
• Enhance the ability of the Forest Service to provide a supply of timber from the Tongass National Forest 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 (TTRA)
• Create procedures that enable Agency managers to identify, evaluate, and conserve or enhance the characteristics of Alaska roadless areas through land management planning activities.
• Support community economic opportunity and long-term sustainability.

Proposed Action

The USDA proposes to develop a durable and long-lasting regulation for the conservation and management of roadless areas in Alaska on the Tongass

National Forest. The State-specific roadless rule would establish a land classification system designed to conserve roadless area characteristics on the Tongass National Forest while accommodating timber harvesting and road construction/reconstruction activities that are determined to be needed for forest management, economic development opportunities, and the exercise of valid existing rights or other non-discretionary legal authorities.

Decision Framework

The USDA Secretary, or a designee, will decide whether to promulgate an Alaska state-specific rule as proposed, one of the other alternatives, or a combination of the alternatives as analyzed by the EIS. Promulgation of a rule involves establishing regulations, which would be issued under 36 CFR Part 294, Subpart D. The decision to be made involves a choice among the six alternatives analyzed in detail in this DEIS.

Public Participation

The Forest Service published an NOI to prepare an EIS for the Alaska Roadless Rule in the *Federal Register* on August 30, 2018. The NOI initiated a 45-day scoping period which ended on October 15, 2018. During this time period, the Forest Service conducted 17 public meetings including meetings in Anchorage, Alaska; Washington, DC; and communities throughout Southeast Alaska – Angoon, Craig, Gustavus, Hoonah, Kake, Ketchikan, Petersburg, Point Baker, Sitka, Tenakee Springs, Thorne Bay, Wrangell, Yakutat, and two meetings in Juneau. Approximately 144,000 written responses were received during the scoping period, including 10 petitions with 110,000 total signatures. The majority of the responses included form letters; a total of 1,400 unique letters were received during the scoping period.

Tribal Participation

On July 30, 2018, the Forest Service sent letters to 32 federally-recognized tribes and 27 Alaska Native Corporations, within Southeast and Southcentral Alaska, initiating government-to-government and government-to-corporation consultation on the Alaska Roadless Rule.

Cooperating Agencies

The State of Alaska requested cooperating agency status for the Alaska Rulemaking process on June 19, 2018 and entered into a Memorandum of Understanding (MOU) on August 2, 2018. On July 30, 2018, the Forest Service invited 19 Southeast Alaska federally-recognized tribes to participate as cooperating agencies during the rulemaking process. The following six tribes agreed to become a cooperating agency through MOUs:

- Angoon Community Association;
- Central Council Tlingit and Haida Indian Tribes of Alaska;
- Hoonah Indian Association;
- Hydaburg Community Association;
- Organized Village of Kake;
- Organized Village of Kasaan; and
- Hydaburg Cooperative Association.

Commented [U3]: For the record (see attached letter dated 9/07/2018) OVK objected to the lack of tribal consultation prior to the Forest Service signing the MOU with the State of Alaska relating to this rule making process on Sept. 7, 2018. On Oct 10, 2018 OVK submitted comments with an attached OVK Resolution No. 2018-24 that requested engagement with the Forest Service and the State of Alaska "as a co-manager/cooperator of resources" in the traditional Kake territory (map was also attached to this request). To date the Forest Service has not initiated formal consultation regarding this rule-making.
OVK on January 31, 2019 (see attached) requested an extension on the timeline for Alaska Roadless Rule process.
Via a joint letter dated 2/05/2019 (see attached), OVK and the Organized Village of Saxman, requested government to government consultation with the Secretary of Agriculture regarding this rule. OVK and Saxman have yet to receive any response to this request.

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Key Issues

The regulations implementing NEPA (40 CFR 1501.2) require federal agencies to develop and evaluate alternatives to recommended courses of action in any proposal that involves unresolved conflict concerning alternative uses of available resources. Public involvement was used to identify points of disagreement about the proposed Alaska Roadless Rule, and to identify issues to use as a basis for developing and evaluating alternatives.

Comments that support the purpose and need of the proposed action are not listed below as "issues," but are evaluated in this EIS. NEPA regulations require the agency to identify and eliminate from detailed study those issues that are not significant or that have been covered by prior environmental review, to narrow the scope of the analysis. Reasons for eliminating issues from detailed study include when the issues are related to the following:

- General opinions or position statements not specific to the proposed action;
- Items addressed by other laws, regulations, or policies;
- Items not relevant to the potential effects of the proposed action, or otherwise outside the scope of this analysis; and/or

The issues included in the Dismissed Issues section at the end of Chapter 3 were eliminated from detailed study in this DEIS because they are outside the scope of the decision to be made by the USDA secretary on the proposed rule relative to other alternatives analyzed in this DEIS, are not relevant to this project, or would have zero or negligible effects. Refer to the sections on Decision Framework and Rule Scope and Applicability.

The following three Key Issues were identified for the Alaska state-specific roadless rulemaking effort and this DEIS and will be carried forward throughout the analysis.

Key Issue 1 – Protection of roadless area characteristics from road development and timber harvest activity.

The Tongass National Forest includes large undeveloped geographic areas, with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large blocks of unfragmented wildlife habitats, undeveloped or natural areas, and exceptional opportunities for primitive recreation and/or solitude. This large scale of roadless lands does not exist anywhere else in the NFS, except on the Chugach National Forest in Southcentral Alaska. The majority of the Tongass National Forest is in a natural condition, unlike most other national forests, and the Forest represents a significant portion of the world's remaining temperate rainforests.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism, inherent passive use values, and ecosystem services values they provide. Passive use values represent the value that individuals assign to a resource independent of their use of that resource and typically include existence, option, and bequest values. These values represent the value that individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation, carbon sequestration, and biological diversity.

Key Issue 2 –
Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors.

The Tongass National Forest comprises approximately 80 percent of Southeast Alaska and therefore plays a critical role in supporting local and regional economy, promoting economic diversification, and also enhancing rural community well-being. The visitor industry, seafood industry, and resource extraction industries contribute to local jobs and income alongside public sector employment spanning federal, state, and local government. While the visitor and seafood industries have grown to become the greatest private-sector employers across Southeast Alaska, resource extraction remains important in some rural communities where jobs are limited and unemployment is oftentimes high.

The Forest Service manages land for the multiple-use and sustained yield of all renewable resources. There is fragmentation and disagreement among the public regarding the best management of federal lands for economic development purposes and to support the overall economic vitality of Tongass National Forest communities. Many believe the visitor industry and seafood industries have become the mainstay of Southeast Alaska's economy and therefore should have prominence in Forest Service land management decision-making. Others note that resource extraction, including forest products and the minerals industry, continue to provide important jobs and income sources in remote and isolated Southeast communities. Furthermore, Southeast Alaska residents, communities, and Native tribes consistently provide reminders of the value of the Tongass National Forest for subsistence uses, recreational hunting and fishing, and independent travelers and outdoor enthusiasts – and that these activities yield economic value as well.

Key Issue 3 –
Protection of terrestrial and aquatic wildlife habitat and biodiversity from road development and timber harvest activities.

The Tongass includes large, undeveloped, and natural land areas that represent large, unfragmented blocks of wildlife habitat. This scale and size of contiguous habitat is not available elsewhere in the NFS, except on the Chugach National Forest. Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. The Tongass Forest Plan Conservation Strategy was developed to maintain the integrity of the old-growth forest ecosystem, and thereby conserve biodiversity across the Forest, by retaining intact, largely undisturbed habitat. In addition, because of its predominantly undeveloped nature, a number of wide-ranging species find optimal habitat in the more remote areas of the Forest.

1 Purpose of and Need for Action

Fish and the aquatic resources on the Tongass National Forest support major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. The Tongass includes high-value, intact watersheds that were designated to be managed for intact ecological values and aquatic habitat productivity, and many commenters believe these areas should be protected so that they can continue to provide the clean water and fish habitats that are essential to the ecological and economic health of the Southeast Alaska communities and residents who rely on them.

Incorporation by Reference

In order to focus on the issues and streamline the EIS, the following documents are incorporated by reference:

- The Tongass Land and Resource Management Plan (USDA Forest Service 2016a) and accompanying EIS and Record of Decision (USDA Forest Service 2016b and 2016c).
- Forest Service Roadless Area Conservation Final EIS (USDA Forest Service 2000).
- The project record for this DEIS.

Scope and Applicability

Scope is the extent of actions and impacts that are considered relevant in this EIS. Applicability concerns the lands subject to this EIS. This section explains what is, and is not, included in this EIS, and defines which lands are affected by the proposed rule.

Scope of the EIS

The scope of this EIS consists of the range of actions, alternatives, and impacts that are considered relevant to the proposed action. The proposed action is geographically limited to proposed Alaska Roadless Areas (AKRAs) and existing IRAs established in the 2001 Roadless Rule, or the “analysis area” within the State of Alaska (see Chapter 3 for a further discussion of the analysis area). The proposed action is primarily focused on the prohibitions and exceptions for tree cutting, sale, or removal and road construction and reconstruction within roadless areas. The proposed rule would not suspend, revoke, or modify land-use permits, contracts, or other legal instruments issued before the effective date of the proposed rule.

The purpose of this analysis is to disclose the relevant environmental impacts associated with each of the Alaska Roadless Rule alternatives so the USDA secretary, or his designee, can make an informed decision. This analysis is a programmatic review which the Council on Environmental Quality (CEQ) defines as any broad or high-level NEPA review of proposed policies, plans, programs, or projects for which subsequent actions will be implemented based on site- or project-specific NEPA review at the time the action is proposed. The Alaska Roadless Rule establishes regulations for management of roadless areas on the Tongass National Forest and does not make any site- or project-specific decisions on any activities.

The relationship between regulations, national forest plans, and national forest projects is of particular importance to roadless rulemaking. Hierarchically, the proposed Alaska Roadless Rule is two steps removed from any Tongass National Forest project-specific decision. A regulation is hierarchically above a

forest plan, which must comply with all applicable regulations. A forest plan is programmatic and provides broad guidance for project activities within a specific national forest. Although the 2001 Roadless Rule and the proposed Alaska Roadless Rule are closely related to forest planning, the roadless rules are narrowly focused on how much timber harvest and road construction/ reconstruction is allowed within roadless areas. The alternatives are constrained to this narrow focus because broad programmatic guidance for project activities is better addressed in a forest plan since it is simpler to change, periodically revised, and provides greater flexibility to adapt as the agency gains greater understanding and/or circumstances change on the ground.

The CEQ regulations implementing NEPA require an agency, when evaluating reasonably foreseeable significant adverse effects of a proposed action, to obtain incomplete or unavailable information when such information is essential to making a reasoned choice among alternatives – or to explain why such information cannot be obtained (40 CFR 1502.22). The Alaska Roadless Rule does not authorize or make any project-level decisions. Therefore, the extent and location of specific timber harvest and road construction/reconstruction activities are not known, nor is it possible to obtain this information at this time.

The 2014 CEQ guidance on programmatic reviews states that one of the purposes of programmatic reviews is to provide greater efficiencies to federal agencies in complying with NEPA. While environmental impacts should be disclosed as soon as information is reasonably available and at the earliest practicable stage, it is not reasonable or efficient to develop numerous speculative potential timber harvest or other project-level scenarios, nor is the public served by developing worst-case or hypothetical activity scenarios. It is more reasonable and efficient to limit detailed site-specific impact analyses to when specific proposals are brought before the agency.

Programmatic reviews support policy-level decisions when there are limitations in available information and uncertainty regarding the timing, location, and environmental impacts of subsequent implementing actions. Rulemaking establishes regulations with which future actions would have to comply. This rulemaking will guide conditions under which timber harvest and road construction/reconstruction may occur within the Tongass National Forest over the long-term future, but it does not make site-specific decisions or authorize any ground-disturbing activities at this stage. At the present time, the scope and extent of potential future timber harvest and road construction/reconstruction activities are unknown; thus, the site-specific environmental effects of these proposals cannot be reasonably foreseen.

Applicability

The lands subject to this rulemaking are NFS lands in Alaska that contain roadless areas under any of the alternatives. Two national forest administrative units in Alaska are subject to this rulemaking EIS, the Tongass and the Chugach National Forests. However, at this time, this Alaska rulemaking effort is only focused on the Tongass National Forest. Therefore, the detailed description and analysis of the affected environment and impacts on resources will be limited to the Tongass National Forest. Currently, only an administrative provision for boundary corrections and modifications would apply to the Chugach National Forest. This provision is administrative in nature and does not have any effects at the programmatic level.

The proposed rule, like other regulations, would work in conjunction with forest plan direction. Thus, tree cutting, sale, or removal, and/or road construction or

reconstruction in roadless areas would be allowed in certain areas as described in the proposed rule. However, the activities must still comply with applicable standards and guidelines identified in forest land management plans.

Alternatives Including the Proposed Action

This chapter describes the six alternatives considered in detail in this draft environmental impact statement (DEIS). It compares the alternatives and describes the alternatives dismissed from detailed study.

The terms central to understanding the alternatives described in this chapter are defined below. These terms and others used in the analysis are also defined in the glossary.

Alaska Roadless Areas (AKRA) = Areas identified in the set of AKRA maps which the Alaska Roadless Rule applies to. These represent new roadless designations and are tied to new roadless rule language.

Categories of AKRAs = Areas identified with varying degrees of exceptions and prohibitions, as identified in new roadless rule language.

Exceptions = Activities that would be allowed in different categories of AKRAs.

Prohibitions = Activities that would not be allowed in different categories of AKRAs.

Features Common to All Alternatives

This section describes the features that are common to all alternatives (Alternatives 1-6) analyzed in detail in this DEIS.

2016 Tongass Land and Resource Management Plan

With the exception of the timber land suitability determinations described below under *Features Common to all Action Alternatives*, none of the alternatives would make any changes to the 2016 Tongass Land and Resource Management Plan (Forest Plan) including the following:

- Goals and Objectives,
- Land Use Designations or Management Prescriptions,
- Forest-wide Standards and Guidelines,
- Plan Components developed under the 2012 Planning Rule
- Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition

Project-Specific Activities

None of the alternatives authorize any site-specific projects or other ground-disturbing activities. Specific projects that include tree cutting, road construction, and/or reconstruction must undergo site-specific environmental analysis when they are proposed as required by the National Environmental Policy Act (NEPA). None of the alternatives considered in this DEIS waive any applicable requirements regarding site-specific environmental analysis, public involvement, consultation with tribes and other agencies, or compliance with other applicable laws.

Activities that are not otherwise prohibited are permissible in roadless areas under all of the alternatives, including the no-action alternative (2001 Roadless Rule), if not restricted by other law, regulations, and/or policies. These activities include, but are not limited to, the following:

- Motorized and non-motorized trail construction or maintenance;
- Public hunting, fishing, camping, or other dispersed recreational uses;
- Use of a motorized vehicle on a trail open to motorized use;
- Mountain biking on a trail open to mechanized use;
- Prescribed burning, including tree cutting for fireline construction to manage a prescribed fire;
- Construction or reconstruction of roads when needed in conjunction with the continuation, extension, or renewal of a mineral lease in existence as of January 12, 2001, in the case of reserved or outstanding rights, or as provided for by statute or treaty. This includes roads associated with locatable mineral activities pursuant to the General Mining Law of 1872;
- Public water and other utility system development;
- Road construction and timber cutting for listed projects[1];
- Personal timber use, firewood, and certain roadside microsales[1]; and
- Hydroelectric development.[1]

Ongoing Projects

None of the alternatives would revoke, suspend, or modify any project or activity in which the NEPA decision was made prior to the promulgation date of the Alaska Roadless Final Rule.

Existing Land Use Authorizations

All of the alternatives allow for the continuation, transfer, or renewal of existing land use authorizations for activities in roadless areas. “Authorizations” refer to land uses allowed under a special use permit, contract, or similar legal instrument. Numerous types of lands and recreation-related authorizations are

[1] Pursuant to U.S. District Court for the District of Alaska in Organized Village of Kake v. USDA, No. 1:09-cv-00023 (March 4, 2011). The District Court’s final judgment, Organized Village of Kake v. USDA, (May 24, 2011), makes special provision for certain projects and activities.

issued for occupancy and use of NFS lands. “Existing authorizations” are those that are issued before the effective date of the final rule. Public non-commercial recreational activities that do not require an authorization are not affected by any alternative.

Examples of land use authorizations not specifically prohibited or restricted under any alternative include, but are not limited to, the following:

- Outfitting and guiding for remote setting nature tours, road-based nature tours, hunting, fishing, camping, etc.
- Commercial filming
- Temporary events
- Tribal and noncommercial group use
- Research, training, and surveys
- Communication sites
- Special forest products (berry picking, personal use firewood collection, etc.)
- Minerals development under 1872 mining law

Features Common to all Action Alternatives

Alternatives 2, 3, 4, 5, and 6 propose to modify the timber land suitability determinations made in the 2016 Tongass Land and Resource Management Plan (Forest Plan). Specifically, lands identified as tentatively suitable that were made unsuitable solely due to roadless designation in either the “Timber Priority” Alaska Roadless Area category or that were removed from roadless would be designated as suitable for timber production. This change to the Tongass suitability determinations does not preclude future suitability determinations.

Features Common to Alternatives 2, 3, 4, and 6

This section describes the features that are common to Alternatives 2, 3, 4, and 6 analyzed in detail in this DEIS.

Roadless Area Designation Updates

Alternatives 2, 3, 4, and 6 propose to correct and modify Inventoried Roadless Area (IRA) boundaries based on ownership changes and updated mapping. Updated roadless areas would be known as Alaska Roadless Areas (AKRAs) and the Alaska Roadless Rule would only apply to those identified lands. Corrections and modifications to AKRAs that apply to Alternatives 2, 3, 4 and 6 would entail:

- Removing about 107,900 acres from roadless areas that were either misidentified in 2001, had an ownership change since 2001 due to land exchanges, or resulted from corrections due to mapping alignment issues.

Commented [U4]: Per OVK Resolution 2018-24, OVK requested the Forest Service to utilize the most recent updated roadless inventory. This did not happen; OVK objects. The Forest Service must use the most recent inventory to support it’s analysis.

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Commented [U5]: Not certain what ‘misidentified’ means. In fact, the Forest Service identified over 300K roadless acres in 2003 that were not included in the 2001 inventory. Some of those acres directly impact OVK’s traditional territory. This needs to be addressed.

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- Adding about 2,300 acres to roadless areas due to changes in ownership or boundary alignment issues
- Removing about 95,600 acres from roadless areas that currently have roads, referred to as roaded roadless. These areas were identified in the 2008 Forest Plan amendment process and subsequently updated in the 2016 Forest Plan amendment process. The roaded roadless areas have been substantially altered due to road construction and/or timber harvesting and include significantly reduced roadless area characteristics.

Roadless Boundary Correction and Modification Provisions

Alternatives 2, 3, 4, and 6 propose to provide for administrative correction and modification provisions within the Rule to streamline future boundary changes. Administrative corrections would be limited to adjustments that remedy clerical errors, typographical errors, mapping errors, improvements in mapping technology, conformance to statutory changes, or incorporation of changes due to land exchanges. The Regional Forester may issue administrative corrections after a 30-day public notice and opportunity to comment period.

Commented [U6]: Why isn't the Forest Service using the most current inventory?

Commented [U7]:

Modifications would be changes to AKRA boundaries not considered to be an administrative correction. The Regional Forester would provide at least a 45-day public notice and opportunity to comment period for all modifications.

Commented [U8]: Why isn't the Forest Service using the most current inventory?

Given the size, degree of change, level of public interest, or whether regulatory impact analysis is necessary, the Chief may decide that rulemaking is warranted.

Alaska Roadless Areas Management Categories

Alternatives 2, 3, 4, and 6 provide for a variety of management approaches within roadless areas through Alaska Roadless Area Management Categories (see Table 2-1) which include Land Use Designation (LUD) II Priority, Watershed Priority, Roadless Priority, and Timber Priority. The management categories prohibit tree cutting and road construction/reconstruction with a range of exceptions (including full exception for the Timber Priority category) and are applied by varying degrees across the alternatives. A brief description of each management category follows.

LUD II Priority

The LUD II Priority management category is to ensure that congressional intent is fully met and reduce management direction confusion. Confusion is reduced by eliminating similar but different regulatory direction from the Roadless Rule and maintaining only the statutory direction. These lands will be managed in a roadless state to retain their wildland character as defined in the Tongass Timber Reform Act (Title II, Section 201) and the National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291, 128 Stat. 3729, Section 3720(e)(4)).

Approximately 855,000 acres of the Tongass National Forest is congressionally designated as LUD II (826,000 acres currently designated as IRA under the 2001 Roadless Rule and 28,000 acres currently not designated as IRA). Alternatives 2 and 4 propose to designate all congressionally designated LUD II acres as LUD II Priority AKRAs. Alternative 3 proposes to remove all LUD II areas from roadless designation as a means of eliminating confusion and ensuring

Commented [U9]: According to the 2016 TLMP there are a total of almost 888,000 acres of LUD II lands designated by congress on the Tongass.

congressional intent. LUD II areas under Alternative 3 will retain their congressional protections. Alternative 6 proposes to utilize the LUD II Priority management category only for LUD II areas that are currently designated as IRA and designate them as LUD II AKRAs.

Watershed Priority

The Watershed Priority management category is more protective than the 2001 Roadless Rule and provides for activities specific to aquatic habitat improvement and protection. Approximately 3,214,000 acres in Alternative 2 would be managed under this management category. No other alternative would apply the Watershed Priority management category. These are areas identified as Tongass 77 (T77)[2] Watersheds and The Nature Conservancy (TNC)/Audubon Conservation Areas.

Roadless Priority

The Roadless Priority management category is similar to the 2001 Roadless Rule but is less restrictive and provides for Alaska-specific concerns. Specifically, it provides for infrastructure development to connect and support local communities, and road construction for leasable minerals. The leasable minerals exception provides for geothermal, oil, gas, and/or coal development. Oil, gas, and coal development potential is low due to the low potential for these leasable minerals. In addition, the Roadless Priority management category adds exceptions for activities that are allowed under the 2001 Roadless Rule to provide clarity and be explicit that these activities are allowed. This management category is applied to Alternatives 2, 3, 4, and 6.

Timber Priority

The Timber Priority management category excepts timber harvest and road construction/reconstruction within AKRAs to facilitate timber management. This management category applies to approximately 860,000 acres and is only proposed in Alternative 4. In other action alternatives, this management category is not needed because the timber management opportunity areas have been removed from AKRAs.

[2] The Tongass 77 (T77) refers to Value Comparison Units (VCUs), which approximate major watersheds located on National Forest System lands that Trout Unlimited, Alaska Program, identified as priority salmon watersheds. Four watersheds were removed from the T77 in 2014 as a result of the Sealaska Land Entitlement Finalization in the Carl Levin and Howard P. “Buck” McKeon National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291).

Table 2-1
Rule Language Associated with the Four Alaska Roadless Area Management Categories

Category	Tree cutting, sale, or removal within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:	Road construction and reconstruction within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:
LUD II Priority	(1) The cutting, sale, or removal of timber is needed for one of the following purposes and can be conducted in a way that is compatible with the primitive characteristics of the area: (i) wildlife and fish habitat improvement; (ii) salvage of timber to prevent damage to other resources, such as removal of windfall in an important fish stream or control of epidemic insect infestations; or (iii) personal use for cabin logs, firewood, float logs, trolling poles, and other similar uses. (2) The cutting, sale, or removal of timber is incidental to permanent improvements such as fishways, fish hatcheries, or aquaculture sights and such improvements can be designed to be compatible with the primitive characteristics of the area. Appropriate landscape management techniques will be applied to the design and construction of such improvements to minimize impacts on recreation resources and scenery. (3) The cutting, sale, or removal of timber is incidental to water and power developments that are designed to retain the overall primitive characteristics of the area. (4) The cutting, sale, or removal of timber is incidental to mineral development, subject to existing laws and regulations. (5) The cutting, sale, or removal of timber is incidental to the development of a research facility and such facility can be designed to be compatible with the primitive characteristics of the area. (6) Timber cutting, sale, or removal is incidental to the development of a vital transportation system linkage or transportation needs identified by the State of Alaska, including a log or marine transfer facility, and no other feasible linkage exists or it can be demonstrated that the linkage in the LUD II area is clearly environmentally preferable and site-specific measures can be designed to minimize effects on the primitive characteristics of the area.	(1) A road is needed for mineral development, subject to existing laws and regulations. (2) A road is needed for one of the following reasons and no other feasible routes exist or it can be demonstrated that routing through the LUD II area is clearly environmentally preferable and site-specific measures can be designed to minimize effects on the primitive characteristics of the area or on recreational resources and scenery: (i) a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code; (ii) transportation need identified by the State of Alaska; or (iii) other vital linkage. (3) A road is needed in conjunction with the construction, expansion, or maintenance of water and power developments, and can be designed to retain the overall primitive characteristics of the area. (4) A road is needed in conjunction with the construction, expansion, or maintenance of an authorized fishway, fish hatchery, or aquaculture facility, and can be designed to retain the overall primitive characteristics of the area and to minimize impacts on recreation resources and scenery.

Alternatives Including the Proposed Action 2

Table 2-1 (continued)
Rule Language associated with the four AKRA Management Categories.

Category	Tree cutting, sale, or removal within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:	Road construction and reconstruction within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:
Watershed Priority	(1) The cutting, sale, utilization, or removal of timber is incidental to an activity conducted pursuant to reserved or outstanding rights, or as provided for by statute or treaty; (2) The cutting, sale, utilization, or removal timber is needed for one of the following purposes and will maintain or improve one or more of the roadless area characteristics; (i) To improve threatened, endangered, proposed, or sensitive species habitat; or (ii) To maintain, restore or improve terrestrial and aquatic organism habitat; (iii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period; (3) The cutting, sale, utilization, or removal of timber is incidental to authorized improvements for the purposes of maintaining and/or improving aquatic habitat such as fishways, fish hatcheries, or aquaculture sights and such improvements can be designed to be minimize effects on water quality, fish habitat, fish production, fish passage, aquatic biodiversity, or soil productivity; (5) The cutting, sale, utilization, or removal of timber is incidental to trail or recreation development that does not degrade water quality, fish habitat, fish production, fish passage, aquatic biodiversity, or soil productivity.	(1) A road is needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty, and no other feasible routes exist or it can be demonstrated that routing through the AKRR area is clearly environmentally preferable and site-specific measures can be designed to minimize effects on water quality, fish habitat, fish production, fish passage, aquatic biodiversity, or soil productivity; (2) A road is needed in conjunction with the construction, expansion, or maintenance of an authorized fishway, fish hatchery, or aquaculture facility, and can be designed to minimize effects on water quality, fish habitat, fish production, fish passage, aquatic biodiversity, or soil productivity; (3) A road is needed to protect public health and safety in cases of an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property; (4) A road is needed to conduct a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to conduct a natural resource restoration action under CERCLA, Section 311 of the Clean Water Act, or the Oil Pollution Act; (5) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a road and that cannot be mitigated by road maintenance. Road realignment may occur under this paragraph only if the road is deemed essential for public or private access, natural resource management, or public health and safety.
Roadless Priority	(1) The cutting, sale, utilization, or removal of timber is incidental to an activity conducted pursuant to reserved or outstanding rights, or as provided for by statute or treaty; (2) The cutting, sale, or removal timber is needed for one of the following purposes and will maintain or improve one or more of the roadless area characteristics; (i) To improve threatened, endangered, proposed, or sensitive species habitat; or (ii) To maintain, restore or improve terrestrial and aquatic organism habitat; (ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period; (3) The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited by this subpart; (4) The cutting, sale, or removal of timber is needed and appropriate for personal or administrative use, as provided for in 36 CFR part 223; (5) The cutting, sale, or removal of timber is needed for research and administration of a designated experimental forest;	(1) A road is needed to protect public health and safety in cases of an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property; (2) A road is needed to conduct a response action under the CERCLA or to conduct a natural resource restoration action under CERCLA, Section 311 of the Clean Water Act, or the Oil Pollution Act; (3) A road is needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty; (4) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a classified road and that cannot be mitigated by road maintenance. Road realignment may occur under this paragraph only if the road is deemed essential for public or private access, natural resource management, or public health and safety; (5) Road reconstruction is needed to implement a road safety improvement project on a classified road determined to be hazardous on the basis of accident experience or accident potential on that road; (6) A road is needed for research or administration of a designated experimental forest; (7) A road is needed for one of the following reasons and no other feasible routes exist or it can be demonstrated that routing through the AKRR is the least environmentally damaging practicable alternative:

Table 2-1 (continued)
Rule Language associated with the four AKRA Management Categories.

Category	Tree cutting, sale, or removal within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:	Road construction and reconstruction within Alaska Roadless Areas would be prohibited except where the Responsible Official determines:
	(6) The cutting, sale, utilization, or removal of trees in connection with mineral exploration and mine development, subject to existing laws and regulations; (7) The cutting, sale, utilization or removal of trees is incidental to the construction, expansion, or maintenance of a public utility system, such as municipal water and wastewater systems and hydroelectric and other renewable energy projects and related infrastructure, including transmission lines; (8) The cutting, sale, utilization, or removal of trees is incidental to fire prevention, protection and/or restoration, mitigating risk to public health and safety related to hazard trees, blowdown/windfall management, and/or insect and disease management; (9) The cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses; (10) The cutting, sale, utilization, and removal of trees incidental to authorized road construction. The trees may be sold and/or utilized on the project; (11) The cutting, sale, utilization, or removal of trees for the purposes of providing biomass for Southeast Alaska residential and public utility heating and energy needs; (12) The cutting, sale, utilization, or removal of trees incidental to developing, maintaining, and/or expanding public facilities such as airports, marine access points, and communication equipment. (13) The cutting, sale, utilization, or removal of timber is incidental to trail or recreation development that does not degrade water quality, fish habitat, fish production, fish passage, aquatic biodiversity, or soil productivity.	(i) a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code and the Secretary of Agriculture determines that it is in the public interest or is consistent with the purposes for which the land was reserved or acquired; or (ii) transportation needs identified by the State of Alaska's Southeast Alaska Transportation Plan that are needed for the connection of communities and development of the regional transportation system; (8) Roads identified in the easements Congress enacted in Section 4407 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA- LU; Public Law 109-59); (9) A road is needed for access to locatable or leasable mineral exploration, development and/or reclamation if it meets the criteria of 36 CFR part 228; (10) A road is necessary for the construction, expansion, or maintenance of a public utility system, such as municipal water and wastewater systems and hydroelectric and other renewable energy projects and related infrastructure, including transmission lines.; (11) The road is necessary for the construction, expansion, or maintenance of public facilities such as airports, marine access points, and communication equipment. (12) A road is deemed necessary by the affected federally recognized tribe(s) for access to Alaska Native cultural sites.
Timber Priority	Timber may be cut, sold, or removed in lands designated Timber Priority Alaska Roadless Areas.	Permanent or temporary roads may be constructed, reconstructed, or maintained within Timber Priority Alaska Roadless Areas.

Alternatives Considered in Detail

Based on information obtained during scoping, Cooperating Agency input, and consultation with Alaska Native tribes and Alaska Native Corporations, the Forest Service developed six alternatives for detailed analysis, including the no action and proposed action alternatives. These alternatives respond in varying ways to the three relevant issues identified in Chapter 1. Large-scale color maps showing roadless areas and the lands that would be suitable for timber production are included on the compact disc (CD) version of the EIS and in the map packet that accompanies the EIS hard copy.

Alternative 1 – No Action

This alternative is the no action alternative as required by NEPA, and reflects continuation of current management pursuant to the 2001 Roadless Rule (see large-scale color map). This alternative would continue the general prohibitions on tree cutting, sale, and removal and road construction or reconstruction within IRAs, with some of those activities permitted under certain exceptions. Table 2-2 summarizes the key elements of Alternative 1.

Inventoried Roadless Areas

Under this alternative, the roadless areas consist of IRAs identified in the 2001 Roadless Rule. These IRAs were originally mapped at approximately 9.34 million acres of National Forest System (NFS) land on the Tongass National Forest, and the provisions of the 2001 Roadless Rule would apply to those IRAs (summarized below). After adjusting the boundaries due to ownership and boundary alignment corrections, these IRAs encompass 9.2 million acres of NFS land.

Commented [U10]: According to the 2003 FSEIS, table 3.3-50, there are 9,558,266 roadless acres on the Tongass.

Prohibition on Tree Cutting

Under this alternative, timber may be cut, sold, or removed in IRAs if the Responsible Official determines that one of the following circumstances exists:

(1) The cutting, sale, or removal of generally small diameter timber is needed for one of the following purposes and will maintain or improve one or more of the roadless area characteristics as defined in § 294.11 of the 2001 Roadless Rule.

(i) To improve threatened, endangered, proposed, or sensitive species habitat; or

(ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period;

(2) The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited by the 2001 Roadless Rule;

(3) The cutting, sale, or removal of timber is needed and appropriate for personal or administrative use, as provided for in 36 CFR part 223; or

(4) Roadless characteristics have been substantially altered in a portion of an IRA due to the construction of a classified road and subsequent timber harvest. Both the road construction and subsequent timber harvest must have occurred

after the area was designated an IRA and prior to January 12, 2001. Timber may be cut, sold, or removed only in the substantially altered portion of the IRA.

Table 2-2
Key Element Summary for Alternative 1

Roadless Areas
• Includes all inventoried roadless areas identified in the 2001 Roadless Rule, about 9.20 million acres after corrections.
Prohibition on Tree Cutting[1]
• Timber harvest excepted if incidental, small-diameter timber, and will maintain or improve one or more roadless area.
• Timber harvest excepted if needed and appropriate for personal or administrative use.
• Timber harvest excepted in substantially altered portions of IRAs.
Prohibition on Road Construction and Reconstruction[1]
• Road construction/reconstruction excepted if needed to protect public health and safety, to conduct Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action, pursuant to reserved or outstanding rights, to prevent irreparable resource damage, to implement a road safety improvement project.
• Road construction/reconstruction is excepted if needed for a Federal Aid Highway project that meets certain criteria and is approved by the Secretary of Agriculture.
• Road construction/reconstruction is excepted if needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease by the Secretary of the Interior as of January 12, 2001, or for a new lease issued immediately upon expiration of an existing lease.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations, or Management Prescriptions, Forest-wide Standards and Guidelines, Plan Components developed under the 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition.
• No change to Timber Land Suitability.

[1/] See detailed descriptions of prohibitions/exceptions in 2001 Roadless Rule.

Prohibition on Road Construction and Reconstruction

Under this alternative, roads may not be constructed or reconstructed in an IRA unless the Responsible Official determines that one of the following circumstances exists:

(1) A road is needed to protect public health and safety in cases of an imminent threat of flood, fire, or other catastrophic event that, without intervention, would cause the loss of life or property;

(2) A road is needed to conduct a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to conduct a natural resource restoration action under CERCLA, Section 311 of the Clean Water Act, or the Oil Pollution Act;

(3) A road is needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty;

(4) Road realignment is needed to prevent irreparable resource damage that arises from the design, location, use, or deterioration of a classified road and that

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cannot be mitigated by road maintenance. Road realignment may occur under this paragraph only if the road is deemed essential for public or private access, natural resource management, or public health and safety;

(5) Road reconstruction is needed to implement a road safety improvement project on a classified road determined to be hazardous on the basis of accident experience or accident potential on that road;

(6) The Secretary of Agriculture determines that a Federal Aid Highway project, authorized pursuant to Title 23 of the United States Code, is in the public interest or is consistent with the purposes for which the land was reserved or acquired and no other reasonable and prudent alternative exists; or

(7) A road is needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease by the Secretary of the Interior as of January 12, 2001, or for a new lease issued immediately upon expiration of an existing lease. Such road construction or reconstruction must be conducted in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with all applicable lease requirements, land and resource management plan direction, regulations, and laws. Roads constructed or reconstructed pursuant to this paragraph must be obliterated when no longer needed for the purposes of the lease or upon termination or expiration of the lease, whichever is sooner.

Alternative 2

Alternative 2 includes all the items detailed in the following sections:

- Features Common to All Alternatives
- Features Common to All Action Alternatives
- Features Common to Alternatives 2, 3, 4, and 6

Alternative 2 maximizes roadless acres by designating 9.22 million roadless acres in three AKRA categories: LUD II Priority, Watershed Priority, and Roadless Priority (see large-scale color map). This alternative provides for additional timber harvesting potential while maximizing roadless area protections across the Tongass National Forest. Additional timber harvest opportunities are provided by dropping roadless area protection within roadless areas that have been determined to include roads (known as roaded roadless areas). This alternative maximizes roadless area protections by adding 137,000 acres to AKRAs and applying the Watershed Priority management category. Table 2-3 summarizes the key elements of Alternative 2. The 137,000 acres of added roadless areas are the LUD II areas not designated as roadless in 2001, small islands and areas that are currently unroaded, and unroaded areas identified in the 2016 Forest Plan amendment process that were greater than 5,000 acres. The 137,000 acres were added to AKRAs to offset the impacts of dropping 113,000 acres from AKRAs. The additional roadless protections to unroaded islands also provide for long-term continued recreational and outfitter and guide opportunities of these islands. Table 2-3 summarizes the key elements of Alternative 2.

The Watershed Priority management category would be applied to 3,214,000 acres of roadless areas identified as T77 Watersheds and TNC/Audubon Conservation Areas. The Watershed Priority management category provides limited exceptions as provided by the 2001 Roadless Rule and ensures activities needed for fisheries protection, maintenance, or improvement could occur.

Alternative 2 would convert a net of 18,000 suitable old-growth acres and suitable 10,000 young-growth acres previously identified as unsuitable timber lands to suitable timber lands.

Table 2-3
Key Element Summary for Alternative 2

Roadless Areas
• Converts inventoried roadless areas to 9.22 million acres of AKRAs, including 5.15 million acres in Roadless Priority, 3.21 million acres in Watershed Priority, and 0.85 million acres in LUD II Priority categories.
Prohibition on Tree Cutting[1]
• Under the Roadless Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule. • Under the Watershed Priority category, timber harvest exceptions are slightly narrower than under the 2001 Roadless Rule. • Under the LUD II Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule.
Prohibition on Road Construction and Reconstruction[1]
• Under the Roadless Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule. • Under the Watershed Priority category road construction/reconstruction exceptions are slightly narrower than under the 2001 Roadless Rule. • Under the LUD II Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations or Management Prescriptions, Forest-wide and Guidelines, Plan Components developed under the 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition. • Change to Timber Land Suitability: A net of 18,000 old growth acres and 10,000 young growth acres previously identified as unsuitable timber lands are made suitable timber lands.

[1] See detailed descriptions of prohibitions/exceptions in Table 2-1.

Alternative 3

Alternative 3 includes all the items detailed in the following sections:

- Features Common to All Alternatives
- Features Common to All Action Alternatives
- Features Common to Alternatives 2, 3, 4, and 6

This alternative designates 8.10 million roadless acres into one category of AKRAs: Roadless Priority (see large-scale color map). Alternative 3 provides for more additional timber harvest opportunities than Alternative 2 while maintaining roadless area protections as much as feasible. Additional timber harvest opportunities are provided through the dropping of roadless areas from roaded roadless areas and extending areas dropped from roadless protection to areas most likely to be considered for timber harvesting, areas adjacent to existing road systems. The areas removed from roadless protection were considered to be the

logical extensions of the existing road and harvest systems, which was generally defined as the nearest watershed boundary (ridgeline of a 14th-field hydrologic unit) from an existing road system. These areas were removed based on the premise that the logical extension from the existing infrastructure is the most likely location for future timber harvest and would have the least impact while providing for additional timber opportunities. Table 2-4 summarizes the key elements of Alternative 3.

Alternative 3 also adds 108,000 acres to AKRAs. These added roadless areas are small islands and areas that are currently unroaded, and unroaded areas identified during the 2016 Forest Plan amendment process that were greater than 5,000 acres. The additional roadless protections to unroaded islands also provides for long-term continued recreational and outfitter and guide opportunities of these islands.

Alternative 3 proposes a net decrease of 1.10 million roadless acres, as compared to the no action alternative. Alternative 3 would convert a net of 68,000 suitable old growth acres and 12,000 suitable young growth acres previously identified as unsuitable timber lands to suitable timber lands.

Table 2-4
Key Element Summary for Alternative 3

Roadless Areas
• Converts inventoried roadless areas to 8.10 million acres of AKRAs, all designated as Roadless Priority AKRA.
Prohibition on Tree Cutting[1]
• Under the Roadless Priority category timber harvest exceptions are slightlybroader than under the 2001 Roadless Rule.
Prohibition on Road Construction and Reconstruction[1]
• Under the Roadless Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations or Management Prescriptions, Forest-wide and Guidelines, Plan Components developed underthe 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition. • Change to Timber Land Suitability: A net of 68,000 old growth acres and 12,000 young growth acres, previously identified as unsuitable timber lands, are made suitable timber lands.

[1] See detailed descriptions of prohibitions/exceptions in Table 2-1.

Alternative 4

Alternative 4 includes all the items detailed in the following sections:

- Features Common to All Alternatives
- Features Common to All Action Alternatives
- Features Common to Alternatives 2, 3, 4, and 6

Alternative 4 designates 8.98 million roadless acres into three categories of AKRAs: LUD II Priority, Roadless Priority, and Timber Priority (see large-scale color map). This alternative was developed to provide for a high level of timber management opportunities while maintaining protection for Scenic Viewsheds, T77 Watersheds, and TNC/Audubon Conservation Areas. This alternative manages the AKRAs in Timber Production and Modified Landscape LUDs, as identified in the Forest Plan, under the Timber Priority AKRA category and converts them to suitable timber lands. In addition, the areas dropped from roadless protection under Alternative 3 because they are logical extensions of the existing road and harvest systems would also be removed from roadless protection under Alternative 4. Table 2-5 summarizes the key elements of Alternative 4.

Table 2-5
Key Element Summary for Alternative 4

Roadless Areas
• Converts inventoried roadless areas to 8.98 million acres of AKRAs, including 7.26 million acres in Roadless Priority, 0.86 million acres in Timber Priority, and 0.85 million acres in LUD II Priority categories.
Prohibition on Tree Cutting[1]
• Under the Roadless Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule.
• Under the Timber Priority category there are no timber harvest prohibitions.
• Under the LUD II Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule.
Prohibition on Road Construction and Reconstruction
• Under the Roadless Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
• Under the Timber Priority category there are no road construction/reconstruction prohibitions.
• Under the LUD II Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations or Management Prescriptions, Forest-wide and Guidelines, Plan Components developed under the 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition.
• Change to Timber Land Suitability: A net of 158,000 old growth acres (mostly in Timber Priority AKRAs) and 15,000 young growth acres previously identified as unsuitable timber lands are made suitable timber lands.

[1] See detailed descriptions of prohibitions/exceptions in Table 2-1.

Additionally, Alternative 4 adds 31,000 acres to AKRAs. These added roadless areas are LUD II areas not designated as roadless in 2001. No other lands would be added to AKRAs.

Alternative 4 proposes a net decrease of 224,000 roadless acres, as compared to the no action alternative. However, if the Timber Priority category lands are added to the non-roadless acres, the net decrease would be 1.08 million acres. Alternative 4 would convert a net of 158,000 suitable old growth acres and 15,000 suitable young growth acres previously identified as unsuitable timber lands to suitable timber lands.

Alternative 5

This alternative is the full exemption alternative, as requested in the State of Alaska's petition. As such, it removes all 9.20 million acres of inventoried roadless acres on the Tongass from roadless protection. Table 2-6 summarizes the key elements of Alternative 5.

Alternative 5 includes all the items detailed in the following sections:

- Features Common to All Alternatives
- Features Common to All Action Alternatives

Alternative 5 would add the following provision into the "Scope and Applicability" section of the 2001 Roadless Rule:

> "This subpart does not apply to road construction, road reconstruction, or the cutting, sale, or removal of timber in inventoried roadless areas on the Tongass National Forest."

The alternative would convert a net of 167,000 old growth acres and 20,000 young growth acres previously identified as unsuitable timber lands to suitable timber lands.

Table 2-6
Key Element Summary for Alternative 5

Roadless Areas
• Removes all 9.20 million acres of inventoried roadless acres on the Tongass from roadless protection.
Prohibition on Tree Cutting[1]
• There are no timber harvest prohibitions related to roadless.
Prohibition on Road Construction and Reconstruction[1]
• There are no road construction/reconstruction prohibitions related to roadless.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations or Management Prescriptions, Forest-wide and Guidelines, Plan Components developed under the 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition. • Change to Timber Land Suitability: A net of 167,000 old growth acres and 20,000 young growth acres previously identified as unsuitable timber lands are made suitable timber lands.

[1] See detailed descriptions of prohibitions/exceptions in Table 2-1.

Alternative 6

Alternative 6 includes all the items detailed in the following sections:

- Features Common to All Alternatives
- Features Common to All Action Alternatives
- Features Common to Alternatives 2, 3, 4, and 6

This alternative designates 6.91 million roadless acres into two categories of AKRAs: Roadless Priority and LUD II Priority (see large-scale color map). Alternative 6 maximizes timber management opportunities by removing Timber Production, Modified Landscape, and Scenic Viewshed LUDs identified in the Forest Plan from roadless protection, including T77 Watersheds and TNC/Audubon Conservation Areas within those development LUDs. In addition, areas with mineral potential as defined by the "minerals overlay" defined in the Forest Plan are removed from roadless protection. Table 2-7 summarizes the key elements of Alternative 6.

Alternative 6 proposes a net decrease of 2.29 million roadless acres, as compared to the no-action alternative, and would convert a net of 167,000 suitable old growth acres and 17,000 suitable young growth acres previously identified as unsuitable timber lands to suitable timber lands.

Table 2-7
Key Element Summary for Alternative 6

Roadless Areas
• Converts inventoried roadless areas to 6.91 million acres of AKRAs, including 6.08 million acres in Roadless Priority and 0.83 million acres in LUD II Priority categories.
Prohibition on Tree Cutting[1]
• Under the Roadless Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule.
• Under the LUD II Priority category timber harvest exceptions are slightly broader than under the 2001 Roadless Rule.
Prohibition on Road Construction and Reconstruction[1]
• Under the Roadless Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
• Under the LUD II Priority category road construction/reconstruction exceptions are slightly broader than under the 2001 Roadless Rule.
Tongass Land and Resource Management Plan
• No changes to Goals and Objectives, Land Use Designations or Management Prescriptions, Forest-wide and Guidelines, Plan Components developed under the 2012 Planning Rule, Projected Timber Sale Quantity (PTSQ), Projected Wood Sale Quantity (PWSQ), and the Young-growth Transition.
• Change to Timber Land Suitability: A net of 167,000 old growth acres (mostly in Timber Priority AKRAs) and 17,000 young growth acres previously identified as unsuitable timber lands are made suitable timber lands.

[1] See detailed descriptions of prohibitions/exceptions in Table 2-1.

Alternatives Considered but Eliminated from Detailed Analysis

Sometimes alternatives are suggested or proposed that on examination do not adequately respond to the purpose and need for the action, are technically or economically cost prohibitive, are not ripe for consideration, are remote or speculative, are substantially similar in design to an existing alternative, would have substantially similar effects as an existing alternative, or the authority does not exist to approve such actions (Forest Service Handbook 1909.15, Section 14.4). In such cases, these alternatives are usually eliminated from detailed analysis. Alternatives that were considered and eliminated from detailed analysis are described below, along with the rationale for their elimination.

- Giving management of Tongass National Forest to state of Alaska. This alternative was eliminated because it does respond to the purpose and need, which is to consider options for a state-specific roadless rule that will better incorporate the economic interest concerns and statutory concerns while conserving roadless area characteristics.
- Congressional changes to 2001 roadless rule in Alaska. This alternative dismissed because it is outside of the authority of the USDA
- Use of the 2003 or 2008 IRA layers as the new
- More restrictive buffer for certain areas/communities.

Commented [U11]: The decision not to use these updated inventories is arbitrary.

Comparison of the Alternatives

This section briefly compares the environmental consequences of the six alternatives with respect to the key issues described in Chapter 1. This comparison is based on the effects analyses presented in Chapter 3.

The following subsections provide the issue statement for each key issue described in Chapter 1 and the units of measure used to analyze their effects. Hereafter the term “issues” is synonymous with “key issues.” After these subsections, the alternatives are compared with respect to each issue. Important comparison tables are also presented. Table 2-8, at the end of this section, compares each alternative in terms of the quantitative and qualitative measures associated with each alternative. This table allows the reader to compare the effects of the alternatives on all issues simultaneously, so that a cumulative picture of the net effects can be obtained.

Issue 1 – Protection of roadless area characteristics from road development and timber harvest activity

Issue Summary

The Tongass National Forest includes numerous large, undeveloped areas often approaching or exceeding 1 million acres. These roadless areas have high value as unfragmented fish and wildlife habitats, offer exceptional opportunities for primitive recreation and/or solitude, and are important for tourism, inherent

passive use values, and ecosystem services values that they provide. Dropping of roadless area designations, increases the potential for development through timber harvest, road construction, and mineral or energy development, resulting in the deterioration of roadless area characteristics.

Units of Measure

- Qualitative degree of protection for roadless area characteristics
- Total acres of roadless areas by protection category
- Acres of roadless area removed and added
- Acres of roadless area within Development LUDs

Comparison

Roadless area protection can be defined in terms of both the acres designated as roadless and the degree of protection provided by the specific variations of the roadless rule language. In terms of acres designated, Alternatives 1 and 2 provide the highest degree of protection with over 9.2 million acres designated and Alternative 5 provides the lowest with zero acres designated. Alternative 6 removes all roadless designations within Development LUDs and has the second lowest number of acres designated roadless with 6.9 million acres. Roadless protection within development LUDs provides the highest degree of protection because the restrictions on development provided by the LUDs themselves are generally the lowest among the Forest Plan LUDs. Alternatives 3 and 4 are intermediate in terms of the acres designated roadless. However, the roadless protection provided in development LUDs by Alternative 4 is much lower than for Alternative 3 because all Timber Priority AKRAs under Alternative 4 are in development LUDs.

The roadless rule language under Alternative 1 would be unchanged from the 2001 Roadless Rule; the rule language would be modified under Alternatives 2, 3, 4, and 6; and it would be eliminated under Alternative 5. The proposed Roadless Priority and LUD II Priority categories would be very slightly more permissive in terms of road construction, timber harvest, and mineral development, and would be slightly more permissive in terms of energy and transportation project development. The Watershed Priority category would be slightly less permissive relative to all of these development types and the Timber Priority category under Alternative 4 would be substantially more permissive in terms of these types of development, especially timber harvest and road construction.

As a result, Alternatives 1, 2, and 3 would rank very high in terms of their overall protection of roadless characteristics. Alternative 3 would be very slightly less protective than Alternatives 1 and 2; however, because the majority of roadless protection removals would be in LUD II areas, which are already managed “in a roadless state to retain their wildland character” (USDA Forest Service 2016a, Forest Plan, Land Use Designation II goal description), and because its protection of development LUDs is high compared with Alternatives 4, 5, and 6, it would still rank very high/high overall. Alternative 4 has a substantial acreage designated as roadless; however, these acres include not only the LUD II areas within the IRAs but also 31,000 additional acres of new LUD II areas. As noted above, LUD II areas are already managed to protect roadless characteristics. In addition, 861,000 roadless acres under Alternative 4 are designated as Timber Priority, which provides essentially no protection for roadless characteristics.

Therefore, it is given a high/moderate rating. As indicated above, Alternatives 5 and 6 would rank the lowest in terms of roadless protections. However, they are ranked as moderate in terms of overall protection due to the degree of protections provided by Forest Plan non-development LUDs (especially LUD II, Remote Recreation, Semi-remote Recreation, Old-growth Habitat, Special Interest Area, Wild River, Scenic River, and others). For example, 84 percent of the area that would be removed from roadless protections under Alternative 5 is in non-development LUDs.

Issue 2 – Support for Southeast Alaska resource-based industries and local/regional socioeconomic well-being

Issue Summary

The Tongass National Forest plays a critical role in supporting the local and regional economy, promoting economic diversification, and enhancing rural community well-being. Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors. The visitor industry, seafood industry, and resource extraction industries contribute to local jobs and income alongside public sector employment. While the visitor and seafood industries have grown to become the greatest private-sector employers across Southeast Alaska, resource extraction remains important, especially in some rural communities where jobs are limited and unemployment is often high. The protections or restrictions (depending on one's viewpoint) provided by roadless designations can have negative effects on some industries and positive effects on others.

Units of Measure

- Qualitative degree of support for forest products industry
- Qualitative degree of support for visitor industry
- Qualitative degree of support for fisheries industry
- Qualitative degree of support for minerals development potential
- Qualitative degree of support for energy project development potential
- Qualitative degree of support for major transportation projects
- Acres of forest land suitable for timber production (old growth and young growth)
- Acres of increase in suitable old growth by land category
- Acres of increase in high-volume suitable old growth by land category

Comparison

Support for Southeast Alaska resource-based industries and local/regional socioeconomic well-being is compared among the alternatives by industry/category in the following subsections.

Forest Products Industry

The 2016 Forest Plan established an average annual PTSQ of 46 million board feet (MMBF) prior to the young-growth transition. The old-growth contribution to the PTSQ is expected to start out high and decrease over time as more young growth becomes economic to harvest. During the first decade, an average of about 12 MMBF of young growth and 34 MMBF of old growth was expected to be sold. From Year 11 through Year 15, an average of about 28 MMBF of young growth and 18 MMBF of old growth were expected to be sold annually. Old-growth volume offered was projected to decrease until it reaches 5 MMBF per year (expected to occur about Year 16), at which point it is to be stabilized at 5 MMBF per year to support small operators and specialty products such as wood for musical instruments. Young-growth sales are expected to continue to increase at a rapid rate after Year 16 and are expected to reach an upper limit of 98 MMBF about Year 18. If less than the average annual figure of 46 MMBF is sold in the early years of a decade, the Forest Plan allows the difference to be added to the sale quantity for the remainder of the decade. During the initial two years of the 2016 Forest Plan, the total volumes sold were 30.7 MMBF (fiscal year 2017) and 9.0 MMBF (fiscal year 2018), substantially lower than the PTSQ annual rate.

None of the action alternatives would result in changes to the PTSQ and the timber objectives of the Forest Plan would continue to require transitioning to primarily young-growth harvest. Therefore, harvest levels are not expected to vary significantly among the alternatives. However, the alternatives do vary in terms of the amount and location of acres suitable for timber production. Greater acreage of suitable land would provide greater flexibility in the selection of future timber sale areas, as well as the potential for more flexibility in sale design, depending on the planning areas selected. This improved flexibility could, in turn, potentially improve the Forest Service's ability to offer economic sales that meet the needs of industry. This greater flexibility could be especially beneficial during the first two decades of the 2016 Forest Plan (the transition period), when most old-growth harvest would take place.

Under Alternative 1, about 230,000 acres of old growth and 334,000 acres of young growth are suitable for timber production. The young-growth suitable acres would increase only slightly (3 to 6 percent) under the action alternatives. For old growth, however, the suitable acreage increase would range from 8 percent for Alternative 2 to 72 percent for Alternatives 5 and 6. For Alternatives 3 and 4, the increase would be 29 percent and 69 percent, respectively. Suitable old-growth acres would be added in three broad categories or areas: roaded roadless (Alternatives 2 to 6), logical extension areas (Alternatives 3 to 6), and areas more distant from roads (Alternatives 4 to 6). The added suitable acres in areas where roads already exist or could be logically extended are generally considered relatively economic to harvest due to their locations along or near existing transportation systems. The additional more distant acres added under Alternatives 4 to 6 are farther from transportation systems and less likely to be economic to harvest or improve the Forest's ability to offer economic sales.

Recreation and Tourism Industry

Changes in land management have the potential to affect outfitter/guide operations that provide commercial recreation opportunities on the Forest. Impacts to existing outfitter/guide use are likely to be greatest where changes in roadless protections allow development in remote areas that are used for outfitter/guide activities dependent on high scenic integrity and undisturbed landscapes. Changes in roadless area protections could also affect outfitter/guide use in other adjacent or nearby areas as outfitter/guides displaced from one location seek other places to take clients. Some use areas are presently at capacity, which could serve to exacerbate potential displacement effects. Long-term changes in roadless area management could affect the Forest's ability to meet future outfitter/guide demand, especially for operators seeking more remote areas.

The outfitter/guide analysis prepared for this EIS used changes in suitable old-growth acres in conjunction with information on existing outfitter/guide use to help focus on potentially affected areas. The resulting analysis identified 15 outfitter/guide use areas where potential conflicts between existing outfitter/guide use and future management could occur. In most of these areas, existing outfitter/guide use occurs near areas where development has occurred in the past, either near or along shorelines and/or Forest road systems. Similarly, in most cases, harvest that could already occur in these areas (under Alternative 1) has the potential to conflict with existing outfitter/guide use. In most of these areas, by expanding the acres available for harvest, Alternatives 4 to 6 could add to these potential impacts by increasing the number and geographic extent of the acres affected.

Salmon Harvesting and Processing

None of the alternatives are expected to have a significant change to the commercial fishing or fish-processing industries over the planning period. Riparian Management standards and guidelines established in the 2016 Forest Plan would remain in place under all of the alternatives. While there would be some variation in the level of protection, these variations are not expected to affect the fishing industry. The future of the fishing industry in Southeast Alaska is more likely to depend upon occurrences outside of the Tongass National Forest such as hatchery production, offshore harvest levels, and changes in ocean conditions.

Mining and Mineral Development

Locatable minerals development is possible within roadless areas under all alternatives. The General Mining Act of 1872 authorizes and governs prospecting and mining for economic minerals on federal public lands, including roadless areas. Changes in roadless management are, therefore, not expected to affect existing or future locatable mineral exploration or mining activities on the Forest.

Roadbuilding is, however, currently prohibited for any new leasable mineral projects, including geothermal projects, within IRAs. Changes in management under Alternatives 2 to 6 would allow road development to differing degrees. However, the Tongass has no current leasable mineral activity and the anticipated demand for leasable minerals is expected to remain low. As a result, changes in roadless management are expected to have limited impacts on related economic activity.

Energy Project Development Potential

Energy project development within roadless areas is possible under all alternatives. Although access is permitted under Alternative 1, there is likely to be a slight improvement in the potential for energy project development under each of the action alternatives because of the broadening of the rule language regarding access for the construction, expansion, or maintenance of hydroelectric and other renewable energy projects and related infrastructure, including transmission lines.

Major Transportation Project Development Potential

With some exceptions, federal and state road development is currently limited in IRAs. Exceptions include roads with reserved or outstanding rights, roads provided for by statute or treaty, or road development related to a Federal Aid Highway. Roadless protection would be removed to various degrees under the action alternatives with corresponding implications for regional highway development. In most cases, changes in roadless management, as well as changes in the number of acres managed as roadless, would be more permissive with respect to regional road systems.

Issue 3 – Protection of terrestrial and aquatic habitat and biodiversity from road development/timber harvest activities

Issue Summary

The Tongass includes large, undeveloped, and natural land areas that represent large, unfragmented blocks of wildlife habitat. This scale and size of contiguous habitat is not available elsewhere in the NFS, except on the Chugach National Forest. Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. The Tongass Forest Plan Conservation Strategy was developed to maintain the integrity of the old-growth forest ecosystem, and thereby conserve biodiversity across the Forest, by retaining intact, largely undisturbed habitat. In addition, because of its predominantly undeveloped nature, a number of wide-ranging species find optimal habitat in the more remote areas of the Forest.

Fish and the aquatic resources on the Tongass National Forest support major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. The Tongass includes many high-value, intact watersheds that were designated to be managed for intact ecological values and aquatic habitat productivity. Roadless designation and the resultant protections provided are generally beneficial to wildlife and fish habitats and biodiversity.

Units of Measure

- Percent of existing and original productive old growth harvested over the long term
- Percent of original high-volume productive old growth harvested over the long term

- Percent of original large-tree productive old growth harvested over the long term
- Acres of young-growth harvest in sensitive areas
- Average road density over the long term
- Percent of Wildlife Analysis Areas (WAAs) with road density <0.7 miles/square mile
- Qualitative ratings of species-specific effects

Comparison

Old-Growth Habitat

Relative to old-growth habitat conservation, all of the alternatives would have old-growth harvest levels similar to the level predicted by the selected alternative (Alternative 5) of the Forest Plan FEIS (USDA Forest Service 2016b). There may be slightly more high-volume and large-tree productive old growth (POG) harvested under the action alternatives than was predicted for the Forest Plan selected alternative because of the increased options for creating positive timber sales. However, this is speculative and depends also on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under the action alternatives, is lower than the proportion in the Alternative 1 suitable acres.

Young Growth in Special Habitats

Young growth suitable for timber harvest occurs in a number of special habitats under the Forest Plan, including Riparian Management Areas, Beach and Estuary Fringe, and the Old-growth Habitat LUD. Young growth on specific portions of these areas may be harvested under required prescriptions and following specific guidelines. The suitable acres of young growth on these special areas will increase slightly under the action alternatives, but only slightly because the vast majority of existing young-growth stands are not in roadless areas. Therefore, little to no difference among the alternatives is expected.

Road Density

Although slightly more road miles may be developed under the action alternatives, the average road densities on NFS lands and the percent of WAAs with road density less than 0.7 miles per square mile are expected to be similar to that predicted under the selected alternative of the Forest Plan FEIS. Although it is impossible to predict future road miles under the alternatives, it is likely that Alternatives 1 and 2 would be virtually the same, Alternative 3 would have slightly more road miles, and Alternatives 4, 5, and 6 would have the most road miles because they add the most remote suitable timber acres.

Fish Habitat

Effects on the fish habitats are expected to be nonexistent under all alternatives, because of the strong protections to fish habitats provided by Forest Plan LUDs, Forest-wide standards and guidelines including the riparian management strategy, and the lack old-growth harvest or associated road construction

permitted in the T77 Watersheds. Localized effects on fish habitat may occur, but these are expected to be negligible overall.

Species-Specific Effects

The transition to young-growth management would continue to slow the long-term decrease in deer habitat capability due to the reduction in POG harvest, under all of the alternatives. Because long-term POG harvest and road densities are expected to be similar to those under the selected alternative of the Forest Plan Final EIS, the species-specific effects for the species identified in Table 2-8 are expected to be almost identical to that predicted under the selected alternative.

Table 2-8
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1 No Action	2 Roaded Roadless	3 Logical Extension	4 Partial Dev LUDs	5 Full Exemption	6 Full Dev LUDs
Key Issue 1 – Protection of Roadless Area Characteristics							
Overall Protection of Roadless Characteristics on the Tongass	Qualitative	Very High	Very High	Very High/High	High/Moderate	Moderate	Moderate
Total Roadless Area	Acres	9,200,000	9,222,000	8,103,000	8,976,000	0	6,905,000
Roadless Priority	Acres	N/A	5,151,000	8,103,000	7,261,000	0	6,079,000
LUD II Priority	Acres	N/A	855,000	0	855,000	0	826,000
Watershed Priority	Acres	N/A	3,214,000	0	0	0	0
Timber Priority	Acres	N/A	0	0	860,000	0	0
Roadless Area Removed	Acres	0	113,000	1,202,000	255,000	9,200,000	2,297,000
Roadless Area Added	Acres	0	115,000	105,000	31,000	0	2,000
Roadless Area in Development LUDs	Acres	2,137,000	2,102,000	1,903,000	1,955,000[1/]	0	0
Key Issue 2— Support for Southeast Alaska Resource-based Industries							
Forest Products Employment	Qualitative	No Change	Very Slight Beneficial Effect	Slight Beneficial Effect	Slight Beneficial Effect	Slight Beneficial Effect	Slight Beneficial Effect
Recreation/Tourism (Visitor) Industry Employment	Qualitative	No Change	No Change	Negligible Effect	Very Slight Adverse Effect	Slight Adverse Effect	Slight Adverse Effect
Fisheries Employment	Qualitative	No Change	No Change	No Change	No Change	No Change	No Change
Minerals Development Potential	Qualitative	No Change	Very Slight Improvement	Very Slight Improvement	Very Slight Improvement	Very Slight Improvement	Very Slight Improvement
Renewable Energy Project Development Potential	Qualitative	No Change	Slight Improvement	Slight Improvement	Slight Improvement	Slight Improvement	Slight Improvement
Potential for Development of State Roads and Other Transportation Projects	Qualitative	No Change	Slight Improvement	Moderate Improvement	Moderate Improvement	Moderate Improvement	Moderate Improvement
Forest Land Suitable for Timber Production							
Old Growth	Acres	230,000	248,000	298,000	388,000	396,000	396,000
Young Growth	Acres	334,000	344,000	346,000	349,000	354,000	351,000

Alternatives Including the Proposed Action 2

Table 2-8 (continued)
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1 No Action	2 Roaded Roadless	3 Logical Extension	4 Partial Dev LUDs	5 Full Exemption	6 Full Dev LUDs
Increase in Suitable Old Growth							
In Roaded Areas	Acres	0	18,000	18,000	18,000	18,000	18,000
In Logical Extensions of Roaded Areas	Acres	0	0	50,000	50,000	50,000	50,000
In Areas More Distant from Roads	Acres	0	0	0	90,000	99,000	99,000
TOTAL	**Acres**	**0**	**18,000**	**68,000**	**158,000**	**167,000**	**167,000**
Increase in High-Volume Suitable Old Growth							
In Roaded Areas	Acres	0	6,000	6,000	6,000	6,000	6,000
In Logical Extensions of Roaded Areas	Acres	0	0	20,000	20,000	20,000	20,000
In Areas More Distant from Roads	Acres	0	0	0	29,000	34,000	34,000
TOTAL	**Acres**	**0**	**0**	**26,000**	**55,000**	**59,000**	**59,000**
Key Issue 3 – Protection of terrestrial and aquatic wildlife habitat and biodiversity							
Percent of existing productive old growth harvested after 100 years	Percent	1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Percent of original productive old growth remaining after 100 years (92% in 2015)	Percent	91	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Percent of original high volume productive old growth remaining after 100 years (83% in 2015)	Percent	83	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Percent of original large-tree productive old growth remaining after 100 years (82% in 2015)	Percent	81	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
YG Harvest in Beach and Estuary Fringe after 100 years (all prescriptions)	Acres	3,546	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
YG Harvest in Riparian Management Areas after 100 years (all prescriptions)	Acres	882	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
YG Harvest in Old Growth Habitat LUD after 100 years (all prescriptions)	Acres	1,796	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Average road density on NFS lands after 100 years (0.20 miles/square mile in 2016)	Miles/Sq. Mile	0.23	Similar to Alt 1	Similar to Alt 1	Very Slightly Higher than Alt 1	Very Slightly Higher than Alt 1	Very Slightly Higher than Alt 1

Table 2-8 (continued)
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1 No Action	2 Roaded Roadless	3 Logical Extension	4 Partial Dev LUDs	5 Full Exemption	6 Full Dev LUDs
Average road density on All lands within Tongass boundary after 100 years (0.33 miles/sq.mi.in 2016)	Miles/Sq. Mile	0.45	Similar to Alt 1	Similar to Alt 1	Very Slightly Higher than Alt 1	Very Slightly Higher than Alt 1	Very Slightly Higher than Alt 1
Percent of WAAs with road density on NFS lands <0.7 miles/sq. mile after 100 years (85% in 2016)	Percent	83	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Percent of WAAs with road density on All lands <0.7 miles/sq. mile after 100 years (79% in 2016)	Percent	72	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Species-Specific Effects							
Goshawks – Likelihood of maintaining viable, well-distributed populations after 100 years	Rating	Very High	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Marten – Likelihood of maintaining viable, well-distributed populations after 100 years	Rating	Very High	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Wolf – Likelihood of maintaining viable, well-distributed populations after 100 years	Rating	Very High	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Brown Bear – Likelihood of maintaining viable, well-distributed populations after 100 years	Rating	Very High	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Endemic Mammals – Likelihood of maintaining viable, well-distributed populations for all endemics after 100 years	Rating	Moderate to High	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1
Deer habitat capability on NFS Lands after 100 years in Terms of Percent of Original (1954) Habitat Capability (89% currently)	Percent	88	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1	Similar to Alt 1

[1] Note the 1,955,000 acres of roadless under Alternative 4 includes 860,000 acres of Timber Priority. If Timber Priority is excluded, the Roadless Area in Development LUDs is 1,094,000 acres.
* 21 Biogeographic Provinces inside the Forest Boundary

Commented [U12]: Add moose and mountain lions both which exist in the Kake Community Use area (see attached OVK Community Use area map). What about Marbel Murrelets and Red Tail Flicker.

Commented [U13]: For the record please consider the attached Marten research by Natalie Dawson.

Commented [U14]: More roads will improve efficiency of wolf hunting of deer.

Commented [U15]: Deeper analysis is needed regarding the impacts of deer populations due to the increase of roads, forest fragmentation, and stem exclusion.

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 Code of Federal Regulations [CFR] 1500-1508). The discussions are combined 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. 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 the environmental impact statement (EIS) alternatives may affect the resource. Methodology and scientific accuracy is discussed for most resources.

Many of the relationships established and discussed in the 1997 Tongass Land and Resource Management Plan (Forest Plan) Revision Final EIS (FEIS), the 2003 Supplemental EIS (SEIS), the 2008 Forest Plan Amendment EIS, and the 2016 Forest Plan Amendment EIS are still valid and, therefore, are incorporated by reference in this EIS. However, this EIS updates some of this information to better reflect current conditions and focuses on the potential effects most relevant to the potential changes that could occur from this proposed action.

Analyzing Effects

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with implementation of each EIS 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. Mitigation measures are also described, where appropriate.

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 could 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 that 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. Some adverse effects can be reduced or mitigated by limiting the extent or duration of effects.

Short-term uses, and their effects, are those that occur annually or within the first 10 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 typically not made at this programmatic level. 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. The actual commitment to develop, use, or affect nonrenewable resources is made at the project level. The gradual decline in old-growth habitat may be considered an irreversible commitment. Irreversible and irretrievable commitments are not identified, as such, in the discussions.

For estimating the effects of alternatives at the programmatic level, the assumption is made that the kinds of resource management activities allowed under the Plan will in fact occur to the extent necessary to achieve the goals and objectives of each alternative. The actual location, design, and extent of such activities are, however, not known at this time because that is a project-by-project decision. In many cases, the discussions refer to the potential for effects to occur, realizing that in many cases these are only estimates. For example, harvests are assumed to occur at the level authorized by the Forest Plan, even though this level of harvest may or may not occur.

This proposal does not make site-specific decisions or authorize any ground-disturbing activities. Therefore, site-specific impacts of projects are not considered in this EIS and only broad environmental issues commensurate with program-level, landscape-scale decision making are considered. Impacts of future projects would need to be assessed on a project-by-project basis as they are proposed.

The effects analysis is useful in comparing and evaluating alternatives, but should not be applied per se to any specific location within the Forest. The actions analyzed here modify the way the Tongass Forest Plan is implemented. The Forest Plan is a strategic plan that establishes a long-term management framework for the Tongass National Forest. Within that framework, specific projects and activities will be proposed, approved, and implemented depending on specific conditions, budgets, needs, proposals, and circumstances at that time. The plan can only speculate about the projects that may be proposed and budgeted and the events that may occur that will force changes in the projects and the effects of these projects. Thus, the effects presented here are comparative in nature. Specific effects that can be meaningfully measured and evaluated generally occur at the project and activity stage.

An effort was made throughout this NEPA 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 was done where appropriate. 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. This EIS, along with the analyses presented in the 2016 and 2008 Forest Plan Amendments and the 1997 Forest Plan Revision FEIS, along with their planning records, will provide the decision-maker with the "essential" information needed to make a reasoned choice among alternatives.

Cumulative Effects

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. For this analysis, the area considered for cumulative effects varies according to the resource being assessed. Cumulative effects are discussed in detail for each resource in this chapter. Appendix A describes the projects considered for cumulative effects analysis.

For most aquatic or watershed-related resources, the area within the proclaimed Forest boundary (approximately 17.9 million acres, including 1.2 million acres of non-National Forest System [NFS] lands) was used and analyses were generally conducted at the watershed scale (sixth-level hydrologic unit).

For wildlife and other terrestrial resources, all of Southeast Alaska from Yakutat Bay southeast to the southeastern end of Alaska (approximately 21.6 million acres, including 4.8 million acres of non-NFS lands) is sometimes used as the study area, although some analyses will be based on the area within the Forest boundary, depending on the availability and quality of available information. The Southeast Alaska area includes all of Glacier Bay National Park and the State, Bureau of Land Management, and other lands in the vicinity of Haines and Skagway. Often, Wildlife Analysis Areas (WAAs) will be used to summarize information within these study areas. In addition, biogeographic provinces will be used to summarize cumulative effects information for wildlife and other terrestrial resources.

For social and economic, recreation, and related human uses, all of Southeast Alaska and beyond will be given consideration for cumulative effects, especially regarding economic, market, and other factors.

Existing conditions reflect the extensive changes brought about by long-term human occupancy and use of the forest and represent the present-day condition resulting from past and present actions. Direct and indirect effects include the short- and long-term effects that would result from each of the alternatives considered in this EIS. Cumulative effects may result when the direct and indirect effects associated with the alternatives are added to the effects associated with other past, present, or reasonably foreseeable actions. Cumulative effects analyses are presented in the effects sections for each resource. Analysis of long-term cumulative effects extends at least 25 years into the future and to 100 years in many cases. A complete list of past, present, and reasonably foreseeable projects considered, is provided in Appendix A, Cumulative Effects.

Geographic Information System Database and Quantification for this EIS

The Forest Service has developed an extensive computerized geographic information system (GIS) database that is continually improved and is used for Forest Plan–level and project-level analyses. This system makes it possible to conduct spatial analysis of alternatives and effects, and to rapidly display resource information in map format. The GIS is a very large database, containing information on many of the resources of the Forest. Much of the data consist of map "layers," each representing a particular resource or attribute (such as forest type, soil type, or recreation places). Numerical data can also be stored, displayed, and analyzed. Computer technology and capability continues to improve and the Forest GIS program, especially at the project level, reflects such growth. Additional information, as well as improved information, is now available for many resource areas. This EIS takes advantage of the new technology capability and information.

The baseline numbers used to describe the existing condition do not always match the numbers in the 2016 Forest Plan EIS. This is primarily because of ongoing management of the Tongass National Forest. Examples include changes in land ownership, changes in resource conditions resulting from timber harvest and road construction, and forest plan amendments. In addition, the use of newer computer mapping and measurement techniques that are more accurate than earlier methods also affects the numbers. In general, the relative differences between previous documents and the baseline numbers used in this EIS are small, and do not affect the analysis relationships among these documents.

It should be noted that in some cases where the acreages are measured that depend on overlaying of multiple coverages, the acreage measurements for individual categories sometimes need to be adjusted to account for the fact that coverages do not always line up exactly in places where they should (e.g., along property boundaries, saltwater shorelines, lake edges). Very slight misalignment of the coverages can result in polygon slivers between the coverages, which can produce acreage differences initially. These differences can amount to tens or hundreds of acres or more, especially because we are dealing with such a large area (i.e., 17 million acres). However, on a percentage basis, these slivers and the adjustments that are necessary are insignificant.

It should also be noted that the figures presented are generally rounded to the nearest whole acre, tenth of a mile, or whole percent. Sometimes they are rounded to tens, hundreds, or thousands, but when numbers are given to the nearest acre or tenth of a mile, it does not necessarily mean that they are accurate to that level. No attempt has been made to adjust rounded numbers to force their sums to equal the expected totals. Therefore, the sum of rounded individual numbers will often be one digit higher or lower than the expected sum. The sums that are presented are the sums of the unrounded numbers.

Land Use Designation Groupings

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

Intensive Development. For some analyses, the LUDs are grouped into two categories: Wilderness and Natural Setting LUDs make up the non-development LUDs and Moderate and Intensive Development LUDs make up the development LUD category. Therefore, acreages in this EIS generally reflect the underlying LUD acreages. Table 3-1 displays these LUD groupings.

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

LUD Group	Land Use Designation
Non-development LUDs[4]	
Wilderness LUD Group	Wilderness
	Wilderness National Monument
	Nonwilderness National Monument
Natural Setting LUDs	LUD II
	Remote Recreation
	Semi-Remote Recreation
	Old-Growth Habitat
	Municipal Watershed
	Research Natural Area[1]
	Special Interest Area[1]
	Wild River[1]
	Scenic River
	Recreational River
Development LUDs	
Moderate Development	Experimental Forest[4]
	Scenic Viewshed
	Modified Landscape
Intensive Development	Timber Production
Overlay LUDs[2]	
	Minerals
	Transportation and Utility Systems[3] (Alternative 1 only)

Notes:

[1] These three LUDs function as overlay LUDs (see footnote 2) when they occur within Wilderness, Wilderness National Monument, or LUD II areas.
[2] The Minerals and Transportation and Utility Systems (TUS) LUDs are overlay LUDs. Areas allocated to these LUDs are managed according to the underlying LUD until such time that mineral or transportation or utility development is approved, if at all. Generally, acreages in this EIS do not include the Minerals or TUS LUDs, but rather the underlying LUD.
[3] The TUS LUD would be eliminated under Alternatives 2, 3, 4, and 5.
[4] Sometimes Experimental Forest, which is a minor LUD, is included with Non-development LUDs.

Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the different resources and how they are affected by the alternatives. These divisions vary by resource because the relationship of each resource to geographic conditions and zones also varies. Several of these divisions are described briefly here.

Watershed

The 6th-level hydrologic unit code polygons were used for some watershed/fisheries effects. These come from the national Watershed Boundary Dataset.

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 evaluation of Research Natural Areas and Wild and Scenic Rivers. See the *Research Natural Areas* section of the 1997 Forest Plan Revision FEIS for a description of each province.

Biogeographic Provinces

Biogeographic provinces 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.

Ecological Sections and Subsections

Ecological sections and subsections are two classification levels within a hierarchical system for subdividing ecosystems according to the National Hierarchical Framework of Ecological Units (see the *Biodiversity* section of this chapter).

The framework consists of eight nested mapping levels that serve a variety of purposes. Within the hierarchy, ecological sections characterize medium to large ecosystems (on the order of 1,000 square miles) and ecological subsections characterize mid-sized ecosystems (10 to 1,000 square miles). Fourteen ecological sections and 73 ecological subsections occur on the Tongass.

Value Comparison Units

Value Comparison Units (VCU) 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. VCUs were used for the 1979 Tongass Forest Plan to compare the relative values of various resources by location and have been modified to account for changes in allocation for Wilderness and LUD II. The Forest currently has about 945 VCUs averaging 18,000 acres in size.

Wildlife Analysis Areas

WAAs are land divisions used by the Alaska Department of Fish and Game. Approximately 190 WAAs apply to the Tongass National Forest; they average slightly less than 90,000 acres in size. In general, WAA boundaries correspond with VCU boundaries and they typically include three to eight VCUs (averaging just under five). They are used in the *Subsistence* and *Wildlife* sections.

Organization of Chapter 3

The remainder of Chapter 3 is divided into three parts. First, the three key issues are addressed. The focus of the EIS is on significant effects, with the analysis centered on the key issues. Next, the other important issues are discussed. The final section of Chapter 3 includes the dismissed issues, which are concerns raised by the public or interdisciplinary team that are outside the scope of this analysis, not relevant to this project, or would have zero or negligible effects.

Key Issues

Key Issue 1 – Protection of Roadless Area Characteristics

Issue Statement: Protection of roadless area characteristics from road development and timber harvest activity.

Background: The Tongass National Forest includes large undeveloped geographic areas, with several portions of the forest consisting of contiguous roadless areas that exceed 1 million acres and represent large, blocks of unfragmented wildlife habitats, undeveloped or natural areas, and offer exceptional opportunities for primitive recreation and/or solitude. This large scale of roadless lands does not exist anywhere else in the National Forest System (NFS), except on the Chugach National Forest in Southcentral Alaska. The majority of the Tongass National Forest is in a natural condition, unlike most other national forests, and the forest represents a significant portion of the world's remaining temperate rainforests.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism, inherent passive use values, and ecosystem services values they provide. Passive use values represent the value that individuals assign to a resource independent of their use of that resource and typically include existence, option, and bequest values. These values represent the value that individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation, carbon sequestration, and biological diversity.

Affected Environment

This section provides an overview of the existing conditions related to Inventoried Roadless Areas (IRAs) as defined in the Roadless Area Conservation Rule (2001 Roadless Rule; USDA Forest Service 2000) and assesses the potential direct, indirect, and cumulative effects of the alternatives on these areas. IRAs in the Alaska Region include 9.2 million acres (57 percent) of the Tongass National Forest. In some locations short-term "boom and bust" developments including fox farming, salmon canneries, mining, and military activity resulted in the temporary development and occupation of small areas mostly near the shoreline. Many of these areas have since been largely reclaimed by nature. Southeast Alaska residents (approximately 73,000) are, for the most part, surrounded by land that has many of the characteristics of wilderness. Routine travel and ordinary outdoor recreation activities typically require a higher degree of skill, risk-taking, and self-reliance than is usually required of adventurous backcountry visitors on other National Forests.

Several characteristics of IRAs on the Tongass are unique relative to other areas in the NFS. 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 IRAs exceeding 1 million acres, and thus represent large, unfragmented wildlife habitats and exceptional opportunities for solitude. Many of the Tongass IRAs represent wildlife habitats, ecosystems, and visual character, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forests, ice fields, and glaciers that exist nowhere else in the NFS. Many of these areas are remote and difficult to access for primitive recreation, and many contain other important resources, such as timber, minerals, and salmon-producing streams.

Roadless Area Characteristics

IRAs are defined as undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act, and were inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE) II process and subsequent updates and forest planning analyses. The Tongass is using the IRA boundaries associated with the 2001 Roadless Rule (USDA Forest Service 2000), which are identified in a set of maps, associated with the Forest Service Roadless Area Conservation, Final Environmental Impact Statement (FEIS), Volume 2, dated November 2000.

Roadless characteristics (i.e., values or features that make the area meet the minimum criteria for wilderness consideration under the Wilderness Act) are described in the Roadless Area Conservation FEIS and summarized below in Table 3.1-1 (USDA Forest Service 2000, Vol. 1, pp. 3-3 to 3-7).

The characteristics of the IRAs are described in Appendix C to the Tongass Land Management Plan Revision, Final Supplemental EIS (SEIS), Roadless Area Evaluation for Wilderness Recommendations (USDA Forest Service 2003b). These characteristics are also discussed in detail in the individual resource sections in this EIS.

Table 3.1-1
Roadless Characteristics

2001 Roadless Rule Characteristics
Biological Values
Diversity of plant and animal communities
Habitat for threatened, endangered, proposed, candidate, and sensitive species, and for those species dependent on large, undisturbed areas of land
Physical Values
High quality or undisturbed soil, water, and air
Sources of public drinking water
Social Values
Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of dispersed recreation opportunities
Reference landscapes
Natural appearing landscapes with high scenic quality
Traditional cultural properties and sacred sites
Other locally identified unique characteristics

Source: USDA Forest Service 2000

The roadless area 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 in a way that emphasizes relatively large undeveloped or natural areas, such as areas usually required for old-growth habitat, scenic backdrops, or primitive recreation.

Table 3.1-3 (in the *Environmental Consequences* section below) provides an overview of the IRAs identified in the 2001 Roadless Rule. These areas consist of approximately 9.2 million acres spread over 110 separate IRAs ranging in size from just 465 acres (Fake Pass IRA 532) to 1.19 million acres (Juneau-Skagway Icefield IRA 301). All but 5 of the 110 IRAs identified in the 2001 Roadless Rule are larger than 5,000 acres.

Ecosystem Services

Ecosystem services are the products of functioning ecosystems that often are available without direct costs to people who benefit from them (Kline 2006). These services have been described in a number of different ways including the typology developed by the Millennium Ecosystem Assessment (2005), which is featured on the Forest Service's Ecosystem Services web site (http://www.fs.fed.us/ecosystemservices/) and identifies four general categories of ecosystem services: provisioning, regulating, cultural, and supporting. Provisioning services include wild food, fresh water, and fiber. Regulating services are the benefits obtained from ecosystem impacts on natural processes, such as air quality, climate stabilization, water quality, and erosion. Cultural services include recreation, aesthetic, educational, and spiritual and religious benefits. Supporting services are the underlying processes that maintain the conditions for life on Earth, such as nutrient cycling and soil formation (Smith et al. 2011).

The concept of ecosystem services has emerged as a way of framing and describing the comprehensive set of benefits that people receive from nature. The Forest Service has been exploring use of these concepts to describe the benefits provided by forests, but the ecosystem service approach has not been applied operationally in a management context. The Forest Service's Pacific Northwest Research Station issued a technical report that attempts to define an economics research program to describe and evaluate ecosystem services (Kline 2006). More recently, the Pacific Northwest Research Station and the Deschutes National Forest have partnered to develop a place-based application to explore how this type of approach might be implemented by a national forest to enhance forest stewardship. Ecosystem services are discussed at the forest planning level for the Tongass National Forest in the 2008 Forest Plan EIS (USDA Forest Service 2008b, pp. 3-544 to 3-556). The 2008 Forest Plan EIS also discusses non-use values, including existence, option, and bequest values (USDA Forest Service 2008b, pp. 3-551 to 3-552).

Environmental Consequences

The following analysis evaluates roadless area protection in terms of the acres designated as roadless and the degree of protection provided by the specific variations of the roadless rule language. Variations in the roadless rule language would generally allow more activities to take place, but all management activities on the Forest would remain subject to the 2016 Forest Plan standards and guidelines that directly and indirectly protect roadless area characteristics.

Features Common to Alternatives 2, 3, 4, and 6

Alternatives 2, 3, 4, and 6 propose to correct and modify IRA boundaries based on ownership changes and updated mapping. Updated roadless areas would be known as Alaska Roadless Areas (AKRAs) and the Alaska Roadless Rule would apply to those identified lands. AKRAs would be assigned to one of four categories of Alaska roadless areas: Land Use Designation (LUD) II Priority,

Watershed Priority, Roadless Priority, and Timber Priority. These categories are described in Chapter 2 of this EIS and briefly summarized below:

- The **Watershed Priority** management category is more protective than the 2001 Roadless Rule and provides for activities specific to aquatic habitat improvement and protection. Alternative 2 is the only alternative with lands that would be managed under this category.
- The **LUD II Priority** management category provides for lands to be managed in a roadless state to retain their wildland character in accordance with applicable LUD II requirements.
- The **Roadless Priority** management category is similar to the 2001 Roadless Rule but is less restrictive and provides for Alaska specific concerns, specifically for infrastructure development to connect and support local communities, and road construction for leasable minerals.
- The **Timber Priority** management category excepts timber harvest and road construction/reconstruction within AKRAs to facilitate timber management. This management category is only proposed for Alternative 4.

As ordered above, these management categories proceed from most protective (Watershed Priority) to least protective (Timber Priority) of roadless area characteristics.

Effects Common to All Action Alternatives

Management activities have the potential to have detrimental effects to roadless area characteristics. This is especially the case with timber harvest and associated road building. Additional timber harvest opportunities would primarily be provided by dropping roadless protections for areas that are currently protected under the 2001 Roadless Rule (i.e., areas that are presently within IRAs). Timber harvest would also be allowed in AKRAs assigned to the Timber Priority management category.

Overall timber harvest levels and composition (old-growth versus young-growth) are expected to remain unaffected by the final rule. Timber program output levels are expected to remain constant and involve a similar number of acres under all alternatives, varying only by the location of tree cutting. The share of total harvest expected to occur within versus outside of current roadless areas would likely vary by alternative. Young-growth suitable acres would increase only slightly (2 to 5 percent) under the action alternatives and, as a result, the following assessment focuses on changes in old-growth suitable acres. After 25 years of Forest Plan implementation, an estimated 24,000 old-growth acres would be harvested. Old growth would continue to be harvested over time, but at a much reduced rate, with an estimated total of 42,500 old-growth acres expected to be harvested after 100 years.

Infrastructure development to connect and support local communities, and road construction for locatable minerals would also negatively affect roadless characteristics. These types of developments would be allowed in areas where roadless area protections are dropped and also in AKRAs assigned to the Roadless Priority and Timber Priority management categories. The impacts of these types of developments are expected to be limited, especially when viewed as a share of total protected acres. Limited development of these types would also be allowed in LUD II and Watershed Priority categories under some circumstances. Note also that some types of infrastructure development and mining are currently allowed under the 2001 Roadless Rule.

Comparison of Effects on Roadless Characteristics by Alternative

The following sections provide an overview of the potential effects to the roadless area characteristics identified in the 2001 Roadless Rule and summarized above in Table 3.1-1.

Roadless Characteristics: Biological Values

One major category of roadless area characteristics is biological value. Roadless areas are considered high in biological value if they contain a diversity of plant and animal communities and/or contain habitat for threatened, endangered, or sensitive species or wide-ranging species that are dependent on large, undisturbed tracts of land. These values are of special importance on the Alaska national forests and particularly on the Tongass, because it, along with adjacent areas in Canada, represents the largest intact tract of coastal temperate rainforest on earth. In addition, the fish and wildlife on the Tongass are of exceptionally high importance for subsistence, recreation, and the economic well-being of the residents and visitors of southeast Alaska.

Of primary importance and of highest value in roadless areas on the Tongass are biodiversity, especially associated with old-growth habitats, and sensitive species, endemic species, and the wide-ranging predators of Southeast Alaska. The threatened and endangered fish and wildlife associated with the Tongass National Forest are all marine-oriented species and have only minor associations with the roadless areas of the Tongass (see Key Issue 3, *Fish* and *Wildlife* sections of this EIS). There are no threatened or endangered plant species known to occur on the Tongass National Forest (see *Sensitive and Invasive Plants* section of this EIS).

Biodiversity and Old Growth Habitat Conservation Strategy

The biodiversity of the Tongass National Forest, especially associated with old-growth forests, is considered of high importance to residents and visitors to the Tongass and from a national and worldwide perspective as part of the largest remaining intact tract of coastal temperate rainforest habitat on earth. Protection of this unique resource has been given high priority by the Tongass National Forest through the Old Growth Habitat Conservation Strategy, which was originally developed for the 1997 Forest Plan and has subsequently been carried forward through the 2008 and 2016 Forest Plan Amendments (USDA Forest Service 2008a, 2016a).

The effects of the alternatives on biodiversity and the Old Growth Habitat Conservation Strategy are described in detail in the *Biodiversity* section of this EIS. Effects related to old-growth harvest acres are the same as those for Alternative 1 under the 2016 Forest Plan Amendment, which prescribes a harvest level much lower than the level originally allowed under the Conservation Strategy (see 1997 Forest Plan and 2008 Forest Plan Amendment). However, effects due to the distribution of harvest, related to fragmentation and connectivity, would vary. Alternatives 1, 2, and 3 would have very low effects, while Alternatives 4, 5, and 6 would have greater effects because of entry into more remote watersheds and roadless areas.

Sensitive Species

The Tongass National Forest currently has no fish, 16 plant, and 4 bird species designated as sensitive (see Key Issue 3, *Fish* and *Wildlife* sections and the *Sensitive and Invasive Plants* section). Of the 16 sensitive plant species, only 4 species have known occurrences expected to be within suitable young-growth or

old-growth harvest areas. For these populations and for previously undocumented populations that are located during project surveys, Forest-wide standards and guidelines under all alternatives would consider protection to minimize impacts to these species. Among the bird species, three are marine or shoreline species and are expected to be protected from almost all negative effects by Forest Plan LUDs and standards and guidelines. However, the Queen Charlotte goshawk (*Accipiter gentiles laingi*) is a wide-ranging species that seems to prefer mature and old-growth forest habitats for nesting and foraging. This species would be negatively affected under all alternatives; effects would generally be similar among the alternatives but slightly higher for Alternatives 4, 5, and 6 because of longer road developments and associated fragmentation expected under these alternatives relative to Alternatives 1, 2, and 3.

Endemic Species

By definition, endemic species occur in isolated populations and many have limited mobility or specific habitat requirements (see *Key Issue 3, Wildlife* section). Thus, they are vulnerable to the effects of habitat loss and fragmentation, introduced non-natives, pathogens and disease, natural events (i.e., climate change), and overharvesting (Dawson et al. 2007). Although timber harvest levels are the same among all alternatives, Alternatives 4, 5, and 6 would have the greatest potential for effects on endemics because the degree of fragmentation is likely to be higher under these alternatives (landscape connectivity and fragmentation are discussed in detail in the *Biodiversity* section). Most endemic species would benefit from the transition to young-growth harvest proposed under all alternatives due to the reduced amount of scheduled productive old-growth harvest over the long term.

Wide-ranging Predators

Three mammals are included in this category: Alexander Archipelago wolf (*Canis lupus ligoni)*, brown bear (*Ursus arctos*), and American marten (*Martes americana;* see Key Issue 3, *Wildlife* section). These species are of concern because their numbers are relatively low (they are at or near the top of the food chain), they are under harvest pressure (which is affected by access), they are sensitive to disturbance, and they range widely so they are often subject to many disturbances within their home ranges. Remote roadless areas often represent optimum habitats for them and may serve as important refugia for populations under harvest and development pressures. Of greatest concern on the Tongass is the Alexander Archipelago wolf, particularly on Prince of Wales and surrounding islands. Although the alternatives would be similar in terms of overall harvest levels, Alternatives 4, 5, and 6 would result in the largest negative effects on these species because of greater road lengths, penetration into remote roadless areas, and habitat fragmentation that they would produce relative to Alternatives 1, 2, and 3.

Roadless Characteristics: Physical Values

The physical values associated with roadless areas include soils, water, and air. The Tongass roadless areas are generally in pristine condition in terms of soils, water quality, and air quality.

Large acreages of excessive soil erosion, detrimental soil disturbance, or landslides attributed to management activities generally do not exist. However, there are localized areas within the roaded roadless portion that include past management-related soil impacts. During project-level analysis, areas sensitive to surface erosion or landslides are identified and appropriate mitigation measures including the Forest-wide standards and guidelines for Soil and Water (USDA Forest Service 2016a) are used to reduce surface erosion and sediment

production. Although timber harvest, energy resource development, mining activities, and other development would be similar under each alternative, the potential for adverse impacts on the soil and water resource in roadless areas would differ slightly among the alternatives based on different levels of projected roading. Alternatives 4, 5, and 6 would have a slightly larger potential for adverse effects, relative to Alternatives 1, 2, and 3, because they are expected to result in slightly more road development. However, the differences among alternatives would be minor because effects from those projected activities would be mitigated through the use of site-specific analysis, Forest-wide standards and guidelines, and other best management practices (BMPs), including post-project rehabilitation of disturbed soil. In addition, actual impacts on water quality anticipated from any alternative would be small in magnitude and scattered over a wide geographic area. Most of the potential effects would be of short duration, with disturbed soil areas rehabilitated after projects are completed in those areas.

Effects on air quality would also not substantially differ among alternatives. Based on the projected land management activities that differ among alternatives, atmospheric emissions in roadless areas are not anticipated to directly, indirectly, or cumulatively increase to a level that would be likely to exceed state or federal air quality standards. Air quality impacts from dust emissions would be negligible and would not vary significantly by alternative.

Roadless Characteristics: Social Values

The social values considered under roadless characteristics include scenic quality, recreation opportunities, traditional cultural properties and sacred sites, and other locally identified unique characteristics. The current condition of most roadless areas on the Tongass is nearly pristine in terms of these social values. Exceptions include the roaded roadless areas, where previous road development and timber harvest has taken place and localized areas along the shoreline where historic development has occurred or localized areas where mining-related activities have occurred.

Scenic Quality

The Tongass National Forest offers a variety of high-quality scenery to its visitors, from spectacular mountain ranges and glaciers to low-lying marine landscapes composed of intricate waterways, bays, and island groups. Scenic quality is based on two definable elements, landscape character and scenic integrity. Tongass roadless areas have natural appearing landscapes and have very high scenic integrity and generally have high value for landscape character as well. The exception for scenic integrity is the roaded roadless areas, which have significantly reduced scenic integrity because of past harvest and road construction. Roadless areas are viewed from a variety of vantage points, including the communities of Southeast Alaska, the Alaska Marine Highway ferry route, cruise ship routes, existing road systems, popular small boat routes and anchorages, small aircraft, and hiking trails.

Road construction and timber harvest can have varying degrees of negative effects on the scenic integrity of a landscape. In most studied viewsheds, the highest effects on scenery would be associated with Alternatives 5 and 6, followed in order by Alternative 4, Alternative 3, Alternative 2, and Alternative 1. In addition, Alternatives 4, 5, and 6 would likely result in more road development to reach more remote places, which would have a greater negative effect on scenery than with less road development under Alternatives 1, 2, and 3.

Recreation Opportunities

Approximately 95 percent of the 2001 roadless areas on the Tongass consist of primitive, semi-primitive non-motorized and motorized Recreation Opportunity

Spectrum (ROS) classes, and almost two-thirds of these are primitive. Under Alternative 2, roaded roadless areas would lose protection as roadless. These newly unprotected areas would provide 20,500 acres of suitable old growth and 10,900 acres of suitable young growth. These roaded roadless areas are 64 percent roaded modified and roaded natural and 35 percent semi-primitive non-motorized and motorized ROS. The remaining roadless areas under Alternative 2 would maintain approximately 95 percent of the remaining roadless areas on the Tongass as primitive, semi-primitive non-motorized and motorized ROS.

Under Alternative 3, the remaining roadless areas would maintain approximately 96 percent of the remaining roadless areas on the Tongass as primitive, semi-primitive non-motorized and motorized ROS. The areas removed from roadless designation would provide 70,400 acres of suitable old growth and 12,400 acres of suitable young growth. Under Alternatives 4 and 6, the remaining roadless areas would maintain approximately 97 and 98 percent of the remaining roadless areas on the Tongass as primitive, semi-primitive non-motorized and motorized ROS, respectively. The areas removed from roadless designation under these two alternatives would provide 157,900 to 166,600 acres of suitable old growth and 14,600 to 16,600 acres of suitable young growth. With Alternative 5, all roadless designations would be removed. The areas removed from roadless designation would provide 166,600 acres of suitable old growth and 19,900 acres of suitable young growth. Under Alternatives 1, 2, 3, 4, and 6, the retained roadless areas would remain similar in terms of their ROS allocations. The exception would be Alternative 5, which would include no retained roadless designations.

Similarly, outfitter-guide use on the Tongass includes activities in more remote areas. The vast majority of these areas would be retained under Alternatives 1, 2, and 3. Significantly more lands in the primitive ROS class would be removed under Alternatives 4, 5, and 6.

Traditional Cultural Properties and Sacred Sites

All alternatives require compliance with existing laws and regulations; therefore, before any management actions take place, the standard process for considering effects would be conducted as required by the implementing regulations for the National Historic Preservation Act. In most cases, a cultural resource inventory would be conducted and impacts would be avoided or mitigated. Tribal consultation is an integral part of the planning process for management actions; as well as consultations with the State Historic Preservation Officer and other interested parties.

For cultural and heritage sites, prior to management actions taking place on the ground under any alternative, resource inventories and appropriate mitigation are required by law. Increasing risk to cultural resources may occur under Alternatives 4, 5, and 6 because of greater road lengths. Otherwise, effects would be similar.

Locally Identified Unique Characteristics

A range of unique characteristics occur within the Tongass roadless areas. Many of these are already identified in the Forest Plan and managed as Special Interest Areas. These include Geological Areas, Recreation Areas, Zoological Areas, Botanical Areas, Cultural Areas, and Scenic Areas. Special Interest Areas cover 184,000 acres within 2001 roadless areas. In addition, a number of Research Natural Areas occur within the Tongass roadless areas (21,000 acres). Further, a number of river corridors are managed under the Forest Plan as wild and scenic rivers. Within 2001 roadless areas, there are 13,000 acres of

Recreational River, 15,000 acres of Scenic River, and 40,000 acres of Wild River. Finally, there are other small areas, not included within these special LUDs, such as areas with unique karst features that occur within roadless areas.

Altogether, these special LUDs cover 273,000 acres within 2001 roadless areas (Alternative 1). Under Alternative 2, these acres would actually increase slightly to 275,000 acres, and they would be little changed under Alternatives 3, 4, and 6 at 270,000 acres, 268,000 acres, and 272,000 acres, respectively. However, under Alternative 5, the roadless acreage within these special LUDs would drop to zero.

Alternative 1

Under Alternative 1 there would be no change in the boundaries of the IRAs identified in the 2001 Roadless Rule and no changes to current management (Table 3.1-2, Figure 3.1-1). This alternative would continue the general prohibitions on tree cutting, sale, and removal and road construction/reconstruction within IRAs (9.2 million acres), with some of those activities permitted under certain exceptions. There would be no impact to existing Forest-wide roadless characteristics under this alternative. Existing IRA boundaries would not be corrected or modified to address ownership changes and updated mapping.

Viewed relative to the action alternatives, along with Alternative 2, Alternative 1 would protect the most acres and existing management direction would provide the highest degree of protection, with the existing general prohibitions remaining in place.

Alternative 2

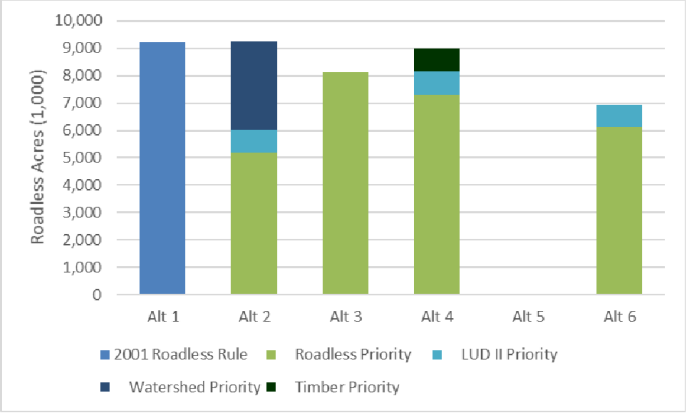
Under Alternative 2, there would be a net gain in roadless area acres, with 9.22 million acres managed as AKRAs (Table 3.1-2, Figure 3.1-1). As discussed in Chapter 2, this net increase in acres would result from gains exceeding reductions in roadless areas. In addition to gains and losses from ownership changes and updated mapping, gains would include the addition of LUD II acres not designated as roadless in 2001, while losses would include the removal of approximately 96,000 acres that currently have roads, referred to as “roaded roadless.” These areas were identified in the 2008 Forest Plan amendment process and subsequently updated in the 2016 Forest Plan amendment process. Roaded roadless areas have been substantially altered due to road construction and/or timber harvesting and no longer possess roadless area characteristics.

Table 3.1-2
Roadless Areas by Alternative and Management Category

Roadless Category (acres)	Alternative 1 No Action	2 Roaded Roadless	3 Logical Extension	4 Partial Dev LUDs	5 Full Exemption	6 Full Dev LUDs
Total Roadless Area	9,201,000	9,220,000	8,103,000	8,976,000	0	6,905,000
AKRA Management Categories						
Roadless Priority	na	5,151,000	8,103,000	7,261,000	0	6,079,000
LUD II Priority	na	855,000	0	855,000	0	826,000
Watershed Priority	na	3,214,000	0	0	0	0
Timber Priority	na	0	0	860,000	0	0
Change in Roadless Area Acres						
Roadless Area Removed	0	112,701	1,201,896	255,098	9,200,133	2,297,175
Roadless Area Added	0	132,500	104,112	30,704	0	2,280
Net Change	0	19,799	-1,097,784	-224,394	-9,200,133	-2,294,895
Old-Growth Acres Suitable for Harvest						
Total Acres	230,000	248,000	298,000	388,000	396,000	396,000
Net Change	0	18,000	68,000	158,000	167,000	167,000

na = not applicable

Figure 3.1-1
Roadless Areas by Alternative and Management Category



The removal of roaded roadless acres from roadless protection and other removals and additions would convert a net of about 18,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest. The projected harvest on these suitable acres would be about 3,000 acres over 100 years (assuming a uniform distribution of the projected old-growth harvest over all suitable old-growth lands). Harvest in these areas would further reduce the limited roadless characteristics that remain in roaded roadless areas.

Roadless area increases larger than 100 acres would be distributed over 24 IRAs, with increases ranging from 101 acres to 2,861 acres. Almost two-thirds of the suitable old-growth lands in roaded roadless are located on existing road systems in six 2001 IRAs: North Kupreanof (IRA 211), North Revilla (IRA 526), Twelvemile (IRA 534), Lindenberg (216), South Zarembo (IRA 237), and West Wrangell (IRA 288) (Table 3.1-3). Most of the increase (95 percent) in suitable acres would be in the five ranger districts on the south part of the Forest (Craig, Ketchikan-Misty Fiords, Petersburg, Thorne Bay, and Wrangell (Table 3.1-4, Figure 3.1-2).

Table 3.1-3
Total Acres by 2001 Inventoried Roadless Area and Net Increase in Suitable Old-Growth Acres by IRA and Action Alternative

Ranger District[1]	Roadless Area Number	Roadless Area Name	Total IRA Acres	Increase in Suitable Old-Growth Acres[2]				
				ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
PRD	201	Fanshaw	48,116	0	0	0	0	0
PRD	202	Spires	533,184	1	3,136	6,026	6,771	6,771
PRD	203	Thomas	739	-739	-739	0	0	0
WRD	204	Madan	67,695	0	0	0	0	0
WRD	205	Aaron	78,547	0	0	0	0	0
WRD	206	Cone	127,862	0	0	0	0	0
WRD	207	Harding	173,125	0	0	0	0	0
WRD	208	Bradfield	197,789	0	0	0	0	0
WRD	209	Anan	36,635	0	16	16	16	16
WRD	210	Frosty	37,296	101	326	1,693	1,693	1,693
PRD	211	North Kupreanof	114,242	2,861	4,696	10,610	10,610	10,610
PRD	212	Missionary	16,652	788	1,855	2,468	2,553	2,553
PRD	213	Five Mile	18,802	1	1,113	1,256	1,263	1,263
PRD	214	South Kupreanof	216,279	2	2	882	882	882
PRD	215	Castle	49,129	0	0	0	0	0
PRD	216	Lindenberg	25,743	2,056	4,316	6,392	6,761	6,761
PRD	217	Green Rocks	10,575	214	237	319	328	328
PRD	218	Woewodski	9,988	0	0	0	0	0
PRD	220	East Mitkof	7,921	0	0	551	551	551
PRD	223	Manzanita	8,384	0	964	966	966	966
PRD	224	Crystal	18,321	2	462	1,866	2,025	2,025
WRD	225	Kadin	2,000	0	0	0	0	0
WRD	227	North Wrangell	7,829	408	2,674	2,674	2,674	2,674
WRD	229	South Wrangell	14,110	0	0	2,368	2,369	2,369
WRD	231	Woronkofski	11,047	0	0	0	0	0
WRD	232	North Etolin	40,834	-5	1,185	1,326	2,402	2,402
WRD	233	Mosman	53,018	0	216	216	272	272
WRD	234	South Etolin	26,122	0	191	1,443	1,443	1,443
WRD	235	West Zarembo	6,780	0	0	264	264	264
WRD	236	East Zarembo	10,845	224	224	3,024	3,123	3,123
WRD	237	South Zarembo	36,236	1,594	2,551	5,138	5,138	5,138
WRD	238	Kashevarof Islands	4,564	0	0	0	0	0
PRD	239	Keku	8,976	0	0	5	5	5
PRD	240	Security	31,277	17	574	1,418	1,418	1,418
PRD	241	North Kuiu	6,352	-1,298	0	512	513	513

Table 3.1-3 (continued)
Total Acres by 2001 Inventoried Roadless Area and Net Increase in Suitable Old-Growth Acres by IRA and Action Alternative

Ranger District[1]	Roadless Area Number	Roadless Area Name	Total IRA Acres	Increase in Suitable Old-Growth Acres[2]				
				ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
PRD	242	Camden	36,458	0	1,886	1,886	1,886	1,886
PRD	243	Rocky Pass	76,625	0	0	256	256	256
PRD	244	Bay of Pillars	26,948	0	0	0	0	0
PRD	245	East Kuiu	26,770	0	-207	608	608	608
PRD	246	South Kuiu	61,576	0	0	0	0	0
WRD	247	East Wrangell	7,224	12	369	369	369	369
WRD	288	West Wrangell	8,825	1,140	1,292	1,299	1,299	1,299
WRD	289	Central Wrangell	13,097	0	0	2,147	2,147	2,147
WRD	290	Southeast Wrangell	18,336	20	819	819	819	819
JRD	301	Juneau-Skagway Icefield	1,186,325	0	0	7	7	7
JRD	302	Taku-Snettisham	660,070	0	0	0	0	0
JRD	303	Sullivan	66,831	0	0	0	0	0
JRD	304	Chilkat-West Lynn Canal	193,891	256	256	3,420	4,341	4,341
JRD	305	Juneau Urban	100,269	0	0	0	1	1
JRD	306	Mansfield Peninsula	52,598	0	0	0	0	0
JRD	307	Greens Creek	26,813	0	0	0	0	0
JRD	308	Windham-Port Houghton	159,941	0	0	5	5	5
JRD	310	Douglas Island	24,381	0	0	0	0	0
HRD/SRD	311	Chichagof	551,179	-265	2,220	8,312	8,824	8,824
HRD/SRD	312	Trap Bay	13,166	13	972	972	972	972
JRD	313	Rhine	22,794	0	0	0	0	0
SRD	314	Point Craven	10,722	0	0	0	490	490
HRD	317	Point Augusta	15,445	0	1,377	2,532	2,532	2,532
HRD	318	Whitestone	5,612	0	0	705	856	856
HRD	319	Pavlof-East Point	4,906	45	348	348	414	414
SRD	321	Tenakee Ridge	20,511	2	1,222	3,529	3,577	3,577
HRD/SRD	323	Game Creek	49,835	805	1,093	7,177	7,177	7,177
HRD	325	Freshwater Bay	43,122	79	79	4,889	4,889	4,889
SRD	326	North Kruzof	31,563	0	0	55	55	55
SRD	327	Middle Kruzof	14,659	6	6	2,360	2,360	2,360
SRD	328	Hoonah Sound	78,330	0	0	0	0	0
SRD	329	South Kruzof	54,417	-22	0	4	4	4
SRD	330	North Baranof	310,357	45	45	6,602	6,604	6,604
SRD	331	Sitka Urban	110,793	0	0	97	97	97
SRD	332	Sitka Sound	13,101	0	0	0	0	0
SRD	333	Redoubt	66,850	8	8	12	12	12
SRD	334	Port Alexander	118,900	0	-1,298	0	0	0
YRD	338	Brabazon Addition	498,080	0	0	0	0	0
YRD	339	Yakutat Forelands	317,008	0	0	0	0	0
YRD	341	Upper Situk	16,371	0	0	0	0	0
HRD	342	Neka Mountain	6,100	0	0	0	0	0
HRD	343	Neka Bay	6,936	0	-149	0	0	0
CRD	501	Dall Island	103,659	0	-3	0	0	0
CRD	502	Suemez Island	19,795	0	7	1,505	1,505	1,505
CRD	503	Outer Islands	97,788	0	0	0	8	8
CRD	504	Sukkwan	43,846	0	-22	1	1	1
CRD	505	Soda Bay	63,292	416	1,133	2,620	2,624	2,624
CRD	507	Eudora	190,211	233	313	1,073	1,986	1,986
TRD	508	Christoval	8,968	133	133	320	320	320
TRD	509	Kogish	63,429	757	7,018	7,018	7,018	7,018

Table 3.1-3 (continued)
Total Acres by 2001 Inventoried Roadless Area and Net Increase in Suitable Old-Growth Acres by IRA and Action Alternative

Ranger District[1]	Roadless Area Number	Roadless Area Name	Total IRA Acres	Increase in Suitable Old-Growth Acres[2]				
				ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
CRD	510	Karta	51,047	701	3,468	5,201	6,160	6,160
TRD	511	Thorne River	72,971	263	1,959	2,304	2,665	2,665
TRD	512	Ratz	5,323	40	40	210	210	210
TRD	514	Sarkar	51,350	41	457	494	494	494
TRD	515	Kosciusko	63,537	-149	1,211	1,568	1,568	1,568
TRD	516	Calder	8,573	0	0	0	0	0
TRD	517	El Capitan	26,081	124	212	4,431	5,029	5,029
TRD	518	Salmon Bay	22,615	169	443	1,179	1,179	1,179
CRD	519	McKenzie	76,010	603	1,632	2,387	2,387	2,387
TRD	520	Kasaan	7,572	0	0	0	0	0
KRD	521	Duke	44,382	0	0	0	0	0
KRD	522	Gravina	37,104	0	0	1,020	1,021	1,021
KRD	523	South Revilla	51,620	89	3,571	3,672	3,673	3,673
KRD	524	Revilla	29,017	0	678	1,330	1,330	1,330
KRD	525	Behm Islands	4,327	0	0	0	0	0
KRD	526	North Revilla	212,613	2,489	6,325	14,375	15,025	15,025
KRD	528	Cleveland	185,414	0	0	0	101	101
KRD	529	North Cleveland	104,863	0	0	1	271	271
KRD	530	Hyder	121,289	0	0	0	2	2
CRD	531	Nutkwa	40,319	0	0	78	82	82
TRD	532	Fake Pass	465	0	0	0	0	0
CRD	533	Hydaburg	11,014	0	0	0	0	0
CRD	534	Twelvemile	37,894	2,133	3,193	3,376	3,376	3,376
KRD	535	Carroll	11,268	716	730	3,014	3,014	3,014
TRD	536	Kasaan Bay	6,210	767	870	870	870	870
KRD	577	Quartz	142,264	0	0	0	0	0
		Total	**9,200,872**	**17,897**	**67,708**	**157,895**	**166,565**	**166,565**

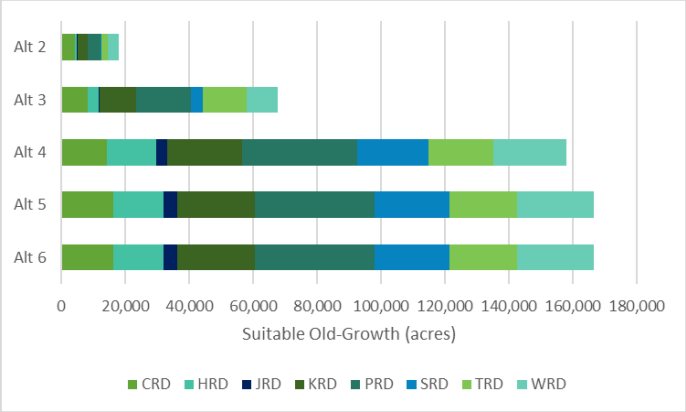
Notes:
IRA = Inventoried Roadless Area
[1] CRD = Craig Ranger District; HRD = Hoonah Ranger District; JRD = Juneau Ranger District; KRD = Ketchikan-Misty Fiords Ranger District; PRD = Petersburg Ranger District; SRD = Sitka Ranger District; TRD = Thorne Bay Ranger District; WRD = Wrangell Ranger District; YRD = Yakutat Ranger District
[2] Increases in suitable old-growth acres would occur in areas dropped from roadless area protection under all five action alternatives. In addition, under Alternative 4 suitable old-growth acres would also be available in AKRA areas managed for Timber Priority.

Table 3.1-4
Total Acres by 2001 Inventoried Roadless Area and Net Increase in Suitable Old-Growth Acres by Ranger District and Action Alternative

Ranger District	Total IRA Acres	Increase in Suitable Old-Growth Acres				
		Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
		Percent of Total Increase[2]				
Admiralty NM	15,300	0%	0%	0%	0%	0%
Craig	715,400	24%	12%	9%	10%	10%
Hoonah	410,100	2%	5%	10%	9%	9%
Juneau	2,478,700	1%	0%	2%	3%	3%
Ketchikan-Misty Fiords	944,100	18%	17%	15%	15%	15%
Petersburg	1,353,000	22%	25%	23%	22%	22%
Sitka	1,116,400	2%	5%	14%	14%	14%
Thorne Bay	356,500	10%	20%	13%	13%	13%
Wrangell	979,900	20%	15%	14%	14%	14%
Yakutat	831,500	0%	0%	0%	0%	0%
Total Acres[1]	**9,200,900**	**18,100**	**67,800**	**157,900**	**166,600**	**166,600**

Notes:
IRA = 2001 Inventoried Roadless Area; NM = National Monument
[1] Total IRA acres represent the total IRA acres for the Forest. Total acres presented by alternative are the estimated increase in suitable old-growth acres that would be available for harvest under each alternative.
[2] Percent of total increase identifies the share of the total Forest-wide increase in suitable old-growth acres by Ranger District.

Figure 3.1-2
Increase in Suitable Old-Growth Acres Available for Harvest by Ranger District and Alternative



Notes:
CRD – Craig Ranger District; HRD – Hoonah Ranger District; JRD – Juneau Ranger District; KRD – Ketchikan-Misty Fiords Ranger District; PRD – Petersburg Ranger District; SRD – Sitka Ranger District; TRD – Thorne Bay Ranger District; WRD – Wrangell Ranger District.
[1] There are no suitable old-growth acres on the Admiralty National Monument, and there would be no increase in suitable old-growth acres available for harvest on the Yakutat Ranger District under any of the alternatives.

AKRAs would be assigned to three roadless categories: LUD II Priority (9 percent), Watershed Priority (35 percent), and Roadless Priority (56 percent) (Table 3.1-2). None of these categories would allow commercial timber harvest or associated road building. The Watershed Priority management category is more restrictive than the 2001 Roadless Rule. Watershed Priority would be assigned to areas identified as Tongass 77 (T77) Watersheds in the 2016 Forest Plan (USDA Forest Service 2016a). Forest-wide, the majority of the AKRA acres would allow some forms of infrastructure development and mineral-related road construction, as is the case under Alternative 1, but they would be more explicitly allowed under Alternative 2. The impacts of these types of development are expected to be limited in terms of acreage covered, especially when viewed as a share of total protected acres.

Alternative 3

Under Alternative 3, there would be an overall reduction in roadless area acres, with an estimated total of 1.2 million acres removed from roadless protection, for a net loss of approximately 1.1 million acres due to roadless area additions. A total of 8.10 million acres would be managed as AKRAs under this alternative (Table 3.1-2). Like Alternative 2, this alternative would remove “roaded roadless” areas. In addition, areas adjacent to existing road and harvest systems would also be removed from roadless protection. These adjacent areas, considered “logical extensions” of the existing road and harvest systems within the same watersheds, would convert 50,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest. Altogether, the removal of roaded roadless and logical extension acres from roadless protection, along with the gains and losses from ownership changes and updated mapping, would result in a net increase of about 68,000 acres of suitable old-growth lands that would be available for harvest. The projected harvest on these suitable acres would be about 10,000 acres over 100 years (assuming a uniform distribution of the projected old-growth harvest over all suitable old-growth lands). Harvest in these areas would affect roadless characteristics that are presently protected under Alternative 1.

Increases in suitable old-growth lands available for harvest larger than 100 acres would be distributed over 44 IRAs, with increases ranging from 133 acres to 7,018 acres. Half of the suitable old-growth lands that would be made available for harvest under this alternative are located in eight IRAs. The largest increases (more than 4,000 acres each) would be in areas that are presently part of the Kogish (IRA 509), North Revilla (IRA 526), North Kupreanof (IRA 211), and Lindenberg (IRA 216) IRAs (Table 3.1-3). Most of the increase in suitable old-growth acres would be in the five ranger districts on the south part of the Forest (89 percent) with increases in these five districts ranging from 12 percent (Craig) to 25 percent (Petersburg) of the total (Table 3.1-4).

Roadless protection would also be removed from the 826,000 LUD II acres that are currently within an IRA. This change in management accounts for a large share of the drop in roadless area acres that would occur under this alternative. Alternative 3 proposes to remove all LUD II areas from roadless designation as a means of eliminating confusion and ensuring congressional intent. As a result, LUD II areas under Alternative 3 would retain their congressional protections and would continue to be managed “in a roadless state to retain their wildland character” (USDA Forest Service 2016b).

AKRAs would all be entirely assigned to the Roadless Priority management category under this alternative. The Roadless Priority category is similar to the 2001 Roadless Rule, but less restrictive with respect to some forms of infrastructure development and mineral-related road construction. The impacts of

these types of development are expected to be limited in acreage covered and affect a relatively small number of acres.

Alternative 4

Under Alternative 4, there would be an overall reduction in roadless area acres, with an estimated total of 255,000 acres removed from roadless protection, for a net loss of approximately 224,000 acres. A total of 9.0 million acres would be managed as AKRAs under this alternative (Table 3.1-2). The areas removed from roadless protection under this alternative would produce about 40,000 acres of suitable old-growth lands that would be available for harvest. In addition, the Timber Priority roadless category (see below) would result in the conversion of about 118,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest, resulting in a total of 158,000 acres of suitable old growth. Additions to roadless protection under this alternative include the LUD II acres not designated as roadless in 2001.

AKRAs would be assigned to three roadless categories: LUD II Priority (10 percent), Roadless Priority (80 percent), and Timber Priority (10 percent) (Table 3.1-2). The LUD II Priority and Roadless Priority categories, which account for the majority of AKRA acres (90 percent) under this alternative, do not allow commercial timber harvest or associated road building. Forest-wide, most of the AKRA acres (80 percent) would allow some forms of infrastructure development and mineral-related road construction, but the impacts of these types of development are expected to be limited in terms of acreage, especially when viewed as a share of total protected acres.

As noted above, the Timber Priority category (10 percent of AKRA acres) would except timber harvest and road construction from roadless protection, resulting in the conversion of about 118,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest. The AKRA acres that would be managed as Timber Priority roadless areas are allocated to Timber Development and Modified Landscape LUDs in the 2016 Forest Plan. The Timber Priority roadless areas often include areas farther from existing road systems, making them more expensive and less likely to be accessed for timber production under the current Forest Plan. If harvest were to occur in these areas, impacts to roadless characteristics would likely be more noticeable than in logical extension areas, which are, by definition, in watersheds where road development and harvest has occurred in the past.

Reductions in roadless areas (roaded roadless and logical extensions) and the allocation of AKRA acres to Timber Priority management would result in the total conversion of 158,000 acres of previously unsuitable lands to suitable old-growth. The projected harvest on these suitable acres would be about 17,000 acres over 100 years (assuming a uniform distribution of the projected old-growth harvest over all suitable old-growth lands). Harvest in these areas would affect roadless characteristics that are presently protected under Alternative 1.

Increases of 100 acres or more in suitable old growth within an individual roadless area would occur in 59 IRAs, with increases ranging from 210 acres to 14,375 acres. The largest gain in suitable old-growth acres would be in the North Revilla (IRA 526) IRA, followed by the North Kupreanof (IRA 211), Chichagof (IRA 311), Game Creek (IRA 323), and Kogish (IRA 509) IRAs (Table 3.1-3). Slightly less than three-quarters of the increase (74 percent) in suitable acres would be in the five south ranger districts (Craig, Ketchikan-Misty Fiords, Petersburg, Thorne Bay, and Wrangell), with shares ranging from 9 percent (Craig) to 23 percent (Petersburg) of the total (Table 3.1-4).

Alternative 5

Alternative 5 is the full exemption alternative, as requested in the State of Alaska's petition. Under this alternative, roadless protection would be removed

from all roadless areas on the Tongass, resulting in a net reduction of 9.2 million acres of roadless areas (Table 3.1-2). Former roadless areas would be managed in accordance with the 2016 Forest Plan. Existing protections to roadless characteristics provided by Forest Plan Non-development LUDs (including LUD II, Remote Recreation, Semi-remote Recreation, Old-growth Habitat, Special Interest Area, Wild River, Scenic River, and others) would remain in place.

Viewed in terms of suitable acres, the removal of all roadless area protections would result in the total conversion of about 167,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest. This is similar to the total additional acres that would be available under Alternative 4 (158,000 acres). The projected harvest on these suitable acres would be about 18,000 acres over 100 years (assuming a uniform distribution of the projected old growth harvest over all suitable old growth lands). Harvest in these areas would affect roadless characteristics that are presently protected under Alternative 1.

Overall increases in suitable old-growth larger than 100 acres would occur within 62 IRAs, with increases ranging from 101 acres to 15,025 acres. The largest gains in suitable old-growth acres would be in the same IRAs as Alternative 4, with the largest increase in North Revilla (IRA 526), followed by North Kupreanof (IRA 211), Chichagof (IRA 311), Game Creek (IRA 323), and Kogish (IRA 509) IRAs (Table 3.1-3). The increase suitable acres in the North Revilla IRA would be higher than under Alternative 4; the gains in the other four identified IRAs would be the same under both alternatives. Slightly less than three-quarters of the increase (74 percent) in suitable acres would be in the five south ranger districts (Craig, Ketchikan-Misty Fiords, Petersburg, Thorne Bay, and Wrangell). Increases in suitable old-growth in these five districts would range from 10 percent (Craig) to 22 percent (Petersburg) of the total (Table 3.1-4).

Alternative 6

Under Alternative 6, there would be an overall reduction in roadless area acres, with an estimated net loss of approximately 2.3 million acres. A total of 6.9 million acres would be managed as AKRAs under this alternative (Table 3.1-2). In addition to roaded roadless and logical extension areas, this alternative would remove all other Timber Production, Modified Landscape, and Scenic Viewshed LUDs identified in the 2016 Forest Plan from roadless protection, including T77 Watersheds and The Nature Conservancy/Audubon Conservation Areas within those development LUDs. Areas with mineral potential as defined by the “minerals overlay” in the Tongass Forest Plan would also be removed.

As with Alternative 5, this alternative would result in the total conversion of about 167,000 acres of previously unsuitable lands to suitable old-growth lands that would be available for harvest. The projected harvest on these suitable acres would be about 18,000 acres over 100 years (assuming a uniform distribution of the projected old growth harvest over all suitable old-growth lands). Harvest in these areas would affect roadless characteristics that are presently protected under Alternative 1. Suitable old-growth acres would be distributed across the same IRAs and ranger districts as they would be under Alternative 5, as summarized above (see also Tables 3-3 and 3-4).

AKRAs would be assigned to two roadless categories: LUD II Priority (12 percent) and Roadless Priority (88 percent) (Table 3.1-2). The LUD II Priority and Roadless Priority categories do not allow commercial timber harvest or associated road building. Forest-wide, most of the AKRA acres (88 percent) would allow some forms of infrastructure development and mineral-related road construction, but the impacts of these types of development are expected to be limited, especially when viewed as a share of total protected acres.

Ecosystem Services

Under the 2016 Forest Plan, timber management activities are governed by a large number of rules and regulations designed to protect or mitigate negative impacts to natural resources that provide ecosystem services. This is discussed further in the 2008 Forest Plan EIS (USDA Forest Service 2008b, pp. 3-553 to 3-556). These rules and regulations would remain in place under all of the alternatives evaluated in this EIS. The effects of the alternatives on these types of services are assessed in the sections of this EIS that address fisheries, wildlife and subsistence use, and timber and vegetation, among others. Monetary values are not assigned to these services, but this does not lessen their importance in the decision-making process. Decision-makers will consider the economic values discussed in the Key Issue 2 section within the context of the information presented elsewhere in this document, much of which cannot readily be translated into economic terms."

Cumulative Effects

The Council on Environmental Quality asks agencies to look at the effects of their similar and different actions to see if they may produce a cumulative effect greater than the sum of the effects (synergistic interaction). The alternatives have been reviewed for possible cumulative effects associated with the federal actions. The actions selected are those the Agency determined were most likely to have an influence on or from the Alaska Roadless Rule. While it is possible that changes to roadless area conservation could happen at a national scale, by future congressional or executive action, these possibilities for change are too speculative and, therefore, are not analyzed.

Cumulative actions affecting the Roadless Rule have included modifications to the Roadless Rule as it applies to Idaho and Colorado. In addition to modifying the Roadless Rule, Colorado roadless lands were removed from roadless. In addition, Utah is seeking a state-specific modification to the Roadless Rule. Table 3.1-5 summarizes the acres affected by modifications of the Roadless Rule, including past projects (Idaho and Colorado), potential future projects (Utah), and the alternatives being evaluated in this EIS for the Alaska Rule.

Under Alternative 1, 30 percent of the national roadless acres would have been modified or removed as a result of the Idaho, Colorado, and Utah Rule modifications. However, the total acres of roadless areas nationally would remain at almost 100 percent. Under Alternatives 2 through 6, the percent of national roadless acres modified would be 46 percent. The total acres remaining in roadless areas under Alternatives 2, 3, 4, and 6 would be 96 to almost 100 percent; however, this percentage would drop to 84 percent under Alternative 5.

Table 3.1-5
Summary of Acres Affected by Modifications of the National Roadless Rule along with the Acres Affected by Proposed Alaska Rule Modifications by the Alternatives

Category	Modifications Proposed by Alaska Rule					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Modifications by Idaho Rule	9,306,000	9,306,000	9,306,000	9,306,000	9,306,000	9,306,000
Modifications by Colorado Rule	4,186,000	4,186,000	4,186,000	4,186,000	4,186,000	4,186,000
Colorado Removals from Roadless (Net)	247,000	247,000	247,000	247,000	247,000	247,000
Proposed Modifications by Utah Rule	4,013,000	4,013,000	4,013,000	4,013,000	4,013,000	4,013,000
Proposed Alaska Rule Modifications	0	9,219,000	8,102,000	8,976,000	0	6,905,000
Proposed Alaska Removals from Roadless (Net)	0	20,000 (increase)	1,098,000	224,000	9,200,000	2,295,000
Total Acres Modified or Removed	**17,752,000**	**26,952,000**	**26,952,000**	**26,952,000**	**26,952,000**	**26,952,000**
Total Original Acres in Roadless Nationally	**58,453,000**	**58,453,000**	**58,453,000**	**58,453,000**	**58,453,000**	**58,453,000**
Percent of National Acres Affected	**30%**	**46%**	**46%**	**46%**	**46%**	**46%**
Percent of National Acres Remaining in Roadless	**100%**	**100%**	**98%**	**99%**	**84%**	**96%**

Source: National Datasets and To ngass GIS

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Key Issue 2 –Support for Southeast Alaska Resource-based Industries

Issue Statement: Tongass National Forest management must support local and regional socioeconomic well-being including community vibrancy, Alaska Native culture, rural subsistence lifestyles, and economic opportunity across multiple economic sectors.

Background: The Tongass National Forest comprises approximately 80 percent of Southeast Alaska and therefore plays a critical role in supporting local and regional economy, promoting economic diversification, and also enhancing rural community well-being. The visitor industry, seafood industry, and resource extraction industries contribute to local jobs and income alongside public sector employment spanning federal, state, and local government. While the visitor and seafood industries have grown to become the greatest private-sector employers across Southeast Alaska, resource extraction remains important in some rural communities where jobs are limited and unemployment is oftentimes high.

The Forest Service manages land for the multiple-use and sustained yield of all renewable resources. There is fragmentation and disagreement among the public regarding the best management of federal lands for economic development purposes and to support the overall economic vitality of Tongass National Forest communities. Many believe the visitor industry and seafood industries have become the mainstay of Southeast Alaska's economy and therefore should have prominence in Forest Service land management decision-making. Others note that resource extraction, including forest products and the minerals industry, continue to provide important jobs and income sources in remote and isolated Southeast communities. Furthermore, Southeast residents, communities, and Alaska Native tribes consistently provide reminders of the value of the Tongass National Forest for subsistence uses, recreational hunting and fishing, and independent travelers and outdoor enthusiasts – and, that these activities yield economic value as well.

Affected Environment

The Tongass National Forest stretches roughly 500 miles northwest from Ketchikan to Yakutat and includes approximately 80 percent of the land area in Southeast Alaska. The region is sparsely settled with an estimated 72,915 people living in more than 30 towns and villages located in and around the Forest in 2017, most of which are located on islands or along the narrow coastal strip (Alaska Department of Labor [DOL] 2018). The communities of Southeast Alaska depend on the Tongass National Forest in various ways, including employment in the wood products, commercial fishing and fish processing, recreation, tourism, and mining and mineral development sectors. Many residents depend heavily on subsistence hunting and fishing to meet their basic needs. In addition, natural amenities and recreation activities associated with the Tongass National Forest form an important part of the quality of life for many residents of Southeast Alaska. Since there is very little private land in the region to provide these resources and opportunities, appropriate management of the Tongass National Forest is extremely important to local communities and the overall regional economy.

The Tongass National Forest is also an important national and international resource. An estimated 1,212,000 people visited Southeast Alaska in 2016, with most of these visitors (86 percent) arriving by cruise ship (McDowell Group 2017). For many, a visit to the Tongass is a once-in-a-lifetime experience and

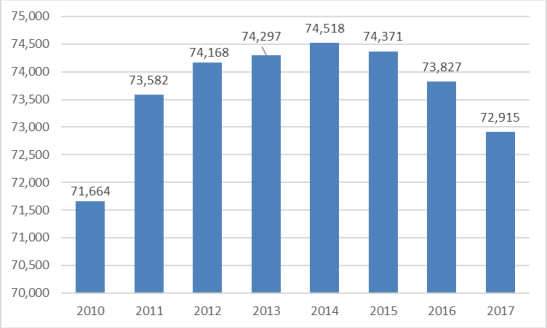
spending by these visitors helps drive the recreation and tourism sector. The Tongass National Forest contains large areas of essentially undisturbed forest lands, which represent increasingly scarce and, therefore, increasingly valuable ecosystems. These lands have value for many people who may never visit Southeast Alaska, but benefit from knowing that the Tongass National Forest is there. This type of value, often referred to as non-use value, includes existence, option, and bequest values. These values represent the value that individuals obtain from knowing that the Forest exists, knowing that it would be available to visit in the future should they choose to do so, and knowing that it will be left for future generations to inherit.

Regional Demographic Overview

Southeast Alaska is divided into eight boroughs and two census areas (CAs). The eight boroughs – Haines, Juneau, Ketchikan Gateway, Petersburg, Sitka, Skagway, Wrangell, and Yakutat – correspond with the county governments found elsewhere in the United States. The remaining areas that are not part of a borough are allocated to two CAs: the Hoonah-Angoon CA and Prince of Wales-Hyder CA. CAs are statistical units that are widely recognized from a data reporting standpoint by federal agencies and most state agencies as county equivalents. Boroughs and CAs are collectively referred to as “boroughs” in the remainder of this section.

Total regional population in Southeast Alaska peaked in 2014 and has since dropped three years in a row, by a combined total of 1,600 people (Figure 3.2-1). Population losses have been most dramatic in Juneau, with recent cuts in state sector employment contributing to a net reduction of 900 residents in 2016 and 2017. Much of these losses appear to be the result of young families moving away, with Juneau losing more than 300 children and 400 30-somethings. These reductions have been matched by a further decrease in K-12 enrollment in Southeast Alaska. Since 1997, annual enrollment has dropped by 3,400, a 23 percent decline (Southeast Conference 2018). This loss of young families has exacerbated the most pronounced regional demographic shift since 2010: the aging of the population, with the 60-plus population increasing by more than a third over this period due to aging in place (Southeast Conference 2018).

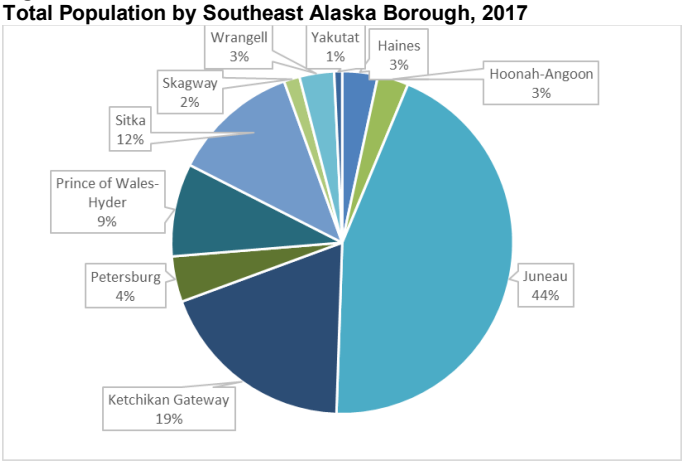
Figure 3.2-1
Total Population in Southeast Alaska, 2010 to 2017



Note:
1/ Data for 2010 are from the 2010 Census (April). Data for 2011 to 2017 are annual estimates.
Source: Alaska DOL 2018

The three largest communities – Juneau, Ketchikan, and Sitka – together accounted for 75 percent of total regional population in 2017 (Figure 3.2-2). Juneau, which is the state capital and a regional trade center, accounted for 44 percent of Southeast Alaska's total population in 2017 (Figure 3.2-2). Ketchikan Gateway Borough, the second largest borough in Southeast Alaska, accounted for about 19 percent of the region's population. Ketchikan is a smaller regional trade center that serves Prince of Wales Island and the surrounding area. Population is discussed in more detail in the *Subregional Overview and Communities* section of the 2016 Forest Plan FEIS (USDA Forest Service 2016b; pp. 3-525 to 3-535).

Figure 3.2-2
Total Population by Southeast Alaska Borough, 2017



Notes:
Total = 72,915 residents
Source: Alaska DOL 2018

The remote nature of the region is reflected in a population density of approximately two persons per square mile, which is much lower than the United States' average of 92 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 Alaska State ferry system transports people and vehicles between several ports in Southeast Alaska, and Prince Rupert, British Columbia, and Bellingham, Washington. Haines and Skagway, at the northern end of the Forest, and Hyder at the southern end, offer access to interior and Southcentral Alaska via the Alaska Highway, and Canada via the Cassiar Highway.

Regional Economic Overview

Southeast Alaska employment in 2017 is summarized by sector in Table 3.2-1. Government and the visitor sector were the largest employers accounting for 29 percent and 17 percent of total employment, respectively. The government sector is the main source of year-round employment in all the communities in Southeast Alaska. In addition to direct employment in government, many of the area's private sector jobs are also dependent on government funding and contracts.

Private sector activities dependent on government funding include road construction and health care services.

State government employment has dropped significantly since 2012, with a loss of 850 state jobs in Southeast Alaska from 2012 through July 2018. Three-quarters of these losses occurred in Juneau. These losses have accompanied declining oil production and prices, with state revenues falling by 70 percent from fiscal year 2013 to fiscal year 2018, and the state budget dropping by 40 percent. Federal government employment has also declined in Southeast Alaska over the past decade, with the loss of 600 jobs since 2005 (Southeast Conference 2018).

Table 3.2-1
Southeast Alaska Employment by Sector, 2017

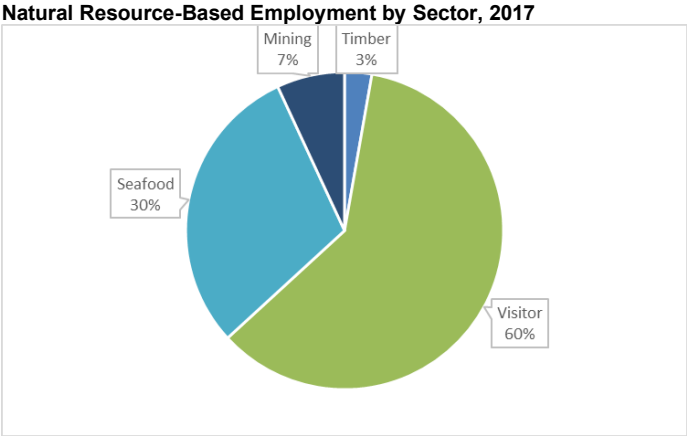
Economic Sector[1]	Total Employment (Jobs)	Total Earnings ($M)[2]	Percent of Total	
			Employment	Earnings
Government (includes Coast Guard)	13,256	769.0	29%	35%
Visitor	7,739	231.4	17%	11%
Seafood	3,829	216.5	8%	10%
Retail and Wholesale Trade	4,474	145.2	10%	7%
Health Care (private only)	2,732	150.1	6%	7%
Construction	1,932	121.9	4%	6%
Financial	1,964	118.5	4%	5%
Professional and Business Services	2,869	118.5	6%	5%
Social Services	886	90.5	2%	4%
Mining	1,580	46.1	3%	2%
Information[3]	571	23.9	1%	1%
Timber	354	18.7	1%	1%
Warehousing, Utilities, Transportation[4]	903	53.9	2%	2%
Other	2,551	91.8	6%	4%
Total	**45,640**	**2,195.9**	**100%**	**100%**

Notes:
[1] These data were compiled on behalf of Southeast Conference based on data collected by the Alaska DOL and the U.S. Census Bureau. The Alaska DOL data are for 2017 for non-agricultural wage and salary employment. These data do not include proprietors or self-employed workers, and are, therefore, supplemented using data from the 2016 US Census Nonemployer Statistics, which specifically count proprietors and the self-employed.
[2] Total earnings are expressed in millions of dollars.
[3] The Information sector, as defined here, includes publishing, broadcasting, and telecommunications.
[4] Includes non-visitor-related transportation only. Visitor-related transportation is included in the visitor sector.
Source: Southeast Conference 2018

Natural Resource-Based Industries

Direct employment in natural resource-based industries – timber, visitor, seafood, and mining – together accounted for an estimated 12,808 jobs in 2017, more than one-quarter (28 percent) of total employment in Southeast Alaska (Table 3.2-1). The estimated distribution of resource-dependent employment is shown by industry in Figure 3.2-3. The visitor industry accounted for more than half (60 percent) of this total, followed by the seafood sector, which accounted for almost one-third (30 percent). Mining accounted for 7 percent and wood products made up 3 percent (Figure 3.2-3).

Natural Resource-Based Employment by Sector, 2017



Notes:
Total = 12,808 Employees
Source: Southeast Conference 2018

Commented [U16]: This pie chart is wrong. Timber accounted for less then 1% of the jobs in 2018. See the table 3-30.

Nonresident and Seasonal Employment

Nonresident and seasonal employment are two important and related aspects of resource-dependent employment in Southeast Alaska. Many nonresidents work a relatively short time in Alaska, often for just two or three months, generally spend the bulk of their earnings elsewhere, and, as a result, contribute less to the regional economy than resident workers.

Nonresidents accounted for more than one-quarter (26 percent) of total estimated employment in Southeast Alaska in 2016 (Krieger et al. 2018). Viewed by borough, the estimated nonresident share of total employment ranged from about 19 percent in Juneau to 65 percent in Skagway. Seafood processing had the highest percentage of nonresident workers, with almost three-quarters of the labor force (74 percent) composed of nonresidents. The Arts, Entertainment, and Recreation sector and the Accommodation and Food Services sector in Southeast Alaska also had relatively high nonresident shares, 51 percent and 41 percent, respectively, as did the Mining sector (47 percent) (Krieger et al. 2018).

Southeast Alaska's economy is highly seasonal. This is particularly the case with the salmon-harvesting and seafood-processing sectors. Seasonal variation in the leisure and hospitality sector (used here as a proxy for the visitor industry) is substantially lower than the salmon harvesting and seafood processing sectors, but more than twice the Southeast Alaska average. Annual seasonal variation for mining and logging are lower than the Southeast Alaska average. Nonresident and seasonal employment are discussed in more detail in the 2016 Forest Plan FEIS (USDA Forest Service 2016b, pp. 3-482 to 3-484).

Industry-Specific Descriptions

Wood Products

Employment

Southeast Alaska timber is primarily purchased and harvested from Tongass National Forest lands managed by the USDA Forest Service, from the State of Alaska (Division of Forestry, Alaska Mental Health Trust Land Authority, and University of Alaska), and Alaska Native Village and Regional corporations (Native Corporations). Sawmill employment has historically been supported by Forest Service timber sales, with state timber harvest also contributing. Logging employment is generated from all ownerships, including Native Corporation lands.

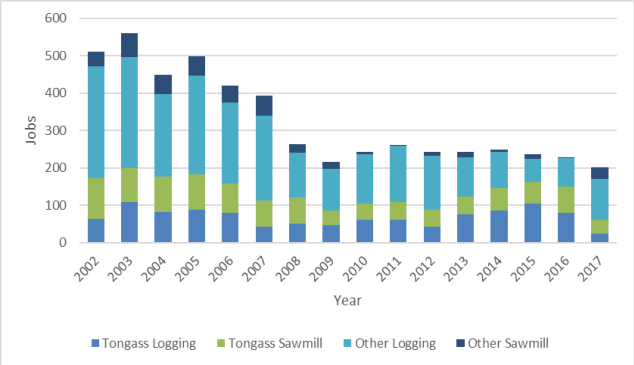
Timber employment in Southeast Alaska peaked at the end of the 1980s, before dropping sharply in the 1990s. Much of this job loss was associated with closure of the large pulp mills in Sitka (1993) and Ketchikan (1997). Timber employment has continued to decline since the 1990s, falling from a recent high of 561 jobs in 2003 to 202 jobs in 2017 (Table 3.2-2; Figure 3.2-4). Tongass National Forest-related employment in logging and sawmilling declined from 199 jobs in 2003 to a low of 61 jobs in 2017. Non-Tongass timber employment also declined over this period, falling from a recent high of 362 jobs in 2003 to 109 jobs in 2017, a drop of 70 percent (Table 3.2-2). From 2002 to 2017 harvest activities on the Tongass supported about 41 percent of timber jobs in Southeast Alaska, on average.

Table 3.2-2
Timber Industry Employment in Southeast Alaska, 2002-2017

Year[1]	Tongass Logging	Tongass Sawmill	Total Tongass-Related Employment	Other Logging	Other Sawmill	Total Other Timber Employment	Total Timber Industry Employment
2002	63	110	173	299	40	339	512
2003	108	91	199	298	64	362	561
2004	82	95	177	220	53	273	450
2005	88	96	184	263	52	315	499
2006	81	77	158	217	46	263	421
2007	44	70	114	225	54	279	393
2008	52	70	122	118	24	142	264
2009	48	39	87	110	19	129	216
2010	61	43	104	133	7	140	244
2011	62	47	109	150	3	153	262
2012	42	47	89	144	11	155	244
2013	75	48	123	106	14	120	243
2014	86	60	146	96	7	104	249
2015	104	58	162	63	12	75	237
2016	81	70	151	76	1	77	228
2017	24	37	61	109	32	141	202

Note:
[1] Data are presented by calendar year.
Source: USDA Forest Service 2018a

Figure 3.2-4
Timber Industry Employment in Southeast Alaska, 2002-2017



Source: USDA Forest Service 2018a

Harvest

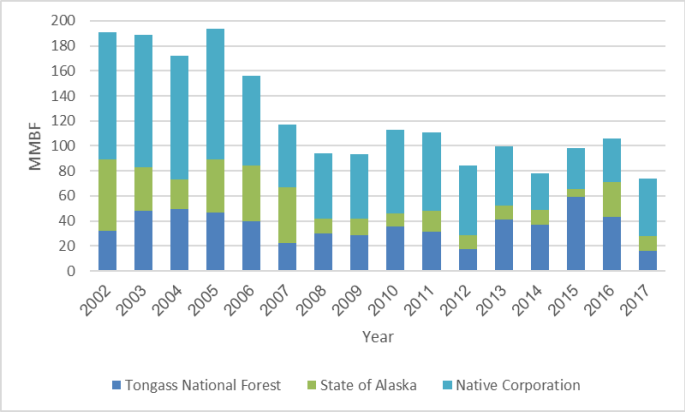
Timber harvest in Southeast Alaska also peaked in the late 1980s, with harvest levels slightly below 1,000 million board feet (MMBF). Total harvest in 2017 was 74.2 MMBF, about 8 percent of peak levels. Harvest on the Tongass accounted for about 21 percent (16.0 MMBF) of this total, with almost two-thirds (63 percent, 46.4 MMBF) of the overall total provided by Native Corporation lands and 16 percent (11.9 MMBF) provided by the State of Alaska (Table 3.2-3; Figure 3.2-5).

Table 3.2-3
Timber Harvest in Southeast Alaska by Ownership, 2002–2017

Year[1]	Tongass National Forest	State of Alaska[2]	Native Corporation	Total
2002	31.9	57.3	101.7	190.9
2003	48.1	34.8	105.7	188.6
2004	49.2	24.2	98.9	172.3
2005[3]	46.6	42.9	103.9	193.4
2006[3]	40.0	44.6	71.2	155.8
2007[3 4]	22.5	44.6	50.0	117.1
2008	30.0	11.9	52.3	94.2
2009	28.3	13.5	51.8	93.6
2010	35.7	10.5	66.4	112.6
2011	31.6	16.3	63.1	111.0
2012	17.5	10.8	56.1	84.4
2013	41.2	11.2	47.4	99.8
2014	36.7	12.0	29.3	78.0
2015	59.5	6.2	32.4	98.1
2016	43.5	27.5	34.6	105.6
2017	16.0	11.9	46.4	74.2

Notes:
[1] Timber harvest volume reported by calendar year, in million board feet (MMBF), and includes both sawlog and utility.
[2] State of Alaska includes Division of Forestry, Mental Health Trust, and University of Alaska public lands.
[3] The relative increase in State harvest was an effort to provide additional timber to make up for a shortfall in supply from the Tongass.
[4] The relative drop in Tongass harvest in 2007 was the result of an injunction that stopped Tongass logging over most of the operating season.
Source: USDA Forest Service 2018a

Figure 3.2-5
Timber Harvest in Southeast Alaska by Ownership, 2002-2017



Source: USDA Forest Service 2018a

2016 Forest Plan and the Tongass Timber Program

2016 Forest Plan

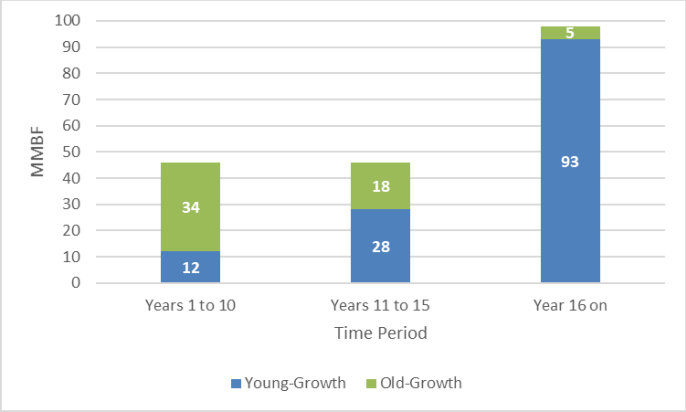
The 2016 Forest Plan amendment responded to a July 2013 Memorandum (1044-009) that directed the Forest Service to transition to a young-growth-based timber management program on the Tongass National Forest within 10 to 15 years, with the goal that at the end of this period the vast majority of timber sold by the Tongass will be young growth. The Secretary's memorandum indicated that this transition to young-growth should be implemented in a manner that would preserve a viable timber industry that provides jobs and opportunities for Southeast Alaska residents

The Forest Service Pacific Northwest (PNW) Research Station has prepared a number of long-term timber demand studies in support of forest planning efforts on the Tongass, including Brooks and Haynes (1990, 1994, 1997) and Brackley et al. (2006a, 2006b). The most recent of these studies (Daniels et al. 2016) was prepared in support of the 2016 Forest Plan amendment. Using methods adapted from the previous PNW Research Station analyses, Daniels et al. (2016) estimated demand for Tongass timber using a materials balance approach based on projected trends in product markets. The analysis projects future demand for timber ("derived demand") based on the overall end-market demand in foreign and domestic markets and the portion of that demand Alaska is likely to fill (based on historic trends). The results of this analysis are discussed in more detail in the 2016 Forest Plan FEIS (USDA Forest Service 2016b, pp. 3-491 to 3-495).

Based on the PNW Research Station demand projections for 2015 to 2030 (Daniels et al. 2016), the Record of Decision (ROD) for the 2016 Forest Plan amendment established an annual projected timber sale quantity (PTSQ) of 46 MMBF prior to the young-growth transition. Under the alternative selected in the ROD, harvest volume would consist of old-growth and young-growth harvest, with old growth decreasing as a share of total volume (46 MMBF) over time as more young growth becomes economic to harvest. Young-growth volume as a

share of the total would continue to increase until it reaches 41 MMBF per year (full transition). Under the selected alternative, the Forest Service expected to sell an average of about 12 MMBF of young growth and 34 MMBF of old growth per year during the first 10 years to reach the estimated quantity of timber expected to be sold during the first decade, 460 MMBF. From Year 11 through Year 15, the Forest Service expected to sell an average of 28 MMBF of young growth and about 18 MMBF of old growth per year. The selected alternative was expected to reach a full transition of 41 MMBF of young growth around Year 16. Young-growth sales were expected to continue to increase at a rapid rate after Year 16 and reach an upper limit of 93 MMBF around Year 18 (Figure 3.2-6). Following the transition, old-growth timber would continue to be offered at an average rate of 5 MMBF per year to support small operators and specialty products such as wood for musical instruments (USDA Forest Service 2016c).

Figure 3.2-6
Estimated Maximum Harvest under the 2016 Forest Plan Amendment



Source: USDA Forest Service 2016c

Annual Market Demand

The Tongass National Forest, in compliance with the Tongass Timber Reform Act (1990), must seek to provide an annual supply of timber to meet market demand to the extent consistent with providing for multiple use and sustained use of all renewable forest resources. The formulas and procedures used to forecast annual market demand are described in a Forest Service report titled *Responding to the Market Demand for Tongass Timber: Using Adaptive Management to Implement Section 101 of the 1990 Tongass Timber Reform Act* (Morse 2000). These procedures, known as the "Morse Methodology," are based on the following premises:

- Forest product markets are volatile, especially in the short-term.
- Timber purchasers in Southeast Alaska have few alternative suppliers of timber if they cannot obtain it from the Tongass National Forest. Oversupplying the market has relatively few adverse economic effects; undersupplying it can have much greater negative consequences.
- It takes years to prepare NFS timber for sale, including completion of EISs.

- It is difficult to estimate demand for timber from the Tongass National Forest, even a year or two in advance.
- Industry must be able to respond to rapidly changing market conditions in order to remain competitive.

Following the 2016 Forest Plan amendment, the derived demand projections from Daniels et al. (2016) were incorporated into the Morse Methodology and used to develop subsequent annual estimates of the Tongass National Forest timber sale offerings required to seek to meet market demand (Grewe 2017). The resulting estimates for fiscal years 2017 and 2018 were 53 MMBF and 58 MMBF, respectively (USDA Forest Service 2017a, 2018b). These estimates are not intended to represent actual timber purchases. Rather, these annual estimates reflect the estimated volume of timber the Forest Service needs to offer to replace the volume expected to be harvested and to help build a 3-year supply of timber under contract. This 3-year supply allows the industry to respond to market fluctuations. In practice, the actual amount of timber that is offered and sold may be substantially less than the predicted timber purchases in the annual demand calculations. This is because the actual volume of timber offered in any year reflects a combination of factors, including final budget appropriations, completing the National Environmental Policy Act (NEPA) process, and volume affected by litigation. The planned annual timber volume could include a combination of new, previously offered, and reconfigured timber sales. Both old-growth and young-growth green timber and salvage sales are components of this program.

Timber Supply

The Tongass National Forest uses a five-year timber sale plan for planning and scheduling purposes that is consistent with Forest Service Manual 2430. This five-year plan is based on completed and ongoing environmental analyses and can be adjusted in response to changing market conditions and the NEPA public involvement process on projects. Volumes for future timber sales are estimates that may be adjusted over time. The Tongass National Forest posts the five-year plan on the public website at: www.fs.usda.gov/tongass/

For fiscal year 2017, the annual demand goal for volume of timber to be offered from the Tongass National Forest was 53 MMBF (USDA Forest Service 2017a). A total of 30.7 MMBF was sold on the Tongass in fiscal year 2017, with the Good Neighbor Authority (GNA) Kosciusko Young Growth sale purchased by Alcan Forest Products accounting for 30 MMBF (98 percent) of the total (USDA Forest Service 2017b). The GNA Kosciusko Young Growth sale was the first timber sale awarded under a GNA agreement between the State of Alaska and USDA Forest Service. Under this agreement, the State Division of Forestry and its partners and contractors were authorized to prepare, award, harvest, and administer the sale. The sale area consisted of 1,500 acres of young-growth timber stands composed of approximately 75 percent Sitka spruce and 25 percent western hemlock, with stands to be harvested using a variety of methods (USDA Forest Service 2017c). The remaining volume sold in fiscal year 2017 consisted of 9 microsales and two other small sales, which together included less than 1 MMBF in volume (USDA Forest Service 2017b).

For fiscal year 2018, the annual demand goal for volume of timber to be offered from the Tongass National Forest was 58 MMBF (USDA Forest Service 2018b). This was not matched by the proposed sales identified for 2018 in the five-year timber sale plan for 2018, which estimated that a total volume of 32.4 MMBF would be made available for sale (USDA Forest Service 2018c). A total of 9.0 MMBF was sold on the Tongass in fiscal year 2018, with the Rough Luck sale

purchased by Viking Lumber accounting for 7.6 MMBF (84 percent) of the total. The remaining 15 sales purchased that year consisted together of about 1.4 MMBF (USDA Forest Service 2018d).

The Final EIS for the Prince of Wales Landscape Level Analysis Project noted that there has been a lack of timber volume available for the Forest Service to offer across the Tongass National Forest (USDA Forest Service 2018e). This, the document explained, is because much of the volume that has gone through environmental analysis and has a NEPA decision may not be offered at this time because these projects were created during more favorable market conditions and are anticipated to appraise negative. Under the Consolidated Appropriations Act, 2018, timber sales that do not appraise positive using the current Region 10 RV (Residual Value) appraisal cannot be offered (USDA Forest Service 2018e).

Three other sales that were offered in fiscal year 2018 did not receive any bids. Combined these sales consisted of an estimated 23.6 MMBF that went unpurchased. The three sales were North Kuiu 2 (13.4 MMBF), Wrangell Island (7.4 MMBF), and Vallenar Young-Growth (2.8 MMBF).

North Kuiu 2 was the largest of the no-bid sales offered in 2018. A timber sale on Kuiu Island was originally authorized by the Forest Supervisor in 2008 and consisted of an estimated 31 MMBF from 1,200 acres of old-growth forest. A version of the sale was first offered in September 2016. This sale consisted of approximately 30 MMBF from 866 acres and did not receive any bids at that time. Following the 2016 Forest Plan amendment, the proposed sale area was reduced and the sale was reoffered in 2018, this time consisting of 13.4 MMBF from 523 acres (Gullufsen 2018). No bids were received in 2018.

The Wrangell Island timber sale consisted of 7.4 MMBF of old-growth timber intended to provide a supply of “bridge” timber that would support local jobs and facilitate the young-growth transition. The project area consisted of approximately 428 acres on Wrangell Island (USDA Forest Service 2017d).

The Vallenar Young-growth Project consisted of approximately 2.8 MMBF of young-growth from about 155 acres (USDA Forest Service 2018f). The project area was located on Gravina Island near the Ketchikan airport.

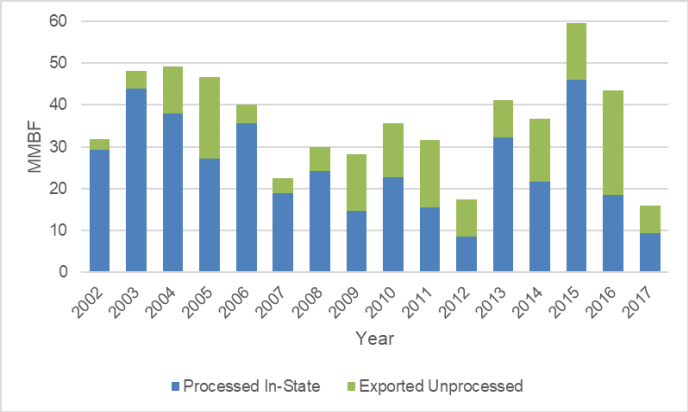
R10 Limited Export Shipment Policy

Initially established in 2007, the Limited Export Policy is intended to boost appraised timber values and provide economic sale opportunities and provide additional processing options for purchasers. The policy has continued since 2007 with modifications designed to provide additional opportunities. The limited export policy is reviewed on an annual basis. The Regional Forester noted in a 2015 review that, while improvements had occurred nationally over the preceding three years, challenges continued for purchasers seeking domestic markets for Alaska timber. The current policy allows the limited export of unprocessed western hemlock and Sitka spruce logs up to 50 percent of the total sale sawtimber volume upon Regional Office approval. In 2012, the Regional Forester agreed to begin reviewing requests to allow increased export of these species on a case-by-case basis, in exchange for purchasers providing an equivalent amount of Alaska yellow-cedar to small business operators who would process the timber locally. The Limited Export Policy is discussed in detail in Appendix H to the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

The share of total harvest on the Tongass exported as logs has varied over time, as shown in Figure 3.2-7. The export share includes both international exports as well as domestic exports to the lower 48. With the exception of 2016, the majority of timber harvested from the Tongass has remained in-state for processing. In

2017, 6.6 MMBF (41 percent) of the total harvested (16.0 MMBF) was exported, with the majority exported to the Pacific Rim, rather than the lower 48 (USDA Forest Service 2018g).

Figure 3.2-7
Timber Harvest Exports from the Tongass National Forest, 2002-2017



Source: USDA Forest Service 2018g

Timber Industry

Annual Mill Survey

The wood products industry in Southeast Alaska in its current form consists of individual- and family-owned sawmills and independent logging businesses. The Forest Service has conducted an annual on-site survey of sawmills in the region since 2000. To maintain consistency, the survey includes only those mills assessed in previous survey years. The original list of mills to be surveyed, initially identified in 2000, consisted of 20 sawmills that regularly operated and met established criteria for medium- to large-size classification. This total was subsequently increased to 22 in 2007. The annual survey for 2017 found that eight of these sawmills (36 percent) were still active; three (14 percent) remained installed with significant equipment on site, but were idle during 2017; and the remaining 11 (50 percent) were no longer in production, either decommissioned or uninstalled (Parrent and Grewe 2018). The eight active and three idle mills included in the survey are identified in Table 3.2-4.

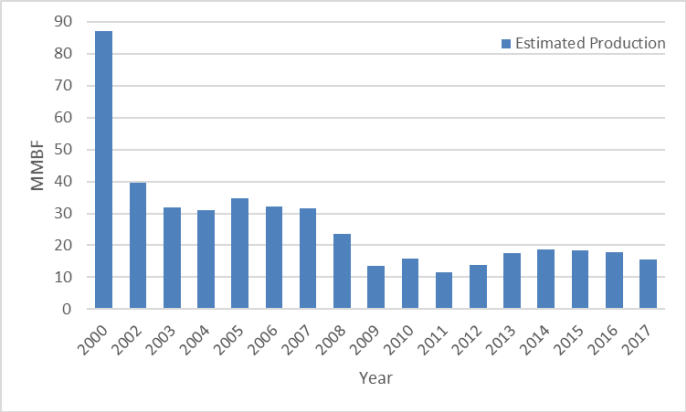
Figure 3.2-8
Forest Service Mill Survey: Estimated Mill Capacity, Production, and Utilization, 2017

Mill Name[1,]	Location	Estimated Capacity (MBF)[2]	Estimated Production (MBF)[3]	Percent Utilization
Viking Lumber Co.	Craig	80,000	14,000	18%
Icy Straits Lumber & Milling Co.[4]	Hoonah	3,000	500	17%
Good Faith Lumber Co. LLC[6]	Thorne Bay	6,250	200	3%
Western Gold Cedar Products	Thorne Bay	6,500	650	10%
D&L Woodworks	Hoonah	1,750	60	3%
Thuja Plicata Lumber	Thorne Bay	1,000	100	10%
The Mill	Petersburg	6,000	24	0%
Falls Creek Forest Products[5]	Petersburg	3,000	10	0%
Total Active	**Southeast Alaska**	**107,500**	**15,544**	**14%**
Porter Lumber Co.	Thorne Bay	2,500	NA	NA
St. Nick Forest Products[7]	Craig	1,150	NA	NA
Northern Star Cedar (NSC)	Thorne Bay	2,500	NA	NA
Total Idle	**Southeast Alaska**	**6,150**	**NA**	**NA**
Overall Total	Southeast Alaska	113,650	15,544	**14%**

Notes:
MBF = thousand board feet; NA = not applicable
[1] Data are presented for those mills included in the Forest Service's annual on-site survey only.
[2] Estimated mill capacity is an estimate of the processing capability of the mill based on the amount of net sawlog volume (Scribner log scale) that could be utilized by the mill as currently configured, during a standard 250-day per year, two shifts per day, annual operating schedule, not limited by availability of employment, raw materials or market.
[3] Estimated Mill Production is the estimated net sawlog volume used during the year to manufacture sawn products.
[4] Estimated capacity for the Icy Straits mill was reduced from 21 MMBF as a result of a major mill fire in July 2010. Mill production occurred prior to the fire.
[5] Formerly Southeast Alaska Wood Products.
[6] Formerly Thorne Bay Wood Products.
[7] Formerly W.R. Jones & Son Lumber Co.
[8] Totals may not sum due to rounding.
Source: Parrent and Grewe 2018

Estimated total production for the mills included in the annual mill survey fell by more than 50 percent from 2000 to 2002, decreasing from 87.1 MMBF to 39.7 MMBF. Production has varied from year-to-year since then, but has generally trended downward (Figure 3.2-8). Total estimated production from the remaining active saw mills was 15.5 MMBF in 2017, approximately 14 percent of total active and idle capacity (Table 3.2-3). The capacity utilization rate of the last operating medium-sized sawmill in Southeast Alaska (Viking Lumber) in 2017 was estimated at about 18 percent (Table 3.2-4). By comparison, sawmills in Idaho, Oregon, California, and Montana generally utilize more than 80 percent of their capacity, unless there is a severe economic downturn (USDA Forest Service 2011).

Table 3.2-4
Estimated Sawmill Production for Surveyed Mills, 2000 to 2017



Note: The annual survey was not conducted during 2001.
Source: Parrent and Grewe 2018

The Tongass National Forest supplied about 8.4 MMBF or 54 percent of the total volume (15.5 MMBF) processed by the mills identified in Table 3.2-4 in 2017, with State lands responsible for most of the remaining volume (Parrent and Grewe 2018). The Tongass share of timber processed locally (8.4 MMBF) was equivalent to about 52 percent of the total (16.0 MMBF) harvested on the Tongass in 2017 (Table 3.2-3). Viking Lumber processed 14 MMBF, approximately 90 percent of the total (15.5 MMBF) processed in 2017 (Table 3.2-4).

Other Mills

As noted above, the annual Forest Service mill survey is not a comprehensive inventory of all sawmills in Southeast Alaska. While no new sawmills of sufficient size classification to be added to the annual mill survey have been established since 2007, many other smaller sawmills operate across the region, including facilities that operate on a seasonal, part-time, or contingent basis. The number of active mills and timber operators in Southeast Alaska varies at any given time. A review of business licenses in December 2018, for example, identified 22 additional sawmills in Southeast Alaska that are not included in the Forest Service survey (Table 3.2-5). The University of Montana's Bureau of Business and Economic Research (BBER), in conjunction with the PNW Inventory and Analysis Program of the Forest Service, conducted a census of timber processors in Alaska in 2011 and identified 27 sawmills in Southeast Alaska, with almost half this total (12 facilities) located on Prince of Wales Island (Berg et al. 2014).

Table 3.2-5
Additional Sawmills in Southeast Alaska Based on a Review of Business Licenses, 2018

Mill Name[1]	Location
Cedar Street Enterprises	Port Alexander
Chilkat Valley Sawmill	Haines
Crew Lumber	Edna Bay
CSL Farm & Services	Edna Bay
Cutting Edge Wood Products	Ketchikan
D and L Woodworks	Hoonah
Dale R. Bakula Construction	Ketchikan
Dark Horse Lumber	Haines
Fair & Square Milling	Coffman Cove
Falls Creek Forest Products	Petersburg
Glacier Bay Woodcraft	Gustavus
K & D Lumber	Thorne Bay
Mud Bay Lumber Company, LLC	Haines
Peavey Log	Thorne Bay
Pitch Enterprises	Thorne Bay
Seakwood.com	Petersburg
Spruce Point Mill	Petersburg
Tenakee Logging Company	Tenakee Springs
Windy Point Sawmill and Bobcat Service	Craig
Wood Marine	Klawock
The Woodshed	Petersburg
Yakutat Supply	Yakutat

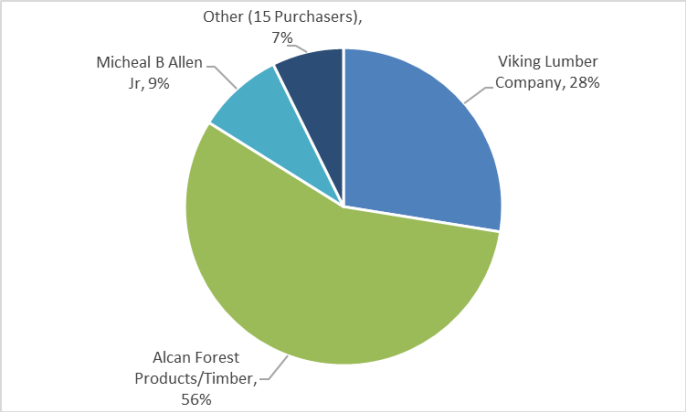
Note:
[1] These businesses were identified through a review of business licenses in December 2018 and includes businesses listed as sawmills (North American Industrial Classification System [NAICS] Code 321113 – Sawmills). This table identifies additional sawmills that are not included in the Forest Service's mill survey (see Table 3.2-4).
Source: Alaska DCCED 2018

Volume Under Contract

Volume under contract refers to the volume included in Forest Service timber sales that have been purchased, but not yet logged or only partially logged. Volume under contract is, therefore, essentially a measure of inventory that changes on a regular basis, increasing as timber is sold and added to the total and decreasing when sale volumes are harvested.

Various purchasers had an estimated total of 66.3 MMBF of uncut timber under contract with the Forest Service at the end of November 2018 (USDA Forest Service 2018d). Alcan Forest Products LLP/Timber Inc. had more than half of this total (56 percent; 37.4 MMBF) under contract, followed by Viking Lumber with 28 percent (18.3 MMBF), and Micheal B. Allen Jr with 9 percent (5.8 MMBF) (Figure 3.2-9). Fifteen other purchasers had a combined total of 4.8 MMBF in uncut volume under contract; in all but one case, the amount under contract was less than 1 MMBF (USDA Forest Service 2018d). Alcan Forest Products, based in Ketchikan, does not operate a processing facility in Southeast Alaska, but follows the Limited Export Shipment Policy, and must sell logs that are not approved for export to a processing facility in the state. The GNA Kosciusko Young Growth sale, which makes up much of the volume Alcan Forest Products has under contract, about 80 percent, was approved for 100 percent export.

Figure 3.2-9
Volume under Contract by Owner, 2018



Source: USDA Forest Service 2018d

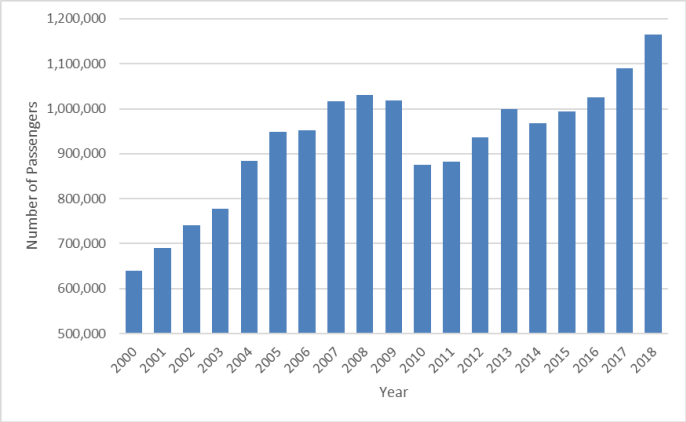
Recreation and Tourism

Recreation and Tourism in Southeast Alaska

Trends in Visitation
As noted above, an estimated 1,212,000 people visited Southeast Alaska in 2016, with most of these visitors (86 percent) arriving by cruise ship (McDowell Group 2017).

Southeast Alaska Cruise Ship Visitor Volume
From 2000 to 2018, Southeast Alaska's total cruise passenger volume has averaged approximately 928,000 each year, with cruise ships visiting during the summer season (May to September). Cruise visitation to Southeast Alaska initially peaked with more than 1 million visitors per year from 2007 to 2009 before dropping in 2010, as a result of the national economic recession. Volumes have gradually increased since then peaking with an all-time high of 1,090,000 cruise visitors in 2017, followed by another record year in 2018, with 1,165,000 cruise visitors (Figure 3.2-10). The number of cruise passengers visiting Southeast Alaska is expected to continue to grow with an estimated 1,361,400 cruise passengers anticipated for 2019 (Southeast Conference 2018).

Figure 3.2-10
Southeast Alaska Cruise Passengers, 2000-2018



Source: Southeast Conference 2018, USDA Forest Service 2016b

Almost all Southeast Alaska cruise passengers, 98 percent of the total, visited Juneau in 2016, followed by Ketchikan (92 percent) and then Skagway (80 percent) (Table 3.2-6). Hoonah and Sitka each received more than 120,000 cruise visitors in 2016 each (159,132 and 122,944, respectively), with Haines and Wrangell visited by 41,685 and 7,926 cruise passengers, respectively (Table 3.2-6). Trends in cruise visitation in the three communities with the largest number of visitors (Juneau, Ketchikan, and Skagway) mirrored regional trends over time, peaking in the years prior to the national recession, with visitation dropping sharply in 2010. From lows in 2010 and 2011, visitation has gradually increased in all three communities and was similar to pre-recession levels by 2016 (Table 3.2-6).

Table 3.2-6
Southeast Alaska Cruise Passengers by Community, 2007-2016

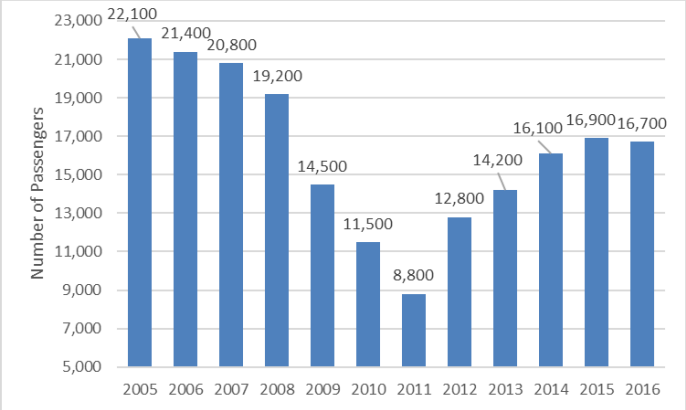
Year	Haines	Hoonah	Juneau	Ketchikan	Sitka	Skagway	Wrangell
2007	27,659	161,920	1,017,341	901,595	233,936	820,829	5,192
2008	50,121	126,381	1,032,274	941,910	289,753	781,676	4,002
2009	43,550	134,575	1,019,507	936,220	224,335	785,034	3,842
2010	32,259	122,974	879,310	828,929	144,383	697,060	3,869
2011	27,176	127,866	875,947	844,412	129,380	708,981	4,719
2012	31,007	120,786	927,941	894,320	110,714	755,681	678
2013	32,378	124,320	978,559	948,685	99,920	821,874	6,417
2014	29,133	142,416	953,055	884,503	90,182	819,239	5,171
2015	42,515	150,434	976,367	944,525	117,546	815,541	7,471
2016	41,685	159,132	1,004,774	947,972	122,944	817,308	7,926

Source: Alaska DCCED 2017

Small Cruise Market

Alongside the international cruise lines, several small- and mid-size cruise operators are active in the region, often taking their customers to smaller places such as Metlakatla and Petersburg in addition to the larger communities. Reliable data regarding the small cruise vessel industry is limited, but the Alaska Department of Economic Development (ADED) (2016) found that small cruise ships accounted for about 1.5 percent of Alaska's cruise passengers in 2015. Although accounting for a small share of the overall market, this segment of the cruise market is important for smaller communities that do not have the infrastructure to accommodate larger vessels. Overall, small cruise vessel passenger capacity declined from a recent high in 2005. Capacity has gradually increased since a low of 8,800 estimated passengers in 2011, but remained below 2005 levels in 2016 (Figure 3.2-11). In 2015, Alaska's small cruise vessel fleet included 27 vessels (including vessels carrying fewer than 20 passengers), with a total of 344 scheduled sailings in 2015 (ADED 2016).

Figure 3.2-11
Southeast Alaska Small Cruise Vessel Passenger Capacity, 2005-2016

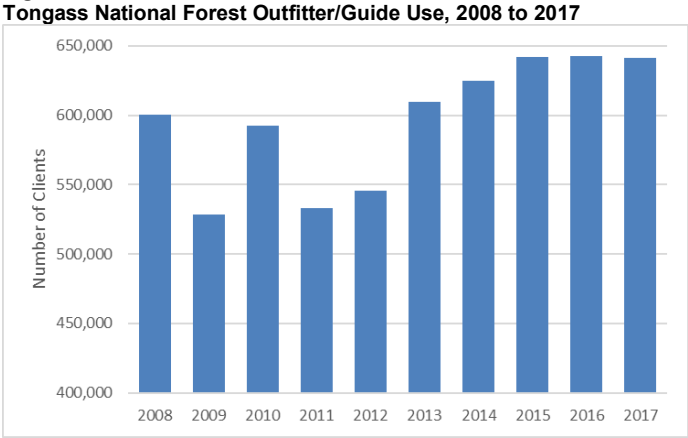


Note:
1/ Small cruise vessels are defined for the purposes of data collection as small, overnight commercial passenger vessels that carry less than 250 passengers. Estimates exclude vessels with capacity for less than 20 passengers.
2/ Data for 2016 was projected.
Source: ADED 2016

Outfitter/Guide Use

A total of 242 permitted outfitter/guides provided services to Forest visitors during 2013 to 2017. More than half of these operators (132) uses the Forest consistently (at least four out of the five years). Outfitter/guides reported an annual average of 632,000 service days over this period, with a total of 614,149 service days or clients reported in 2017. A service day is defined as a day or any part of a day for which an outfitter or guide provides service to a client on NFS lands. Figure 3.2-12 shows reported outfitter/guide use on the Forest from 2004 to 2017. Outfitter/guide use is discussed in more detail in the *Recreation* section of this EIS.

Figure 3.2-12
Tongass National Forest Outfitter/Guide Use, 2008 to 2017



Note:
1/ A service day is defined as a day or any part of a day for which an outfitter or guide provides service to a client on NFS lands.
Source: USDA Forest Service 2017e, 2018h

Employment and Contribution to the Regional Economy. Recreation and tourism-related employment is difficult to accurately quantify because visitors spend their money throughout the local economy. Recreation and tourism is not classified or measured as a standard industrial category. Components of travel and tourism activities are instead partially captured in other economic sectors, such as retail trade (e.g., grocery stores and gift shops), transportation, hotels and other lodging places, and amusement and recreation services. Information presented above for the visitor sector is considered generally representative of recreation and tourism-related employment in Southeast Alaska (see Table 3.2-1 and Figure 3.2-3).

According to the Alaska DOL (Bell 2015), visitor-related jobs in Southeast Alaska are concentrated in Juneau, Ketchikan, and Skagway, which together accounted for more than three-quarters of the regional total in 2014. Transportation is the largest visitor-related economic sector in Southeast Alaska making up about one-third of visitor-related employment, with jobs ranging from whale watching boats, to tour buses, to airlines. The highest paying visitor-related occupations are also in the transportation sector, including captains and mates of water vessels (Bell 2015).

A separate study prepared on behalf of the Alaska DCCED found that the visitor industry supported 11,925 jobs and $445 million in labor income in Southeast Alaska from October 2016 through September 2017 based on direct visitor spending of $705 million (McDowell Group 2018a). These estimates are for total employment and labor income, meaning that they include workers employed directly by the visitor industry (direct jobs and income), as well as jobs and income supported elsewhere in the economy (indirect and induced jobs and

income).[1] A separate estimate of direct employment developed from Alaska DOL and U.S. Census data identified a total of 7,739 direct jobs supported by the visitor industry in 2017 (Table 3.2-1).

Nature-Based Tourism. A study prepared by the Institute of Social and Economic Research at the University of Alaska Anchorage provides insight into the contribution of nature-based tourism to the regional economy. This study, which involved field research conducted in the summers of 2005, 2006, and 2007, focused on a limited number of communities and sought to provide insight into revenues generated, the types of nature-based activities attracting tourists, and the resulting flows of money through the economy (Dugan et al. 2009). The findings of the study indicate that nature-based tourism generates substantial revenues in the region, with an estimated $277 million generated in annual direct business revenues for the companies surveyed in Sitka, Juneau, Chichagof Island, Prince of Wales Island, Petersburg, and Wrangell (Dugan et al. 2009).

Dugan et al. (2009) also found that nature-based tourism takes a number of different forms and the ratio of cruise ship passengers to independent travelers varies by location. Most nature-based activities that originate in Ketchikan, for example, fell into four general categories: flightseeing, marine charters, adventure experiences, and general sightseeing. In all cases, the majority of clients participating in these activities were cruise ship passengers. Nature-based tourism on Chichagof Island, on the other hand, included a mix of cruise ship passengers and independent travelers, depending on the location and activity involved (Dugan et al. 2009).

Another study, conducted on behalf of ADF&G, estimated that residents and visitors to Southeast Alaska spent $363 million hunting and viewing wildlife in 2011, with visitors viewing wildlife accounting for an estimated 59 percent of this total (ECONorthwest 2014). Based on these estimated expenditures, the study estimated that hunting and wildlife viewing, respectively, supported 390 and 1,390 direct jobs and a combined total of $107 million in labor income in Southeast Alaska in 2011, with additional indirect and induced jobs and income supported elsewhere in the economy (ECONorthwest 2014).

Recreation on the Tongass National Forest

While it is reasonable to assume that the majority of visitor recreation and tourism activity in the region is related to the natural environment, not all of the activity generating this employment can be directly linked to the Tongass National Forest. Many visitors experience the Tongass from the deck of a cruise ship without directly using the forest for recreation purposes. In addition, while the Tongass includes approximately 80 percent of the land area in Southeast Alaska, there are other lands that offer wildland recreation opportunities in the region, including 3.3 million acres of National Park Service (NPS) lands, and recreation lands managed by the State of Alaska. Further, other popular recreation and tourism activities, such as saltwater fishing, sea kayaking, and shopping, do not take place on the Tongass.

The Alaska Region of the Forest Service (Region 10) has been participating in the Forest Service's National Visitor Use Monitoring (NVUM) program since 2000. Based on the results of the NVUM program and supplemental survey results for 2008 and 2009, White and Stynes (2010) calculated a visitation

[1] Economic activity in one sector generates 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).

estimate of 1,885,500 annual visits to the Tongass National Forest, with 71 percent of these visits made by local residents. Half of Alaska residents surveyed who live in Southeast Alaska reported using a boat or plane to access the national forest. Almost half (49.7 percent) of non-resident visits to the Tongass National Forest involved the use of a guide or outfitter at some point, with local cruises, wildlife viewing, and flightseeing reported most frequently. Alaska residents in contrast were found to very rarely use outfitters or guides (White and Stynes 2010). More detailed information on recreation use on the Tongass is presented in the *Recreation* section of this EIS.

Spending profiles were estimated for residents and non-residents visiting the Forest based on data compiled during the NVUM surveys. Average spending per Forest visit was estimated to be $46.03 and $341.58 for residents and non-residents, respectively, with every 10,000 visits (a mix of residents and non-residents) supporting 13.7 direct jobs and 3.9 jobs elsewhere in the regional economy. Using these coefficients, White and Stynes (2010) estimated that 1,885,513 annual visits generated about $250 million in spending and supported 2,589 direct jobs and an additional 728 jobs elsewhere in the regional economy. This overall estimate is equivalent to about 28 percent of the regional visitor estimate developed for Alaska DCCED in 2017 (McDowell Group 2018a), and the direct component is about 33 percent of the direct visitor jobs estimated by Southeast Conference (2018).

Commercial Fishing and Seafood Processing

In 2017, an estimated 302 million pounds of seafood was harvested in Southeast Alaska with an ex-vessel value of $289 million. Viewed in terms of value, salmon accounted for more than half (56 percent) of the total commercial catch in Southeast Alaska in 2017, with the remainder divided among black cod (16 percent), halibut (15 percent), crab (8 percent), herring (2 percent), and other (5 percent) (Southeast Conference 2018). Total pounds landed and ex-vessel values in 2017 were similar to regional 10-year averages, and a substantial improvement over the 2016 season, which was the worst in more than a decade (Southeast Conference 2018).

Employment in the seafood harvesting and processing sectors varies from year-to-year, but remains relatively stable compared to the fluctuations in the volumes and value of salmon harvested each year. Salmon harvesting employed an estimated 1,283 people in Southeast Alaska in 2016, with an additional 992 people employed harvesting other fish (Alaska DOL 2017). A further total of 1,400 people were employed in fish processing in 2016 for a combined total of 3,675 jobs (Alaska DOL 2018). Seafood harvesting and fish processing employment trends are shown for 2000 to 2013 in the 2016 Forest Plan FEIS (USDA Forest Service 2016b, pp. 3-501 to 3-503).

Unlike other basic sectors of Southeast Alaska's economy, components of the seafood industry are spread throughout the region with an important presence in virtually every community. Seafood processing workers, for example, were employed in all of the boroughs in 2015, ranging from 10 workers in Skagway to 1,023 workers in Ketchikan Gateway Borough and 1,102 in the City and Borough of Sitka (Alaska DOL 2016).

The seafood processing sector is generally characterized by high seasonality and low resident hire, as well as low hourly wages, with a median annual wage of $24,689 in 2013 (Strong 2014). The industry does, however, have a number of higher paid occupations, including ship engineers, captains, mates, boat pilots, and general and operations mangers, which accounted for just 1.2 percent total employment, but 6 percent of wages, with a median annual wage of $66,720 (Strong 2014).

Mining and Mineral Development

Mineral exploration and mining have been a part of life in Southeast Alaska for more than a century. Estimates developed using Alaska DOL data found that a total of 1,580 workers were employed in the mining sector in Southeast Alaska in 2017 (Table 3.2-1). According to a recent economic impact study prepared for Alaska's mining industry, the Greens Creek and Kensington mines employed 414 workers and 325 workers in 2016, respectively, with the Kensington Mine employing an additional 90 contractors (McDowell Group 2018b). Mining jobs are the highest-paying jobs in the region, with annual wages of $102,000 in 2017 (Southeast Conference 2018). The high wages in this sector reflect the skilled nature of the job, as well as the demands of working in remote locations (Abrahamson 2013). Mining employment in Southeast Alaska increased in 2017, up 11 percent from the preceding year, with the region's two large mines (Greens Creek and Kensington) accounting for the majority of this employment. Despite increasing employment, production dropped at both mines in 2017 (Southeast Conference 2018).

Both the Greens Creek and Kensington mines are located in the City and Borough of Juneau, mostly on Tongass NFS lands. Greens Creek Mine is a primary silver mine located on Admiralty Island; Kensington Mine is a gold mine located on the mainland approximately 45 miles north of Juneau. Alaska residents make up about two-thirds of the total labor force at each mine, 66 percent at Greens Creek and 67 percent at Kensington. Alaska resident employees of both mines live throughout the region. More than two-thirds of Greens Creek's Alaska resident employees live in Juneau. The other third live in other Southeast Alaska communities or elsewhere in the region (McDowell Group 2018b).

Two proposed underground mine projects on NFS lands on Prince of Wales Island received approval for financial assistance through the Alaska Industrial Development and Export Authority in June 2014 (Bradner 2014). Senate Bill 99 authorized $145 million and $125 million in infrastructure and construction financing, respectively, for the proposed Bokan Mountain and Niblack projects. The Bokan Mountain project is a rare earths mine that would include on-site ore processing facilities. The McDowell Group (2013) in a study prepared for the Bokan Mountain project estimated that construction of the project would last 2 years and employ an average construction workforce of 200, with peak employment potentially reaching 300 workers. Operation would be expected to employ 190 workers with approximately $18 million in annual payroll (McDowell Group 2013). The Niblack Project is a proposed underground copper-gold-zinc-silver mine. The project owners estimate that the construction and operation phases of the project would both employ approximately 200 workers (Niblack Project LLC 2015). No exploration activity was reported for either project in 2016 and 2017 (McDowell Group 2018b).

Payments to the State

Prior to 2000, in states with national forests, 25 percent of the returns to the U.S. Treasury from revenue producing Forest Service activities such as timber sales, were returned to each state for distribution back to counties (or in Alaska, boroughs) having acreage within a national forest. Those payments were called the "25 percent fund payments" and were dedicated by law to be used for roads and schools. In October 2000, the *Secure Rural Schools and Community Self Determination Act of 2000* was enacted to stabilize federal payments to states in response to declining federal receipts.

The legislation was authorized for implementation for fiscal years 2001 through 2007 and allowed counties and/or boroughs to choose between 25 percent of

current receipts or a full payment amount based on the average of the highest three payments made to the state during the 14-year period between 1986 and 1999. Alaska boroughs and communities have elected to receive a full payment amount rather than 25 percent of receipts since enactment of this legislation. Those annual full payment amounts are primarily dedicated to roads and schools, with provisions for special project funding under certain conditions. Under the full payment approach, Forest Service payments to the State of Alaska have been based on the high 3-year historic average, rather than linked to annual Forest Service revenue.

The Secure Rural Schools Act has been reauthorized since 2008, most recently in March 2018 for Fiscal Years 2017 and 2018. The program was not reauthorized for Fiscal Year 2016, resulting in a substantial drop in payments. Tongass-related secure rural schools payments to Southeast Alaska by borough for 2013 through 2017 are presented in Table 3.2-7.

Table 3.2-7
Federal Secure Rural Schools Payments to Southeast Alaska Boroughs, 2013 to 2017

Borough/Area	2013	2014	2015	2016	2017
Haines	131,581	124,386	145,551	30,166	376,567
Juneau	670,595	637,211	624,947	43,275	555,618
Ketchikan Gateway	1,045,870	1,059,007	993,053	91,316	905,127
Petersburg	1,255,586	1,204,494	577,743	41,876	544,597
Sitka	800,509	752,083	544,967	49,389	567,243
Skagway	22,105	21,595	17,122	2,664	18,625
Wrangell	1,117,867	1,052,610	922,953	47,826	845,691
Yakutat	560,798	539,527	623,842	36,682	473,738
Unorganized[1/]	3,253,421	3,125,381	2,674,447	110,116	2,476,673
Total	**8,858,332**	**8,516,294**	**7,124,625**	**453,310**	**6,763,879**

Note:
[1] Unorganized represents payments to the Hoonah-Angoon and Prince of Wales-Hyder CAs.
Sources: USDA Forest Service 2015a, 2015b, 2016d, 2018h, 2018i

Environmental Consequences

Wood Products

This EIS provides an assessment of the potential impacts that may result from the alternatives considered for a proposed Alaska Roadless Rule. This assessment and the proposed alternatives are programmatic, meaning that they establish direction and allowable activities for broad land areas, rather than schedule specific activities in specific locations. Specific timber sales would be developed over time in accordance with established Forest Service procedures, with site-specific impacts evaluated through project-level environmental analysis, as appropriate. Overall timber harvest levels and composition (old-growth versus young-growth) are expected to remain unaffected by the final rule. Timber program output levels are expected to remain constant and involve a similar number of acres under all alternatives, varying only by the location of tree cutting.

Factors Affecting the Economics of Timber Offers

In practice, many factors can influence the cost of timber harvest, adding economic risks for potential purchasers and affecting the ability of the Forest Service to offer timber sales. Road construction, helicopter yarding, complex silvicultural prescriptions, setting size, and other factors may increase costs, which then decrease the value of the offering. The value of the timber offered must be sufficient to cover costs and include profit for the purchaser. As noted

earlier, under the Consolidated Appropriations Act, 2018, timber sales that do not appraise positive using the current Region 10 RV (Residual Value) appraisal cannot be offered (USDA Forest Service 2018d). Estimated costs per thousand board feet vary substantially across the Forest, with transportation infrastructure costs and haul distances typically higher in more remote areas that are further from existing infrastructure and markets, either a mill or export yard.

None of the action alternatives would result in changes to the PTSQ, and the timber objectives of the Forest Plan would continue to involve the transition to primarily young-growth harvest. While harvest levels are not expected to vary significantly among the alternatives, the alternatives do vary in terms of the amount and location of acres suitable for timber production. Young-growth suitable acres would increase only slightly (2 to 5 percent) under the action alternatives (Table 3.2-8) and, as a result, the following assessment focuses on changes in old-growth suitable acres.

The ROD for the 2016 Forest Plan estimated that a total of approximately 24,000 old-growth acres would be harvested Forest-wide after 25 years, with a total of 42,500 old-growth acres harvested after 100 years (USDA Forest Service 2016c). These estimates represent an approximate upper ceiling of the number of roadless acres that could be potentially harvested under any of the alternatives. The 2016 Forest Plan FEIS estimated that approximately 5 MMBF of small and micro-sales of old-growth timber is required each year to meet the needs of existing small old-growth mills that produce high value products such as appearance grade lumber and cedar shingles. This annual small and micro-sale demand (5 MMBF) is anticipated to be met for the duration of the planning period under all of the alternatives, including Alternative 1 – No Action.

For larger sales, more acres of suitable old-growth land would allow the Forest Service greater flexibility in the selection of future timber sale areas, as well as the potential for more flexibility in sale design, depending on the planning areas selected. This improved flexibility could, in turn, potentially improve the Forest Service's ability to offer economic sales that meet the needs of industry. This greater flexibility could be especially beneficial during the first two decades of the 2016 Forest Plan (the transition period), when most old-growth harvest would take place. While many factors can influence the cost of timber harvest, as noted above, areas along existing roads are typically more economically efficient, followed by areas where existing roads can be easily extended. Transportation infrastructure costs can include road construction, reconditioning, reconstruction, and maintenance, as well as log transfer facility (LTF) development. Road construction, reconstruction, and maintenance involve substantial costs and have the potential to strongly influence timber sale economics.

Areas closer to markets, either a mill or export facility, are also more likely to offer more economic timber sale options. Existing old-growth mills in Southeast Alaska are primarily located in the south part of the region, with a concentration of mills, including the last remaining medium-sized mill (Viking Lumber), on Prince of Wales Island. Sales on the south part of the Forest are, therefore, more likely to appraise positive. In cases where the Regional Forester allows 100 percent export, which is permissible on a case-by-case basis (as discussed above), proximity to an export facility may also result in sales being more likely to appraise positive.

Areas not covered by existing NEPA decisions would require additional NEPA analysis, adding cost, as well as several years planning time. The projects identified in the most recent 5-year timber sale plan for the Tongass (2018 to

2022) are assumed to be made available to meet short-term (4 to 5 year) demand under all alternative (USDA Forest Service 2018c).

Factors Common to the Action Alternatives

Additional timber harvest opportunities under the action alternatives would primarily be provided by dropping roadless protections for areas that are currently protected under the 2001 Roadless Rule (i.e., the removal of acres from roadless in the transition from 2001 Inventoried Roadless Areas [IRAs] to Alaska Roadless Areas [AKRAs]).[2] Timber harvest would also be allowed in AKRAs assigned to the Timber Priority management category. The removal of protections in either of these ways would convert areas of previously identified unsuitable lands to suitable old-growth lands that would be available for harvest.

Suitable old-growth lands would be incrementally added by alternative, with total net increases ranging from about 18,000 acres (Alternative 2) to 167,000 acres (Alternatives 5 and 6) (Table 3.2-8, Figure 3.2-13). Viewed as a share of existing suitable old growth, these increases would range from 8 percent (Alternative 2) to 72 percent (Alternatives 5 and 6). Suitable old-growth acres would be added in three broad categories or areas: roaded roadless (Alternatives 2 to 6); logical extension areas (Alternatives 3 to 6); and areas more distant from roads (Alternatives 4 to 6).

Roaded Roadless. All action alternatives would remove roadless protections for 96,000 acres that currently have roads (i.e., “roaded roadless”). These areas are considered likely locations for future timber harvest. The removal of roaded roadless acres from roadless protection would convert about 18,000 acres of previously identified unsuitable lands to suitable old-growth lands that would be available for harvest, including an estimated 6,000 acres of high-volume old growth (Table 3.2-8).

Logical Extensions. Alternatives 3 to 6 would also remove roadless protections for “logical extension areas.” These are areas that are considered the logical extension of existing road and harvest systems, and typically include areas within the same watershed (14th-field hydrologic unit) as an existing road system. These areas were identified by District Rangers as the most likely locations for future timber harvest, following roaded roadless. The removal of logical extension acres from roadless protection would convert an estimated 50,000 acres of previously identified unsuitable lands to suitable old-growth lands, including an estimated 26,000 acres of high-volume old growth (Table 3.2-8).

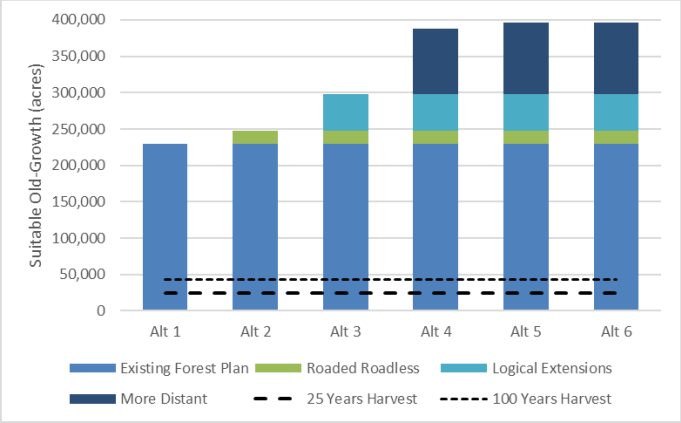
More Distant Areas. Alternatives 4 to 6 would also remove protections for areas considered more distant from existing road systems (i.e., roadless areas outside the “roaded roadless” and “logical extension” areas). These acres are added in different ways, as discussed below, by alternative. However, when viewed in terms of changes in suitable old-growth acres that would be available for harvest, the alternatives are very similar, especially Alternatives 5 and 6, which would result in the same increase in areas more distant from roads, about 99,000 acres, including 34,000 acres of high-volume old growth (Table 3.2-8).

[2] Alternative 5 would drop all roadless areas on the Tongass, which would be exempt from the Roadless Rule under this alternative.

Table 3.2-8
Suitable and High Volume Suitable Old-Growth Acres by Alternative

Forest Land Suitable for Timber Production	Alternative 1 No Action	2 Roaded Roadless	3 Logical Extension	4 Partial Dev LUDs	5 Full Exemption	6 Full Dev LUDs
Old Growth	230,000	248,000	298,000	388,000	396,000	396,000
Young Growth	334,000	344,000	346,000	349,000	354,000	351,000
Increase in Suitable Old Growth						
In Roaded Roadless Areas	0	18,000	18,000	18,000	18,000	18,000
In Logical Extension Areas	0	0	50,000	50,000	50,000	50,000
In More Distant Areas	0	0	0	90,000	99,000	99,000
Total	**0**	**18,000**	**68,000**	**158,000**	**167,000**	**167,000**
Increase in High-Volume Suitable Old Growth						
In Roaded Roadless Areas	0	6,000	6,000	6,000	6,000	6,000
In Logical Extension Areas	0	0	20,000	20,000	20,000	20,000
In More Distant Areas	0	0	0	29,000	34,000	34,000
Total	**0**	**6,000**	**26,000**	**55,000**	**59,000**	**59,000**

Figure 3.2-13
Suitable Old-Growth Acres by Alternative



Note:
[1] Harvest levels for 25 years and 100 years represent the total estimated old-growth acres that would be harvested to meet the ASQ established for the 2016 Forest Plan.

Alternative 1 – No Action

Under Alternative 1 there would be no change in the boundaries of the IRAs identified in 2001 Roadless Rule and no changes in the availability of suitable old-growth acres for harvest. Under the current Forest Plan, there are an estimated 230,000 acres of suitable old growth available for harvest, almost 10

times the area expected to be harvested over the next 25 years (Table 3.2-8, Figure 3.2-13).

Alternative 2

Under Alternative 2, additional timber harvest opportunities would be provided in roaded roadless areas, with an estimated net gain of about 18,000 acres of suitable old-growth, including 6,000 acres of high-volume suitable old-growth (Table 3.2-8, Figure 3.2-13). This estimated gain (18,000 acres) is equivalent to about 8 percent of the acres available under Alternative 1 and three-quarters (75 percent) of old-growth acres expected to be harvested over the next 25 years (24,000 acres). The added suitable acres would be in areas where roads already exist and are, therefore, generally considered relatively economic to harvest. Further, the majority (95 percent) of the added acres would be located on the south part of the Forest, with almost one-third (35 percent) on Prince of Wales Island (Craig and Thorne Bay Ranger Districts) (Table 3.2-9).

Table 3.2-9
Increase in Suitable Old-Growth Acres by Ranger District and Alternative

Ranger District	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
South					
Craig	4,400	8,300	14,400	16,300	16,300
Ketchikan-Misty Fiords	3,300	11,300	23,400	24,400	24,400
Petersburg	3,900	17,200	36,000	37,400	37,400
Thorne Bay	1,900	13,700	20,300	21,200	21,200
Wrangell	3,500	9,900	22,800	24,000	24,000
Subtotal	**17,000**	**60,400**	**116,900**	**123,300**	**123,300**
					North
Hoonah	400	3,500	15,300	15,600	15,600
Juneau	300	300	3,400	4,400	4,400
Sitka	400	3,600	22,300	23,300	23,300
Yakutat	0	0	0	0	0
Subtotal	**1,100**	**7,400**	**41,000**	**43,300**	**43,300**
Overall Total	**18,100**	**67,800**	**157,900**	**166,600**	**166,600**

Alternative 3

Under Alternative 3, additional timber harvest opportunities would be provided in roaded roadless and logical extension areas, with an estimated net gain of about 68,000 acres of suitable old-growth, including 26,000 acres of high volume suitable old-growth (Table 3.2-8, Figure 3.2-13). This estimated gain (68,000 acres) is equivalent to about 30 percent of the acres available under Alternative 1 and almost three times the old-growth acres expected to be harvested over the next 25 years (24,000 acres). The added suitable acres would be in areas where roads already exist or could be logically extended and are, therefore, generally considered relatively economic to harvest. Similar to Alternative 2, the majority (89 percent) of the added acres would be located on the south part of the Forest, with one-third (32 percent) on Prince of Wales Island (Table 3.2-9).

Alternative 4

Alternative 4 would provide additional timber harvest opportunities in roaded roadless and logical extension areas, as well as areas more distant from roads, with an estimated net gain of about 158,000 acres of suitable old growth, including 55,000 acres of high-volume suitable old growth (Table 3.2-8, Figure 3.2-13). This estimated gain (158,000 acres) is equivalent to about 69 percent of the acres available under Alternative 1 and more than six times the old-growth acres expected to be harvested over the next 25 years (24,000 acres).

This alternative opens up all Timber Production and Modified Landscape LUDs that were in roadless, outside of T77 Watersheds and TNC/Audubon Conservation Areas. On average, these areas are more distant from roads

compared with Alternative 3 and would include extensive areas assigned to AKRA Timber Priority management category. Within the Timber Priority category, old-growth timber harvest and road construction would be allowed in about 118,000 acres of previously identified unsuitable lands, which would be converted to suitable old-growth lands. Because these areas are more distant from existing road systems, on average, they are likely to be relatively expensive to harvest and less likely to be accessed for timber production under the current Forest Plan. Less than two-thirds (63 percent) of the more distant acres added under this alternative would be located on the south part of the Forest, with 14 percent on Prince of Wales Island (Table 3.2-9).

Alternative 5

Under Alternative 5, the full exemption alternative, roadless protection would be removed from all roadless areas on the Tongass, resulting in a net reduction of 9.2 million acres of roadless areas (Table 3.2-8, Figure 3.2-13). Former roadless areas would be managed in accordance with the 2016 Forest Plan, with an estimated net gain of about 167,000 acres of suitable old growth, including 59,000 acres of high-volume suitable old growth (Table 3.2-8, Figure 3.2-13). This estimated gain (167,000 acres) is equivalent to about 72 percent of the acres available under Alternative 1 and about seven times the old-growth acres expected to be harvested over the next 25 years (24,000 acres). As with Alternative 4, the gain in suitable old-growth acres are more distant from roads (approximately 99,000 acres) and would provide additional opportunities for harvest, but these areas would be relatively expensive to harvest and less likely to be accessed under the current Forest Plan. Similar to Alternative 4, slightly less than two-thirds (64 percent) of the more distant acres added under this alternative would be located on the south part of the Forest, with 16 percent on Prince of Wales Island (Table 3.2-9).

Alternative 6

Alternative 6 would provide additional timber harvest opportunities in roaded roadless and logical extension areas, as well as areas more distant from roads (Table 3.2-8, Figure 3.2-13). In addition to roaded roadless and logical extension areas, this alternative would remove all other Timber Production, Modified Landscape, and Scenic Viewshed LUDs identified in the 2016 Forest Plan from roadless protection, including T77 Watersheds and The Nature Conservancy/Audubon Conservation Areas within those development LUDs. In addition, areas with mineral potential as defined by the “minerals overlay” defined in the Tongass Forest Plan are removed from roadless protection. Viewed in terms of suitable old-growth acres, this alternative would have the same effect as removing roadless protection from all roadless areas (Alternative 5).

Employment and Income

Timber program output levels are expected to remain constant and involve a similar number of acres under all alternatives, varying only by the location of tree cutting. The proportion of cutting activity occurring within versus outside of roadless areas would vary by alternative, but overall economic impacts are assumed to remain constant. These impacts were estimated for the first decade following implementation in the 2016 Forest Plan FEIS (USDA Forest Service 2016b), with all five alternatives based on an annual average harvest of 46 MMBF. In the 2016 Forest Plan FEIS, the ratio of young growth to old growth varied by alternative and over time in the years prior to the transition to young growth (defined as the time that the young-growth supply reaches 41 MMBF). Alternative 5 in that EIS corresponds with Alternative 1 in this EIS and all alternatives are assumed to support a similar range of direct jobs and income. Based on the 2016 Forest Plan EIS assessment, all of the alternatives would support an estimated 92 jobs in logging, 49 to 100 jobs in sawmilling, and 29 to 46 jobs related to transportation and other services, with direct income ranging from $9.8 million to $10.4 million.

Local sawmilling and transportation-related employment estimates are based on a range, from maximum possible shipment out of state (export of all Alaska yellow cedar plus hemlock and Sitka spruce export equal to 50 percent of total sale net sawlog volume), to no shipment of hemlock and Sitka spruce and export of 100 percent Alaska yellow cedar. Transportation and other services include water transportation, independent trucking, stevedoring, scaling, and export marking and sort yard employment for export volume, and water transportation, scaling, and independent trucking for locally sawn volume. Export employs more workers in transportation and other services per million board feet harvested than domestic production, which is reflected in the range of values estimated for transportation and related services.

Actual employment and income in Southeast Alaska would depend on choices made by purchasers; those choices may change as markets and prices shift. Under current market conditions, purchasers are likely to export as much as they can while processing enough material locally to keep manufacturing facilities open, and take advantage of opportunities to produce high-value sawn material in Southeast Alaska. In addition, the Regional Forester has allowed increased export on a case-by-case basis, as discussed above and explained in Appendix H of the 2016 Forest Plan (USDA Forest Service 2016a). If purchasers were allowed on a case-by-case basis to export a larger share of a particular sale in unprocessed form, there would be a commensurate reduction in sawmilling jobs and an increase in transportation-related jobs.

Recreation and Tourism

Potential impacts to recreation and tourism are assessed in the *Recreation* section of this EIS. Potential impacts are evaluated with respect to Recreation Opportunity Spectrum (ROS) settings and recreation places. The *Recreation* section also assesses impacts to outfitter/guide businesses and clients.

Under Alternative 1, most projected harvest is expected to occur in ROS settings where some modification of the natural environment is expected. Less than 1 percent of the acres currently allocated to Primitive (P), Semi-Primitive Non-Motorized (SPNM), and Semi-Primitive Motorized (SPM) ROS settings would be harvested after 100 years, assuming the maximum allowable levels of harvest were to occur. Assuming that the estimated total number of acres harvested would be the same for each alternative and that harvest would be evenly distributed across the available suitable acres, Roaded Modified (RM) as a share of the estimated total would decrease relative to Alternative 1 under all alternatives, dropping from almost 90 percent under Alternative 1 to 67-68 percent under Alternatives 4 and 5. Much of this decrease would be made up by an increase in SPNM acres. SPNM as a share of the estimated total would range from about 6 percent under Alternatives 1 and 2 to 22-23 percent under Alternatives 4 to 6. This analysis is discussed further in the *Recreation* section of this EIS.

Recreation places are identified in the *Recreation* section as areas that are relatively easy to access, primarily areas near communities, protected boat anchorages, boat landings, aircraft landing sites, and road systems, and include approximately 3.6 million acres or 22 percent of the Forest, with some areas being identified as important for more than one type of recreation activity. Recreation places include a range of LUD classifications and timber harvest would occur in areas identified as recreation places under all of the alternatives, with the potential distribution of harvest varying by type of recreation place and alternative. None of the alternatives are expected to result in long-term impacts

to recreationists and visitors wishing to use these areas, but may temporarily displace some use.

Changes in land management have the potential to affect outfitter/guide operations that provide commercial recreation opportunities on the Forest. Impacts to existing outfitter/guide use are likely to be greatest where changes in roadless protections allow development in remote areas that are used for outfitter/guide activities dependent on high scenic integrity and undisturbed landscapes. Changes in roadless area protections could also affect outfitter/guide use in other adjacent or nearby areas as outfitter/guides displaced from one location seek other places to take clients. Some use areas are presently at capacity, which could serve to exacerbate potential displacement effects. Long-term changes in roadless area management could affect the Forest's ability to meet future outfitter/guide demand, especially for operators seeking more remote areas.

The outfitter/guide analysis prepared for this EIS used changes in suitable old-growth acres in conjunction with information on existing outfitter/guide use to help focus on potentially affected areas. The resulting analysis identified 15 outfitter/guide use areas where potential conflicts between existing outfitter/guide use and future management could occur. In most of these areas, existing outfitter/guide use occurs near areas where development has occurred in the past, either near or along shorelines and/or Forest road systems. Similarly, in most cases, harvest that could already occur in these areas (under Alternative 1) has the potential to conflict with existing outfitter/guide use. By expanding the acres available for harvest, Alternatives 4 to 6 could add to these potential impacts by increasing the number and geographic extent of the acres affected. In some locations, new road construction could create new opportunities for operators who use Forest roads for access or provide road-based activities, provided these roads are left open following management activities. These potential impacts are discussed in more detail in the *Recreation* section.

Salmon Harvesting and Processing

None of the alternatives are expected to have a significant change to the commercial fishing or fish-processing industries over the planning period. Riparian Management standards and guidelines established in the 2016 Forest Plan would remain in place under all of the alternatives. While there would be some variation in the level of protection, these variations are not expected to affect the fishing industry. The future of the fishing industry in Southeast Alaska is more likely to depend upon occurrences outside of the Tongass National Forest such as hatchery production, offshore harvest levels, and changes in ocean conditions.

The 1997 FEIS (USDA Forest Service 1997a) noted that the amount of acreage of timber harvest was at most less than 20,000 acres per year, representing approximately 0.5 percent of the total remaining productive old growth (or 5 percent over the next decade) and less than 0.02 percent of the entire Forest. That EIS concluded that this was not expected to result in a significant change to commercial fishing employment. All of the alternatives that are presently being evaluated in this EIS would allow considerably less timber harvest and new road construction than the alternatives evaluated in the 1997 FEIS. Total annual old-growth harvest allowed over the 100-year planning period would be approximately 42,500 acres, substantially lower than the maximum proposed in the 1997 FEIS. Impacts to fish are discussed in detail in the Key Issue 3 section of this EIS.

Mining and Mineral Development

The Forest Service divides minerals resources into three groups: locatable minerals, leasable minerals, and salable minerals. A locatable mineral is any mineral that is "valuable" in economic terms or has a property that gives it distinct and special value. Examples of locatable minerals on the Tongass include gold, silver, copper, molybdenum, iron, nickel, lead, and zinc. 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. Exploration, mining, and mineral processing activities, including road construction and reconstruction, are presently allowed in IRAs and would continue to be allowed under all alternatives. Changes in roadless management are, therefore, not expected to affect existing or future locatable mineral exploration or mining activities on the Forest.

Leasable minerals are certain types of minerals, primarily energy resources (e.g., oil, gas, coal, and geothermal resources) that are not subject to mining claim location but are available for exploration and development under provisions of the Mineral Leasing Act of 1920. Roadbuilding is currently prohibited for any new leasable projects, including geothermal projects, within IRAs. For Alternatives 2, 3, 4, and 6, this prohibition would continue in AKRAs with watershed (Alternative 2) and LUD II priorities. Following project-specific analyses, roads could be approved for leasable projects within AKRAs with timber (Alternative 4) or roadless priorities. The Tongass has no current leasable mineral activity and the anticipated demand for leasable minerals is expected to remain low. As a result, changes in roadless management are expected to have limited impacts on related economic activity.

Salable minerals on the Forest are mainly used to construct NFS roads. Since road construction is not expected to vary much between alternatives, there would be little difference in salable mineral development between the alternatives.

Infrastructure Development

With some exceptions, Federal and state road development is presently limited in IRAs. Exceptions include roads with reserved or outstanding rights, roads provided for by statute or treaty, or road development related to a Federal Aid Highway. Roadless protection would be removed to various degrees under the action alternatives with corresponding implications for regional highway development. In most cases, changes in roadless management, as well as changes in the number of acres managed as roadless, would be more permissive with respect to regional road systems. In addition to those roads presently excepted, Roadless Priority AKRAs would also allow roads needed for the connection of communities and development of the regional transportation system as identified in the State of Alaska's Southeast Alaska Transportation Plan. Timber Priority AKRAs and areas dropped from roadless protection would remove roadless rule-related restrictions on road building. More areas would be available for additional types of regional road development under Alternatives 4 to 6. Future road projects would be subject to funding constraints and evaluated in detail on a project-by-project basis. Potential transportation effects are discussed in more detail in the *Transportation* section of this EIS.

None of the alternatives are expected to substantially affect the development of energy projects or related infrastructure. Removing roadless designations in areas under Alternatives 2 through 6 would simplify the process for projects but would not necessarily result in an increase in the number of projects developed.

In areas where new roadless areas are added or expanded, the permitting process could be more complicated, but projects would not be prohibited. An exemption for public utility systems in Roadless Priority AKRAs under Alternatives 2, 3, 4, and 6 would allow for tree cutting and road construction. Under Alternative 4, Roadless Areas with timber priority would not prohibit tree cutting or road construction at all. Where restrictions are removed, or exemptions added, the greatest effect may be in making the permitting process for developers less burdensome, resulting in more a rapid permitting process rather than an increase in the number of sites developed.

Payments to the State

As noted in the Affected Environment discussion, the Secure Rural Schools Act has been reauthorized since 2008, most recently in March 2018 for fiscal years 2017 and 2018. The amount of these payments would not be affected by any of the alternatives considered in this EIS.

Key Issue 3 – Protection of Terrestrial and Aquatic Wildlife Habitat and Biodiversity

Issue Statement: Protection of terrestrial and aquatic wildlife habitat and biodiversity from road development and timber harvest activities.

Background: The Tongass includes large, undeveloped, and natural land areas that represent large, unfragmented blocks of wildlife habitat. This scale and size of contiguous habitat is not available elsewhere in the National Forest System (NFS), except on the Chugach National Forest. Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. The Tongass Forest Plan Conservation Strategy was developed to maintain the integrity of the old-growth forest ecosystem, and thereby conserve biodiversity across the Forest, by retaining intact, largely undisturbed habitat. In addition, because of its predominantly undeveloped nature, a number of wide-ranging species find optimal habitat in the more remote areas of the Forest.

Fish and the aquatic resources on the Tongass National Forest support major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. The Tongass includes high-value, intact watersheds that were designated to be managed for intact ecological values and aquatic habitat productivity, and many commenters believe these areas should be protected so that they can continue to provide the clean water and fish habitats that are essential to the ecological and economic health of the Southeast Alaska communities and residents who rely on them."

In the following discussion, this issue is divided into three parts. First is *Biodiversity*, which addresses the habitats and biodiversity of the Tongass, landscape connectivity and fragmentation, and the Old-growth Conservation Strategy. Second is *Wildlife*, which addresses threatened, endangered, and sensitive species, along with other important species. Third is *Fish*, which covers fish habitat and salmon and trout including threatened and endangered species.

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Biodiversity

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Affected Environment

Biological diversity, or biodiversity, may be defined as "the variety of and variability within and among living organisms and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems" (United Nations Environment Programme 1991). Biodiversity 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. Under the National Forest Management Act (NFMA), the Forest must provide for diversity of plant and animal communities based on the suitability and capability of specific land areas.

This section provides a summary of the Tongass Conservation Strategy, ecosystem-based landscape delineations or biogeographic provinces on the Tongass National Forest, and past timber harvest. Landscape connectivity and fragmentation and invasive species are also discussed. Additional information on the background of the Conservation Strategy and its components can be found in the 2016 Forest Plan FEIS (USDA Forest Service 2016b, Appendix D).

Ecosystem Classification

Southeast Alaska is divided into 23 biogeographic provinces (21 of which coincide with the Tongass National Forest) and characterized by 1) similarities in terrestrial wildlife species composition, 2) similarities in distributional patterns for many of these species, 3) geologic and water barriers stemming from past events, such as glaciation, and 4) generally similar climatic conditions and physiographic characteristics (USDA Forest Service 2003a). Biogeographic provinces provide an appropriate scale for the analysis of impacts to biodiversity because they are ecosystem-based and vary in the level of resource development that has taken place and is allowed within them (see the 2016 Final EIS Suitable Land maps in the Map Packet for the distribution of suitable old growth and young growth across the Planning Area). Biogeographic provinces in Southeast Alaska are described in Table 3.9-1 and shown on Figure 3.9-1 of the 2016 Forest Plan FEIS (USDA Forest Service 2016b; see also Table 3.9-1 in Appendix B of this EIS).

Cover Types

The vegetation of Southeast Alaska and the Tongass National Forest is dominated by temperate coastal rain forests at lower elevations (less than about 2,000 feet). Intersperse d within the forest are muskegs, other wetlands, and other non-forest types. At higher elevations, alpine vegetation, rock, glaciers, and snowfields dominate. Table 3.3a-1 summarizes the breakdown of cover types by biogeographic province. Each of these cover types is described below.

Table 3.3a-1
Major Cover Types on the Tongass National Forest by Biogeographic Province (NFS Lands Only)

		Productive Forest (acres)			Unproductive Forest (acres)			Non-Forest (acres)		
	Biogeographic Province	POG[3]	Young-growth[1,3]	Total Productive Forest	Forested Muskeg[3]	Other Unproductive Forest[3]	Total Unproductive Forest	Land[2,3]	Water[3]	Total Non-Forest
1	Yakutat Forelands	95,063	40,262	135,325	101,827	25,703	127,530	34,339	7,255	41,595
2	Yakutat Uplands	44,014	13,242	57,256	5,241	14,807	20,048	818,834	20,009	838,843
3	East Chichagof Island	399,206	47,331	446,537	108,710	203,798	312,507	276,080	6,800	282,880
4	West Chichagof Island	72,643	329	72,972	45,204	82,691	127,895	72,722	8,430	81,152
5	East Baranof Island	88,668	14,283	102,951	12,198	90,057	102,255	177,699	6,323	184,022
6	West Baranof Island	214,457	17,716	232,173	70,549	193,754	264,303	242,254	19,678	261,931
7	Admiralty Island	595,432	14,103	609,535	85,110	190,234	275,345	148,513	13,267	161,780
8	Lynn Canal	157,988	8,320	166,309	20,617	100,240	120,857	349,501	2,803	352,305
9	North Coast Range	322,684	5,930	328,614	19,697	159,444	179,141	478,694	15,363	494,057
10	Kupreanof/Mitkof Island	307,752	39,036	346,788	176,592	212,256	388,848	15,478	3,822	19,300
11	Kuiu Island	291,839	30,934	322,773	44,128	88,402	132,530	19,494	2,571	22,065
12	Central Coast Range	246,153	9,269	255,422	27,199	152,597	179,796	268,001	10,612	278,612
13	Etolin Island	221,055	41,419	262,474	71,848	130,102	201,950	22,106	4,836	26,941
14	North Central Prince of Wales	486,160	170,306	656,466	152,189	270,927	423,116	45,859	21,953	67,812
15	Revilla Island/Cleveland Peninsula	504,827	49,119	553,946	175,045	311,591	486,636	91,126	36,079	127,205
16	Southern Outer Islands	112,035	18,114	130,149	27,148	44,386	71,535	4,926	909	5,835
17	Dall Island and Vicinity	66,951	1,299	68,249	6,467	26,553	33,020	9,773	2,962	12,735
18	South Prince of Wales	151,074	4,275	155,349	45,287	105,889	151,176	27,438	10,902	38,340
19	North Misty Fiords	198,210	6,549	204,759	21,227	264,636	285,863	461,818	14,394	476,212
20	South Misty Fiords	309,132	2,405	311,537	80,097	292,249	372,346	204,948	14,714	219,663
21	Ice Fields	116,893	10,006	126,899	8,628	171,804	180,432	2,606,398	15,588	2,621,986
Forest-wide		**5,002,255**	**544,250**	**5,546,504**	**1,305,009**	**3,132,122**	**4,437,131**	**6,376,478**	**239,272**	**6,615,750**

[1] Includes 83,000 acres of natural young growth, 422,000 acres of even-aged harvested stands, and about 40,000 acres of partial harvested stands.
[2] Non-forest land classes primarily include alder brush, brush, alpine, ice and snow fields, muskeg meadow, recurrent slide, and rock.
[3] Totals may not sum or match exactly to other tables in this section due to rounding.

Approximately 60 percent of the Tongass National Forest consists of forest land (including harvested areas). Approximately 5.5 million acres of the forest land is considered "productive forest land," defined as land 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 of standing volume (see the *Timber* section for additional discussion). The remaining 4.4 million acres of forest lands are considered unproductive forest because they do not meet the above criteria.

Productive forest land is divided into productive old growth (POG) and young growth. Young growth includes those stands resulting from past timber harvest, as well as natural young growth (e.g., created by wind, fire, or glacial retreat).

The remaining 40 percent of the Tongass National Forest (about 6.6 million acres) is classified as non-forest land and includes shrub and herbaceous habitats (e.g., muskeg, alpine, estuaries), sparsely vegetated and non-vegetated areas (e.g., snow, rock, ice), and aquatic habitats (e.g., streams, ponds, and lakes).

Productive Old-Growth Forest

Old-growth forests support biodiversity due to their structural and ecological complexity. In Southeast Alaska, old-growth forests are greater than 150 years old, and are characterized by multiple canopy layers; an interspersion of trees of multiple age classes; the presence of snags, decadent trees, and fallen trees; presence of forbs; and variation in the amounts and distribution of live trees (USDA-FS R10-TP-28). These features create intricate habitat niches that support many plant and animal species (Spies 2004). In Southeast Alaska, old-growth forests have been the focus of past timber harvest making them the most susceptible ecosystem to changes caused by forest management activities.

Seven POG types have been defined, based on land form and forest condition, and used to develop a hierarchical mapping model for predicting tree sizes and densities on the Tongass National Forest. Old-growth forest classification is described in greater detail in Section 3.9 and Figure 3.9-2 in the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

From a biodiversity standpoint, high-volume POG and large tree POG are thought to have the highest importance for overall biodiversity. High-volume POG is defined as the grouping of the three tree size and density classes that represent the highest volume strata—SD5S, SD5N, and SD67 types. Large-tree POG is defined as the SD67 class, representing the most productive of the POG types, and typically containing the highest density of large trees.

There are approximately 5 million acres of POG forest on the Tongass National Forest. Of this amount, approximately 16 percent is low-volume POG (SD4H type), 42 percent is medium volume POG (SD4N, 4S, and 5H types), and 42 percent is high-volume POG (SD5S, 5N, and 67 types). Large-tree POG (SD67 type) makes up almost 11 percent of all POG. Table 3.9-3 in the 2016 Forest Plan FEIS (USDA Forest Service 2016b; the table is reproduced in Appendix B of this EIS) provides the distribution of existing POG forest by biogeographic province and is summarized below.

Elevation is considered one of the most significant landscape variables influencing the distribution and availability of POG forest. Lower elevation stands (at or below 800 feet) hold the highest value for many wildlife species because they remain relatively accessible during winter (see the *Wildlife* section for additional discussion). Forest-wide, approximately 59 percent of POG forest occurs at low elevations (see Table 3.9-4 in Appendix B of this EIS).

Young-Growth Forest

There are approximately 544,000 acres of young-growth forest on the Tongass National Forest, of which approximately 84 percent is a result of past timber harvest and approximately 15 percent a result of natural processes (e.g., wind, fire, glacial retreat). Over 90 percent of the harvested young growth is from even-age harvest. Approximately 20 percent of young growth from even-age harvest is 25 years old or younger, in the stand initiation stage. Of this age class, stands up to about 10 years tend to have high species diversity, in particular their shrub layer, which expands as a result of the open canopy after harvest. The remaining approximately 80 percent of young growth is older and mostly in the stem exclusion stage. This type of stand condition has very low species diversity. Some of these older young-growth stands are considered suitable for timber harvest, and could help support the Tongass National Forest's transition to young-growth harvest (see the *Timber* section for additional discussion of young-growth harvest and suitability). Approximately 90,000 acres of young-growth (harvested and natural) occur in Riparian Management Areas (RMAs) and an additional 68,000 acres occur in Beach and Estuary Fringe outside of RMAs. In addition, approximately 32,000 acres of young growth (harvested and natural) occur within the Old-growth Habitat Land Use Designation (LUD) and outside of RMAs and Beach and Estuary Fringe.

Unproductive Forest and Non-Forested Lands

Approximately 27 percent of the Tongass is classified as unproductive forest (Table 3.3a-1). Many unproductive forest stands meet the definition of old growth, but the trees are typically small and stunted (under 40 feet in height) and the canopy is open (10 to 40 percent canopy closure). Hemlock, cedar, and lodge pole pine are the most common trees; blueberry and rusty menzesia are the most common shrubs. Past disturbance to this habitat type has occurred primarily as a result of road construction, which has resulted in some permanent reduction in total acres of these unproductive forest types.

Non-forest ecosystems provide valuable habitat types that include wetland and other areas of shrub and herbaceous types (e.g., muskegs, alder and willow brush, alpine, estuaries), non-vegetated areas (e.g., snow, rock, ice), and aquatic sites (e.g., streams, ponds, and lakes) and contribute greatly to the species diversity on the Tongass National Forest by providing unique microsites and openings that contain shrub and herbaceous vegetation within forested stands. Approximately 40 percent of the Tongass National Forest consists of non-forest lands (Table 3.3a-1).

Overview of Existing Levels of POG Forest on NFS Lands

This section provides a brief summary of past timber harvest as provided in the 2016 Forest Plan FEIS (USDA Forest Service 2016b) and focuses on the amount of POG forest compared to the amount present in 1954 prior to large-scale commercial timber harvest because management activities are most likely to affect productive forest. Other habitat types are expected to be maintained and will contribute toward overall biodiversity.

Approximately 92 percent of the estimated original (prior to 1954) 5.4 million acres of POG that occurred on Tongass National Forest remains today (Table 3.3a-2). Forest-wide, 86 percent of the original high-volume POG and 82 percent of the original large-tree POG remains (Table 3.3a-2). The greatest amount of timber harvest has occurred in the North Central Prince of Wales biogeographic province (74 percent of the total original POG forest remaining), followed by Etolin Island, East Baranof, Southern Outer Islands, East Chichagof Island and Kupreanof/Mitkof Islands biogeographic provinces (85, 87, 86, 90, and 89 percent of the original total POG forest remaining, respectively; Table 3.3a-2).

These biogeographic provinces, in addition to West Baranof Island biogeographic province, have also had the most harvest of high-volume and large-tree POG forest harvested. The Revilla Island/Cleveland Peninsula province also ranks among the highest when considering large-tree POG harvest. For additional discussion of past harvest on the Tongass, see the *Timber* section in this EIS and Appendix C in USDA Forest Service (2016b).

Of the 947 Value Comparison Units (VCUs) on the Tongass National Forest, 72.3 percent are considered intact (for National Forest System [NFS] lands only) and are thus likely to maintain a high degree of biodiversity. Although landscapes with higher amounts of past harvest likely remain functional, this index represents areas that are in relatively pristine conditions and thus have the highest ecological integrity.

Landscape Connectivity and Fragmentation

The Tongass National Forest is characterized by an inherent level of fragmentation due to its island geography. The natural distribution of POG forest is also patchy and linear in many areas, as a result of the mosaic condition of the landscape created by muskeg, forested wetlands, alpine areas, other unproductive forest, and other non-forested habitats. This section provides an overview of the concepts of landscape connectivity and fragmentation and existing conditions on the Tongass National Forest.

Landscape connectivity has been defined as the degree to which the structure of a landscape helps or hinders the movement of wildlife species (Taylor et al. 1993). A landscape with a high degree of connectivity is one in which wildlife and other species can move readily between habitat patches over the long term (USDA Forest Service 2008a). On the Tongass, connectivity between areas of similar habitats (for example, between two patches of old-growth forest) or between high and low elevation habitats is important to maintaining well-distributed, viable wildlife populations and thus contributing to the ecological integrity of the landscape. Empirical studies to date suggest that habitat loss has large, consistently negative effects on overall biodiversity. Fragmentation, both natural (e.g., windthrow, landslides, insects and diseases, and avalanches) and human-caused (e.g., timber harvest, road building, and powerline development), reduces landscape connectivity by breaking apart larger contiguous blocks of habitat into smaller patches. The degree to which impacts to some species habitat requisites depends on species-specific dispersal capabilities, the distance between habitat patches, and conditions within the matrix between habitat patches.

When fragmentation occurs, there is an increase in the amount of forest edge habitat and a decrease in the amount of interior old-growth forest habitat, with which many wildlife species are associated (see the *Wildlife* section). Fragmentation is often accompanied by a decline in native species diversity because habitat conditions along the edge (edge effects) may favor some species over others. Edge effects may include changes to vegetation structure, species composition (both plants and animals), predation rates, and disturbance (Murcia 1995; Nilon et al. 1995; As 1999). Although the number of species may be higher along edges (often favoring invasive species), the number of habitat specialists (such as those associated with interior old growth forest conditions and those that tend to be more sensitive or at-risk) decreases (As 1999; Nilon et al. 1995; Kissling and Garton 2008).

Table 3.3a-2
Original and Percent Remaining Total POG, High-Volume POG (SD5S, SD5N, SD67) Total and Below 800 feet, and Large-Tree POG (SD67) Total and Below 800 feet by Biogeographic Province (NFS Lands Only)

		Acres Original POG[1, 2]					% Original POG remaining				
	Biogeographic Province	Total POG	High-Volume POG	High-Vol. POG <800 ft	Large-tree POG	Large-tree POG <800 ft	Total POG	High-Vol. POG	High-Vol. POG <800 ft	Large-tree POG	Large-tree POG <800 ft
1	Yakutat Forelands	98,656	61,377	61,240	45,164	45,073	96%	96%	96%	98%	98%
2	Yakutat Uplands	45,387	15,335	14,825	3,834	3,595	97%	93%	93%	89%	89%
3	East Chichagof Island	443,241	191,888	121,364	47,460	35,953	90%	83%	77%	72%	69%
4	West Chichagof Island	72,643	18,480	14,532	2,021	1,916	100%	100%	100%	100%	100%
5	East Baranof Island	102,083	40,159	30,513	6,023	5,492	87%	75%	70%	33%	33%
6	West Baranof Island	231,308	68,304	52,778	9,150	8,611	93%	81%	77%	45%	43%
7	Admiralty Island	604,254	308,323	175,317	100,229	63,447	99%	98%	96%	97%	96%
8	Lynn Canal	163,358	65,061	37,150	13,563	8,901	97%	94%	91%	88%	85%
9	North Coast Range	323,361	137,818	64,615	22,549	13,457	100%	100%	99%	99%	99%
10	Kupreanof/Mitkof Island	345,136	134,319	83,651	30,802	23,018	89%	79%	73%	64%	61%
11	Kuiu Island	319,310	183,616	127,805	42,768	27,964	91%	89%	86%	81%	74%
12	Central Coast Range	252,672	114,465	69,176	21,982	16,569	97%	96%	93%	91%	89%
13	Etolin Island	259,071	109,059	67,742	23,888	16,224	85%	74%	67%	52%	46%
14	North Central Prince of Wales	656,415	348,976	237,337	152,999	113,327	74%	63%	57%	67%	64%
15	Revilla Island/ Cleveland Peninsula	553,391	269,121	139,818	46,506	27,341	91%	86%	81%	69%	62%
16	Southern Outer Islands	129,891	61,801	44,041	17,807	12,997	86%	78%	74%	70%	65%
17	Dall Island and Vicinity	68,249	34,469	22,636	8,310	5,764	98%	97%	96%	95%	94%
18	South Prince of Wales	155,349	75,089	50,954	40,113	29,871	97%	96%	94%	97%	96%
19	North Misty Fiords	204,479	71,334	41,509	14,623	10,816	97%	93%	91%	87%	85%
20	South Misty Fiords	311,537	101,292	62,544	14,811	11,629	99%	98%	98%	95%	96%
21	Ice Fields	123,566	43,245	21,327	7,877	5,604	95%	88%	80%	75%	69%
Forest-wide		**5,463,379**	**2,453,537**	**1,540,877**	**672,481**	**487,571**	**92%**	**86%**	**82%**	**79%**	**77%**

[1] Original total productive old-growth (POG) acreages based on Forest Service GIS layer. Data from 2016 Tongass GIS.

[2] To determine amount of high-volume POG, assumed 75% of total past harvest consisted of high-volume POG. To determine amount of large-tree POG (SD67 type), assumed 30 percent of total past harvest consisted of large-tree POG.

Past analysis has looked at biodiversity at the large watershed scale. Intact, undeveloped landscapes, even at this scale, are assumed to function in a way that maintains plant communities, unique habitat, and other supporting ecological processes for increased biodiversity. Intact watersheds are defined as those having less than 5 percent of their POG harvested, which is consistent with a similar analysis conducted by Audubon Alaska and The Nature Conservancy (Albert and Schoen 2007). Based on this definition, a VCU, roughly equivalent to a large watershed, with at least 95 percent of the original POG remaining would be considered to be intact.

Forested corridors along streams and between old-growth habitats at different elevations have been reduced in size by past harvest in many areas of the Tongass. Remaining patches of old-growth forest may 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 old-growth forest ecosystem. These patches may be critical for species that are locally endemic, occur only in very specific conditions of forest structure or soil type, or have limited dispersal capabilities. Biogeographic provinces with the greatest levels of past timber harvest (Table 3.3a-2) are at a higher risk of not maintaining a full range of natural biodiversity (ecological integrity) and have the greatest reductions in overall landscape connectivity. Other biogeographic provinces are naturally fragmented by unproductive forest and non-forest habitats. Detailed analyses of landscape connectivity and fragmentation are typically conducted at the project level where individual patches of contiguous old-growth forest habitat and movement corridors can be identified. For this EIS, landscape connectivity and fragmentation are discussed qualitatively at the biogeographic province scale.

Tongass Forest Plan Conservation Strategy

The Tongass Forest Plan Conservation Strategy was developed to maintain the integrity of the old-growth forest ecosystem, and thereby conserve biodiversity across the Forest, by retaining intact, largely undisturbed habitat. This strategy, initially incorporated into the 1997 Forest Plan, was reviewed and amended for incorporation into the 2008 and 2016 Forest Plans. The Conservation Strategy includes two major components: (1) a forest-wide network of variably sized old-growth reserves (OGRs) allocated to the Old-growth Habitat LUD plus other non-development LUDs and all small islands less than 1,000 acres, and (2) a series of standards and guidelines applicable to lands where timber harvest is permitted, also known as the matrix (USDA Forest Service 2008a, 2008b).

The reserve network was designed to maintain habitats of the species that have the highest viability concerns (USDA Forest Service 2008b), particularly those associated or dependent upon old-growth forest characteristics. The reserve network includes other non-development LUDs such as Wilderness, LUD II, Remote, and Semi-Remote Recreation. These non-development LUDs contribute to maintaining a variety of habitats important for species not necessarily dependent on old growth ecosystems. The intent of the reserve system is to help ensure the maintenance of well-distributed viable populations of all old-growth associated wildlife species across the Tongass, with focus on those species that are most sensitive to habitat loss and fragmentation. For a complete review of the Forest Plan Conservation Strategy, including assumptions underlying the design of the OGR system, refer to Appendix D of the 2008 Forest Plan FEIS (USDA Forest Service 2008b).

Within the matrix areas outside of reserves, components of the old-growth ecosystem are maintained through standards and guidelines designed to provide for important ecological functions such as dispersal of organisms, movement between forest stands, and maintenance of ecologically valuable structural components such

as down logs, snags, and large trees. Matrix lands where commercial timber harvest occurs include Modified Landscape, Scenic Viewshed, and Timber Production LUDs.

Matrix management complements the reserve system by providing habitat at smaller spatial scales, increasing the effectiveness of reserves, and maintaining landscape connectivity (USDA Forest Service 2008b). Standards and guidelines applicable to these lands include maintenance of the 1,000-foot beach and estuary buffer, variable-width stream buffers, project-level legacy forest structure retention requirements, high-hazard soils, steep slopes, karst terrain, and visually sensitive travel routes and use areas, and requirements for connectivity. These are all considered contributing elements of the Conservation Strategy. Finally, a number of species-specific standards and guidelines, such as raptor nest and wolf den buffers, set aside old growth buffers, are implemented to avoid impacts to these species. These standards and guidelines are also addressed in the *Wildlife* section of this EIS. Table 3.3a-3 shows the distribution of POG and young-growth forest within the reserve system and matrix lands.

Table 3.3a-3

Distribution of Existing POG and Young Growth within the Reserve System and Matrix Lands (NFS Lands Only)

Biogeographic Province	Within Reserves (Non-Development LUDs; acres)				Within Matrix (Development LUDs; acres)			
	Productive Old-growth				Productive Old-growth			
	Total	High-volume (SD 5N, 5S, 67)	Large-tree (SD 67)	Young-growth[1]	Total	High-volume (SD 5N, 5S, 67)	Large-tree (SD 67)	Young-growth[1]
1	74,371	42,876	30,916	24	20,691	15,806	13,171	3,569
2	43,193	13,850	3,185	254	821	455	237	1,119
3	230,146	94,783	23,185	10,341	169,060	64,079	11,064	33,694
4	72,639	18,480	2,021	-	5	-	-	-
5	53,694	16,444	1,214	1,767	34,974	13,654	785	11,648
6	181,273	47,481	3,551	6,323	33,184	8,185	543	10,529
7	595,432	301,706	97,582	8,823	-	-	-	-
8	116,162	44,024	8,650	1,093	41,827	17,010	3,302	4,277
9	215,920	90,802	14,521	354	106,763	46,508	7,824	323
10	135,284	49,737	9,467	5,992	172,467	56,544	10,120	31,392
11	197,425	105,819	17,633	4,672	94,414	57,193	16,894	22,799
12	163,813	72,362	12,305	662	82,340	37,214	7,721	5,858
13	102,207	37,434	6,067	4,192	118,848	43,113	6,416	33,824
14	257,676	121,130	55,795	29,811	228,483	100,154	46,128	140,445
15	344,679	160,998	21,401	9,384	160,148	71,700	10,536	39,180
16	89,536	36,703	8,468	4,155	22,498	11,706	3,982	13,701
17	57,671	29,772	7,557	1,269	9,279	3,723	363	30
18	105,567	49,825	27,651	1,667	45,507	22,058	11,179	2,608
19	184,661	61,354	11,542	5,265	13,549	5,278	1,201	1,004
20	309,132	99,488	14,089	2,405	0	-	-	-
21	99,184	33,666	5,634	4,476	17,709	4,574	241	2,197
Forest-wide	**3,629,686**	**1,528,738**	**382,437**	**102,928**	**1,372,569**	**578,956**	**151,706**	**358,196**

[1] Previously harvested young growth, which could help contribute to the transition to young-growth harvest.

Environmental Consequences

Effects Common to All Alternatives

Effects on the Old-Growth Forest Ecosystem

A functional and interconnected old-growth ecosystem is essential to maintaining ecological integrity of several biodiversity components, including: structural complexity (within-stand and landscape level); connectivity (unfragmented contiguous blocks of old growth, as well as functional connectivity within the matrix); stand age and species composition; and various ecological functions (tree establishment, disturbance, and nitrogen fixation [USDA Forest Service 2008b]). Timber harvest in POG may reduce biodiversity by shifting the age-structure of the forest by replacing old growth trees with younger trees (Franklin et al. 1997); changing the composition of understory vegetation (Deal and Tappeiner 2002); and removing key habitat features such as large decadent trees, snags, and downed logs.

Although many other cover types contribute to the overall biodiversity on the Tongass, the emphasis throughout this section is placed on old-growth forest because this is the focus of the Conservation Strategy, and the cover type that has been most affected by timber management activities on the Tongass. The amount of POG remaining and its distribution across the landscape provides a method to estimate the effects of the alternatives on biodiversity and was analyzed in detail in the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

Within matrix lands, there may be slightly more high-volume and large-tree POG harvested under the action alternatives than was predicted for the Forest Plan selected alternative because of the increased options for creating positive timber sales. However, this is speculative and depends also on harvest levels reaching predicted decadal levels. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under the action alternatives is lower than in the Alternative 1 suitable acres (see *Direct and Indirect Effects Specific to Each Alternative*). Regardless, potential impacts would be analyzed at the project level and under a separate National Environmental Policy Act (NEPA) process.

Young-growth harvest, depending on treatment type and rotation, may reduce the range of habitats that support diverse plant and animal communities and alter the ecological functions supported by the old-growth ecosystem. However, treatments such as pre-commercial and commercial thinning can result in benefits to biodiversity by increasing understory growth over the short term, and by promoting the development of old-growth stands over the long term when stands are allowed to mature. The effects of young-growth harvest discussed throughout this section, as well as in the *Wildlife* section, represent the trade-off associated with the proposed transition to predominantly young-growth harvest.

Young growth suitable for timber harvest occurs in a number of special habitats under the Forest Plan, including RMAs, beach and estuary fringe, and the Old-growth Habitat LUD. Young growth on specific portions of these areas may be harvested under required prescriptions and following specific guidelines. The suitable acres of young growth on these special areas will increase slightly under the action alternatives, but only slightly because the vast majority of existing young-growth stands are not in roadless areas. Therefore, little to no difference among the alternatives is expected.

Effects on the Tongass Conservation Strategy

Under all of the alternatives, long-term protection of POG would continue to occur under the Tongass Conservation Strategy. The system of OGRs and other non-development LUDs is intended to maintain the ecological integrity of the old-growth ecosystem; all non-development LUDs would remain intact across all alternatives. Within the matrix, old-growth between reserves is maintained through Forest-wide standards and guidelines for stream buffers, the beach and estuary fringe, legacy forest structure, and other features that preclude or limit POG timber harvest under all alternatives (USDA Forest Service 2016b). Collectively, these measures would facilitate organism dispersal and maintain the functionality and interconnectedness of the old-growth ecosystem (USDA Forest Service 2008b). In addition, the substantial reduction in old-growth harvest relative to the 1997 Forest Plan (under which the Conservation Strategy was developed) through the transition to predominantly young-growth harvest would enhance biodiversity and the functioning of the Conservation Strategy over the long-term. No changes to these Forest Plan features are proposed under any of the alternatives.

Other Developments – Renewable Energy, Transportation, and Mining

The 2016 Forest Plan provides Forest-wide management direction for Renewable Energy and for Transportation Systems Corridors and other activities, which allows greater flexibility in development including renewable energy development to help Southeast Alaska communities reduce fossil fuel energy dependence. Energy project development, major transportation developments, and mining both inside and outside of roadless areas are possible under all alternatives. Although these projects can be permitted under Alternative 1, there is likely to be a slight improvement in the potential for project development under each of the action alternatives because of the broadening of the rule language regarding access for the construction, expansion, or maintenance of facilities.

Under Alternative 1, the only major transportation projects that are permissible in roadless areas are those Federal Highway Projects that are in the public interest. The rule language modifications under the action alternatives make it slightly easier (Alternative 2) to moderately easier (Alternatives 3, 4, 5, and 6) to develop most major transportation projects. In addition to Federal Highway Projects, State transportation projects under the Alaska State Transportation Plan are permitted, and a number of other more minor exceptions would be allowed.

Impacts from transportation, renewable energy projects, and other developments were analyzed in the 2016 Forest Plan FEIS. This EIS does not authorize any action. Any transportation, renewable energy, mining, or other project proposed on NFS land or requiring Forest Service approval would undergo a separate, project-specific NEPA level review; therefore, individual projects are not addressed in detail here.

Effects Specific to Each Alternative

Alternative 1 (No Action)

Alternative 1 represents continued implementation of the 2016 Forest Plan under the 2001 Roadless Rule. Under Alternative 1, there would be no effects related to additional or modified Forest Plan components because none are proposed.

Alternative 1 would maintain the current Forest Plan harvest levels consisting of about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would be about 334,000 acres and old growth suitable acres would be about 230,000 acres. Suitable high-volume POG and suitable large-tree POG would be about 98,000 acres and 32,000 acres, respectively.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. Suitable young growth in RMAs consist of about 27,000 acres; in beach fringe about 29,000 acres; and in Old-growth Habitat LUDs about 26,000 acres. Harvest is limited to a maximum of 10-acre openings or commercial thinning. RMA harvest is only allowed outside of Tongass Timber Reform Act (TTRA) buffers, and beach fringe harvest is only allowed outside of a 200-foot buffer along the shoreline. A one-time entry stipulation is also implemented. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Forest Plan modeling projected harvest levels of 1,089 acres in RMAs, 3,903 acres in beach fringe, and 1,811 acres in Old-growth Habitat LUDs after 100 years (USDA Forest Service 2016b, Table 2-18).

Assuming full implementation of the Forest Plan after 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Table 3.3a-4 shows the projected harvest over the next 100 years of Forest Plan implementation.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 1, overall impacts due to fragmentation and on the Old-growth Conservation Strategy are expected to be minor and consistent with the existing Forest Plan. Under the current Forest Plan, there would be a slight reduction in the number of intact watersheds, and acreage within intact watersheds, over the planning horizon. After 100+ years of Alternative 1 implementation, there would be three fewer intact watersheds considering NFS lands only. This means 72.1 percent of the 947 large watersheds would remain intact.

Alternative 2

This alternative would open up areas identified as roaded-roadless, which would allow access to areas that already have a road system for harvest of old growth and existing young growth. In addition, although 111,000 acres would have the roadless designation removed, about 137,000 acres would have the roadless designation added, resulting in a net increase in roadless area.

Suitable high-volume POG and suitable large-tree POG base would increase by about 6,400 acres (7 percent) and 700 acres (2 percent), respectively. However, the proportion of high-volume and large-tree POG in the added suitable acres under Alternative 2 is lower than in the Alternative 1 suitable acres.

Table 3.3a-4
Projected Harvest of Young Growth[1] and Old Growth Over 100 Years by Biogeographic Province by Alternative

		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
No.	Biogeographic Province	Young Growth	Old Growth	Young Growth	Old Growth	Young Growth	Old Growth	Young Growth	Old Growth	Young Growth	Old Growth	Young Growth	Old Growth
1	Yakutat Forelands	4,321	12	4,473	11	4,527	9	5,517	7	5,671	7	5,462	7
2	Yakutat Uplands	951	0	922	0	1,021	0	1,158	0	1,141	0	1,050	0
3	East Chichagof Island	30,604	6,461	29,978	6,111	29,868	6,006	29,736	6,948	30,209	6,932	29,663	6,932
4	West Chichagof Island	0	0	0	0	0	0	0	0	0	0	0	0
5	East Baranof Island	9,612	606	9,300	570	9,260	475	9,211	1,082	9,076	1,059	9,158	1,059
6	West Baranof Island	8,982	433	8,714	400	8,676	333	8,607	534	8,547	522	8,557	522
7	Admiralty Island	0	0	0	0	0	0	0	0	0	0	0	0
8	Lynn Canal	3,786	1,192	4,241	1,150	4,222	957	4,230	1,082	4,616	1,157	4,526	1,157
9	North Coast Range	154	25	155	23	154	19	172	15	394	15	231	15
10	Kupreanof/Mitkof Island	23,059	6,044	24,749	6,623	24,658	6,617	24,508	6,366	24,445	6,295	24,578	6,295
11	Kuiu Island	17,793	2,783	17,191	2,363	17,116	2,316	17,095	2,152	16,970	2,105	17,096	2,105
12	Central Coast Range	4,098	528	3,975	363	3,958	694	3,926	910	4,068	969	3,956	969
13	Etolin Island & Vicinity	26,824	4,977	27,466	5,199	27,483	5,204	27,336	5,261	27,587	5,278	27,548	5,278
14	North Central Prince of Wales	109,228	12,394	108,758	12,530	109,154	12,641	108,678	10,747	107,328	10,718	108,142	10,718
15	Revilla Island/ Cleveland Pen.	27,543	5,300	27,349	5,499	27,246	5,756	27,250	5,894	27,456	5,875	27,469	5,875
16	Southern Outer Islands	11,422	1,043	11,110	963	11,061	824	10,987	822	10,877	805	10,929	805
17	Dall Island and Vicinity	0	0	0	0	0	0	0	0	23	0	20	0
18	South Prince of Wales	1,910	675	2,021	667	2,012	567	2,015	591	2,044	676	2,038	676
19	North Misty Fiords	872	4	846	4	843	3	836	3	854	3	855	3
20	South Misty Fiords	0	0	0	0	0	0	0	0	0	0	0	0
21	Ice Fields	2,999	8	2,910	7	2,897	62	2,894	67	2,851	67	2,878	67
Totals[1]	**Forest-wide**	**284,158**	**42,484**	**284,157**	**42,483**	**284,157**	**42,483**	**284,157**	**42,482**	**284,157**	**42,482**	**284,157**	**42,482**

[1] Numbers may not appear to sum correctly due to rounding.

Implementation of the Forest Plan under Alternative 2 would have harvest levels similar to the level projected under Alternative 1, the current Forest Plan, about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would increase by about 10,000 acres or about 3 percent relative to Alternative 1 and old-growth suitable acres would increase by about 18,000 acres or about 8 percent.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. The suitable young-growth acres in these three special areas would change by less than 1 percent to 3 percent, relative to Alternative 1. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Therefore, there would be little to no difference in the amount of young-growth harvest in RMAs, beach fringe, or Old-growth Habitat LUDs under Alternative 2.

Assuming full implementation of the Forest Plan after 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Under Alternative 2, the overall harvest level would be maintained, but the distribution of harvest could be different. Assuming harvest patterns follow the distribution of suitable old growth, the provinces where harvest is likely to increase include Kupreanof/Mitkof Island, Etolin Island & Vicinity, North Central Prince of Wales, and Revilla Island/Cleveland Peninsula. Harvest in the other provinces would remain at the same level or decline. However, the projected changes in suitable acres are on the order of a few hundred acres in each province so overall effects are expected to be insignificant. Table 3.3a-4 shows the estimated maximum harvest over the next 100 years.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 2, there would be little change in the distribution of timber harvest, roads, and other facilities relative to Alternative 1. After 100+ years of Alternative 2 implementation, there would be three fewer intact watersheds considering NFS lands only. This means 72.1 percent of the 947 large watersheds would remain intact or the same as under Alternative 1. Therefore, overall, impacts due to fragmentation and the Old-growth Conservation Strategy are expected to be minor and are not expected to be noticeably different from Alternative 1 (existing Forest Plan).

Alternative 3

This alternative would open up areas identified as roaded-roadless and include areas identified as logical extensions of existing roads. Alternative 3 would be less protective because it would remove approximately 1.1 million total acres of roadless designations but would still rank relatively high overall because it would maintain substantial roadless designations within Development LUDs and 8.1 million total acres would still be managed under a roadless priority designation. Furthermore, the majority of lands dropped from roadless designation are

managed as LUD II lands, which are intended to be managed in a roadless state to retain their wildland character (see current Forest Plan, Land Use Designation II goal description). Therefore, the roadless designation on LUD II lands provides little additional protection of roadless characteristics.

Implementation of the Forest Plan under Alternative 3 would have harvest levels similar to the level projected under Alternative 1, the current Forest Plan; about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would increase by about 12,000 acres or about 4 percent relative to Alternative 1 and old-growth suitable acres would increase by about 68,000 acres or about 29 percent.

Suitable high-volume POG and suitable large-tree POG base would increase by about 25,900 acres (27 percent) and 4,100 acres (13 percent), respectively, relative to Alternative 1. There could be a very slight increase in high-volume and large-tree POG harvested under Alternative 3 than was predicted for the Forest Plan because of increased options for creating positive timber sales. However, this is speculative and also depends on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under Alternative 3, is lower than the proportion in the Alternative 1 suitable acres.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. The suitable young growth acres in these three special areas would change by 1 percent to 4 percent, relative to Alternative 1. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Therefore, there would be little to no difference in the amount of young-growth harvest in RMAs, beach fringe, or Old-growth Habitat LUDs under Alternative 3.

Assuming full implementation of the Forest Plan for 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest under Alternative 1 (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Under Alternative 3, the overall harvest level would be maintained, but the distribution of harvest could be different. Assuming harvest patterns follow the distribution of suitable old growth, the provinces where harvest is likely to increase more than 100 acres include Kupreanof/Mitkof Island, Central Coast Range, Etolin Island & Vicinity, North Central Prince of Wales, and Revilla Island/Cleveland Peninsula. Harvest in the other provinces would remain at the same level or decline. However, the projected increases in suitable acres are less than 600 acres in each province so overall effects are expected to be minor. Table 3.3a-4 shows the estimated maximum harvest over the next 100 years.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 3, there would be little change in the distribution of timber harvest, roads, and other facilities relative to Alternative 1. After 100+ years of Alternative 3

implementation, there would be four fewer intact watersheds considering NFS lands only. This means 71.9 percent of the 947 large watersheds would remain intact; one less watershed than under Alternative 1. Therefore, overall, impacts due to fragmentation and on the Old-growth Conservation Strategy are expected to be relatively minor and are not expected to be noticeably different from Alternative 1 (existing Forest Plan).

Alternative 4

This alternative would remove the roadless designation on areas identified as roaded roadless, on areas identified as logical extensions of existing roads, and on some additional acres of development LUDs. Alternative 4 would be substantially less protective than Alternative 3 but would still include a high number of roadless acres within development LUDs. However, 861,000 roadless acres are designated as Timber Priority, which provides little or no protection of roadless characteristics and essentially eliminates the roadless protections provided in these development LUDs.

Implementation of the Forest Plan under Alternative 4 would have harvest levels similar to the level projected under Alternative 1, the current Forest Plan, about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would increase by about 15,000 acres or about 4 percent relative to Alternative 1 and old-growth suitable acres would increase by about 158,000 acres or about 69 percent.

Suitable high-volume POG and suitable large-tree POG base would increase by about 55,000 acres (57 percent) and 9,200 acres (29 percent), respectively, relative to Alternative 1. There could be a slight increase in high-volume and large-tree POG harvested under Alternative 4 than was predicted for the Forest Plan because of increased options for creating positive timber sales. However, this is speculative and also depends on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under Alternative 4, is lower than the proportion in the Alternative 1 suitable acres.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. The suitable young growth acres in these three special areas would change by 1 percent to 4 percent, relative to Alternative 1. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Therefore, there would be little to no difference in the amount of young-growth harvest in RMAs, beach fringe, or Old-growth Habitat LUDs under Alternative 4.

Assuming full implementation of the Forest Plan for 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest under Alternative 1 (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Under Alternative 4, the overall harvest level would be maintained, but the distribution of harvest could be different. Assuming harvest patterns follow the distribution of

Commented [U17]: For this reason co-management authority is essential.

suitable old growth, the provinces where harvest is likely to increase more than 100 acres include East Chichagof Island, East Baranof Island, West Baranof Island, Kupreanof/Mitkof Islands, Central Coast Range, Etolin Island & Vicinity, and Revilla Island/Cleveland Peninsula. Harvest in the other provinces would remain at the same level or decline. However, the projected increases in suitable acres are less than 500 acres in each province so overall effects are expected to be minor. Table 3.3a-4 shows the estimated maximum harvest over the next 100 years by biogeographic province.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 4, there would be some change in the distribution of timber harvest, roads, and other facilities relative to Alternative 1. Under this alternative, roads and timber harvest are likely to penetrate further into currently roadless areas than under Alternatives 1, 2, or 3, resulting in a greater degree of fragmentation. After 100+ years of Alternative 4 implementation, there would be 11 fewer intact watersheds considering NFS lands only. This means 71.2 percent of the 947 large watersheds would remain intact, eight fewer watersheds than under Alternative 1. Nevertheless, because overall harvest levels would not change relative to Alternative 1, the effects due to fragmentation and on the Old-growth Conservation Strategy are expected to be relatively low and slightly greater than expected under Alternative 1 (existing Forest Plan).

Alternative 5

Whereas the roadless rule language under Alternatives 2, 3, 4, and 6 would be modified, all roadless designations would be removed from all lands on the Tongass under Alternative 5 and, therefore, it would rank the lowest in terms of roadless protections. However, it would still be moderate in terms of overall protection due to the degree of protections provided by the underlying Forest Plan LUDs and Forest Plan standards and guidelines, which would not change.

Implementation of the Forest Plan under Alternative 5 would have harvest levels similar to the level projected under Alternative 1, the current Forest Plan, about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would increase by about 20,000 acres or about 6 percent relative to Alternative 1 and old-growth suitable acres would increase by about 167,000 acres or about 72 percent.

Suitable high-volume POG and suitable large-tree POG base would increase by about 59,000 acres (61 percent) and 10,200 acres (32 percent), respectively, relative to Alternative 1. There could be a slight increase in high-volume and large-tree POG harvested under Alternative 5 than was predicted for the Forest Plan because of increased options for creating positive timber sales. However, this is speculative and also depends on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under Alternative 5 is lower than the proportion in the Alternative 1 suitable acres.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. The suitable young-growth acres in these three special areas would increase by 5 to 6 percent, relative to Alternative 1, in RMAs and beach fringe, but by 12 percent in Old-growth Habitat LUDs, which is the largest increase among the action alternatives. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Therefore, there would be no more than minor differences in the

amount of young-growth harvest relative to Alternative 1 in RMAs, beach fringe, or Old-growth Habitat LUDs under Alternative 5.

Assuming full implementation of the Forest Plan for 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest under Alternative 1 (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Under Alternative 5, the overall harvest level would be maintained, but the distribution of harvest could be different. Assuming harvest patterns follow the distribution of suitable old growth, the provinces where harvest is likely to increase more than 100 acres include East Chichagof Island, East Baranof Island, Kupreanof/Mitkof Islands, Central Coast Range, Etolin Island & Vicinity, and Revilla Island/Cleveland Peninsula. Harvest in the other provinces would remain at the same level or decline. However, the projected increases in suitable old-growth acres are less than 600 in each province so overall effects are expected to be minor. Table 3.3a-4 shows the estimated maximum harvest over the next 100 years by biogeographic province.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 5, there would be some change in the distribution of timber harvest, roads, and other facilities relative to Alternative 1. Under this alternative, roads and timber harvest are likely to penetrate much farther into currently roadless areas than under Alternatives 1, 2, or 3, resulting in a greater degree of fragmentation. After 100+ years of Alternative 5 implementation, there would be 10 fewer intact watersheds considering NFS lands only. This means 71.3 percent of the 947 large watersheds would remain intact; seven fewer watersheds than under Alternative 1. Nevertheless, because overall harvest levels would not change relative to Alternative 1 and because the broader Conservation Strategy for the Tongass was developed prior to the roadless rule and would be maintained under the Forest Plan, the effects due to fragmentation and on the Old-growth Conservation Strategy are expected to be relatively low and slightly greater than projected under Alternative 1 (existing Forest Plan).

Alternative 6

Under Alternative 6, approximately 6.9 million acres would be maintained and managed as Roadless Priority or LUDII Priority. Roadless designations would be removed on all development LUDs and mineral overlay areas and, as a result, it would rank the second lowest in terms of roadless protections. However, it would still be moderate in terms of overall protection due to the degree of protections provided by the underlying Forest Plan LUDs and Forest Plan standards and guidelines, which would not change.

Implementation of the Forest Plan under Alternative 6 would have harvest levels similar to the level projected under Alternative 1, the current Forest Plan, about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. The total suitable acres of young growth would increase by about 17,000 acres or about 5 percent relative to Alternative 1 and old-growth suitable acres would increase by about 167,000 acres or about 72 percent.

Suitable high-volume POG and suitable large-tree POG would increase by about 59,000 acres (61 percent) and 10,200 acres (32 percent), respectively, relative to Alternative 1. There could be a slight increase in high-volume and large-tree POG harvested under Alternative 6 than was predicted for the Forest Plan because of increased options for creating positive timber sales. However, this is speculative and also depends on harvest levels reaching predicted decadal levels, as well as on being able to economically access these stands. In addition, the proportion of high-volume and large-tree POG in the added suitable acres under Alternative 6 is lower than the proportion in the Alternative 1 suitable acres.

Harvest of young growth in RMAs, beach fringe, and Old-growth Habitat LUD would remain restricted to the first 15 years and under restrictive harvest prescriptions. The suitable young-growth acres in these three special areas would increase by 3 to 5 percent, relative to Alternative 1. Because of the restrictive prescriptions required in these areas, they are harvested at a lower rate than other young-growth areas. Therefore, there would be little to no differences in the amount of young-growth harvest relative to Alternative 1 in RMAs, beach fringe, or Old Growth Habitat LUDs under Alternative 5.

Assuming full implementation of the Forest Plan for 100 years, approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG would be maintained on the Tongass National Forest under Alternative 1 (see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. The reduction of biodiversity associated with old-growth forest and fragmentation would be greatest in the Kupreanof/Mitkof Island, Etolin Island & Vicinity, and North Central Prince of Wales biogeographic provinces, where the amount of original POG remaining was estimated to be reduced by 2 percent over 100 years. Under Alternative 6, the overall harvest level would be maintained, but the distribution of harvest could be different. Assuming harvest patterns follow the distribution of suitable old growth, the provinces where harvest is likely to increase more than 100 acres include East Chichagof Island, East Baranof Island, Kupreanof/Mitkof Islands, Central Coast Range, Etolin Island & Vicinity, and Revilla Island/Cleveland Peninsula. Harvest in the other provinces would remain at the same level or decline. However, the projected increases in suitable old-growth acres are less than 600 in each province so overall effects are expected to be minor. Table 3.3a-4 shows the estimated maximum harvest over the next 100 years by biogeographic province.

As noted previously, fragmentation can be caused by timber harvest, road building, and powerline and facility development. Under Alternative 6, there would be some change in the distribution of timber harvest, roads, and other facilities relative to Alternative 1. Under this alternative, roads and timber harvest are likely to penetrate much farther into currently roadless areas than under Alternatives 1, 2, or 3, resulting in a greater degree of fragmentation. After 100+ years of Alternative 6 implementation, there would be 10 fewer intact watersheds considering NFS lands only. This means 71.3 percent of the 947 large watersheds would remain intact, seven fewer watersheds than under Alternative 1. Nevertheless, because overall harvest levels would not change relative to Alternative 1 and because the broader Conservation Strategy for the Tongass was developed prior to the roadless rule and would be maintained under the Forest Plan, the effects due to fragmentation and on the Old-growth Conservation Strategy are expected to be relatively low and slightly greater than projected under Alternative 1 (existing Forest Plan).

Cumulative Effects

The cumulative effects analysis for old-growth ecosystem biodiversity takes into account all of Southeast Alaska, including all lands within the Tongass National Forest boundary from the Yakutat area to the south of Ketchikan, the area of Glacier Bay National Park, and the areas around Haines and Skagway, as well as non-NFS lands, and was analyzed in detail in the 2016 Forest Plan FEIS (USDA Forest Service 2016b; see Table 3.9-16 in Appendix B of this EIS), which has not changed substantially to date. A list of all projects considered in the cumulative effects analysis is provided in Appendix A of this EIS.

Approximately 875,700 acres of POG have been harvested across the Tongass, including both NFS lands and non-NFS lands, resulting in a reduction to 86, 79, and 68 percent of the original total, high-volume, and large-tree POG in Southeast Alaska, respectively (see Tables 3.9-16, 3.9-17, and 3.9-18 in Appendix B of this EIS). Approximately 83 percent of the original POG would remain on the Tongass after full implementation of the 2016 Forest Plan (Alternative 1) and future non-NFS harvest in 100+ years. Future representation of high-volume POG and large-tree POG would be expected to be approximately 76 and 63 percent of the original amount, respectively, after 100+ years under the 2016 Forest Plan.

Harvest associated with all action alternatives would contribute to the cumulative reduction in POG and associated increase in fragmentation and loss of connectivity, which has the potential to reduce biodiversity. Timber harvest on non-NFS lands would result in similar effects; however, it would not contribute above what was analyzed for the current Forest Plan. Collectively, the implementation of the Forest Plan under all of the alternatives in combination with ongoing and foreseeable projects would increase the number of smaller patches on the landscape, reducing the amount of interior forest and increasing the occurrence of forest edge habitat. Edge effects such as shifts in species composition may reduce natural biodiversity over time by favoring some species over others; however, effects would be lessened by the Forest Plan, including the action alternatives, which continue to propose a transition to predominantly young-growth harvest. This would reduce the long-term cumulative effects to old-growth ecosystem biodiversity by reducing the total amount of POG harvest and associated fragmentation. Note that the actual amount of timber harvest that has occurred on the Tongass since the 2016 Forest Plan was adopted is less than that projected under the Forest Plan FEIS, and may continue to be less under all of the alternatives (see the *Timber* section of this EIS for additional discussion).

Overall, biodiversity on the Tongass and in Southeast Alaska remains in good condition and the landscape continues to be dominated by old-growth forest ecosystems. As development continues through timber harvest and associated activities such as road building, mining activities, energy development, and community expansion, particularly in areas where extensive development has already occurred (i.e., Prince of Wales Island), maintaining connectivity and roadless refugia will become increasingly important, particularly for wide-ranging species whose distribution depends on some level of connectivity across the landscape. In addition, the management of human resources will continue to play a role in maintaining biodiversity across the Tongass. Within the Tongass National Forest boundary, the Conservation Strategy was designed to address the more extensive harvest on non-NFS lands through the old-growth reserve system and Forest-wide standards and guidelines, both of which were intended to maintain ecological components needed to maintain the ecological integrity important to a variety of organisms and maintain connectivity across the landscape, with or without much contribution from non-NFS lands. The overall Conservation Strategy approach was developed prior to roadless designations and would be maintained regardless of the alternative selected.

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Wildlife

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Affected Environment

Old-Growth Habitat and the Conservation Strategy

Wildlife species and their habitat on the Tongass National Forest were described in the recently developed 2016 Forest Plan FEIS (USDA Forest Service 2016b). This section summarizes the wildlife resources, but relies extensively on that information to characterize the current affected environment and refers the reader to that document for further details. The following subsections summarize the old-growth habitat conservation strategy; threatened, endangered, and candidate species; Management Indicator Species (MIS); Alaska Region Sensitive Species; migratory birds; endemic species; and invasive species. Consumptive uses of wildlife on the Tongass National Forest are discussed in the *Subsistence* section.

Typical of Southeast Alaska, vegetation on the Tongass National Forest is dominated by temperate coastal rain forests at lower elevations (less than 2,000 feet elevation), with interspersed muskegs, other wetlands, and other non-forest types. At higher elevations, alpine vegetation, rock, glaciers, and snowfields dominate. Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. Therefore, this analysis focuses on the old-growth forest ecosystem.

The reserve system of the Tongass Old-growth Forest Conservation Strategy was first designed and implemented for the 1997 Forest Plan to maintain habitats of the old-growth associated and dependent species in a well-distributed and viable manner across the Tongass (see USDA Forest Service 2016b, Appendix D). This strategy is described in greater detail, along with the Forest Plan standards and guidelines and the management of the matrix lands outside of reserves, in the *Biodiversity* section of this EIS.

Landscape Connectivity and Fragmentation

There are currently approximately 5.0 million acres of productive old growth (POG) forest on the Tongass National Forest, of which 2.1 million acres are high-volume POG including 0.53 million acres of large-tree POG, representing 92, 84, and 82 percent of these forest types, respectively, which existed in 1954, prior to the beginning of industrial-scale timber harvest (see *Biodiversity* section; Table 3.3a-2). There are approximately 0.57 million acres of young-growth forest on the Tongass National Forest, of which 85 percent are a result of past harvest and 15 percent are natural young-growth. The *Biodiversity* section briefly describes POG and other cover types and provides a discussion of past timber harvest on the Tongass National Forest (see also the *Timber* section).

The concepts of landscape connectivity and fragmentation are described in the *Biodiversity* section but are summarized here as they relate to wildlife and their habitat requirements. On the Tongass, connectivity between areas of similar

habitats (i.e., old-growth forest) or between high- and low-elevation habitats is important to maintaining well-distributed, viable wildlife populations of some species.

Fragmentation of suitable habitats across the landscape through both natural and human-caused actions reduces larger contiguous blocks of habitat into smaller patches, which may cause some species populations to become isolated, and therefore may pose a greater risk of local extirpation.

Wildlife Species

The following sections summarize information on threatened and endangered species, candidates for listing, MIS (1982 planning rule), Alaska Region sensitive species, and other species of interest that were analyzed in detail for the 2016 Forest Plan (USDA Forest Service 2016a). Table 3.3b-1 provides a comprehensive list of the threatened, endangered, candidate, and sensitive species and identifies any updates of species listing status or occurrences since the completion of the 2016 Forest Plan Final EIS. Some species are grouped based on habitat similarities where possible or referenced back to the 2016 Forest Plan Final EIS, as appropriate.

Threatened, Endangered, and Candidate Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) under authority of the Endangered Species Act of 1973 (ESA), as amended. Pursuant to Section 7 of the ESA, a biological assessment (BA) evaluating the effects of the selected alternative for the 2016 Forest Plan amendment was prepared; one BA for the marine mammals and fish species was submitted to the NMFS and another for the short-tailed albatross was submitted to the USFWS for review and concurrence. Some federally-listed species in the table are not addressed further because the Tongass is outside of their known range or suitable habitat is not present (Table 3.3b-1). Informal programmatic consultation was completed for the 2016 Tongass National Forest Plan Amendment. The NMFS reviewed the biological assessment for threatened and endangered species under their regulatory jurisdiction and concluded that the 2016 Tongass Forest Plan Amendment was “not likely to adversely affect” threatened or endangered species occurring on the Tongass (NMFS 2016).

Also listed in the table are listed fish species that are addressed in the *Fish* section of this EIS. Currently, no candidates for federal listing occur within the boundary of the Tongass National Forest (Table 3.3b-1).

Short-tailed Albatross

The short-tailed albatross is a pelagic seabird species that forages offshore and in shelf-break waters throughout the North Pacific Ocean and Bering Sea and is listed under the ESA as Endangered. The short-tailed albatross primarily breeds in Japan, but single nest sites have been documented on Midway Island, Hawaii.

Previously, the waters adjacent to the Tongass National Forest were thought to be outside of the range of this species; however, more recent satellite tracking indicates that albatrosses, particularly juveniles and sub-adult birds, travel to the west coast, including the outer coast of southeast Alaska (USFWS 2014). This species may forage in nearshore waters adjacent to the outer coastal islands of the Tongass, particularly where the continental shelf break is close to shore. Therefore, it could be exposed to water quality effects associated with land management activities on the Tongass National Forest.

Table 3.3b-1
Federally Listed Threatened and Endangered Species and Candidate Species under the ESA, Forest Service Alaska Region Sensitive Species with Potential for Occurrence on the Tongass National Forest

Common Name	Scientific Name	Habitat Association	Potential for Occurrence in the Planning Area	Status[1]
ESA Species Under USFWS Jurisdiction				
Eskimo curlew	*Numenius borealis*	Arctic tundra.	No, outside of species' range.	E
Short-tailed albatross	*Phoebastria albatrus*	Winters in waters of the Bering Sea, Aleutian Islands, and Gulf of Alaska; breeds in Japan (USFWS 2012a).	Yes, may occur in nearshore waters near islands and mainland coastlines of southeast Alaska.	E
Spectacled eider	*Somateria fischeri*	Coastal waters in northern and western Alaska (USFWS 2012b).	No, outside of species' range.	T
Steller's eider	*Polysticta stelleri*	Occurs in northern and western Alaska (USFWS 2012c).	No, outside of species' range.	T
Polar bear	*Ursus maritimus*	Sea ice and coastlines of western Alaska and along the North Slope.	No, outside of species' range.	T
ESA Species Under NMFS Jurisdiction				
Blue whale Beluga whale Bowhead whale Northern Pacific right whale Sei whale	*Balaenoptera musculus* *Delphinaperus leucas* *Blaena mysticetus* *Eubalaena japonica* *Balaenoptera borealis*	Off-shore (pelagic) marine waters of the Bering Sea, Chukchi Sea, North Pacific Ocean and/or Gulf of Alaska (NMFS 2009a). Critical habitat designated for North Pacific right whales in the Bering Sea and the Gulf of Alaska (NMFS 2009a).	No, very rarely observed in Southeast Alaska.	E
Humpback Whale	*Megaptera novaeangliae*	Common in the inside waters of the Alexander Archipelago and are regularly sighted in the Inside Passage and coastal waters of the Southeast Alaska panhandle (NMFS 1991; NMFS 2018).	Yes, likely to occupy marine waters surrounding the Tongass. May occur in shallow coastal areas.	E
Fin whale	*Balaenoptera physalus*	Typically, off-shore (pelagic) marine waters of the Bering Sea, Chukchi Sea, North Pacific Ocean and/or Gulf of Alaska (NMFS 2009a); two more recent sightings in lower Clarence Strait (Dahlheim et al. 2009).	Yes, may occur seasonally in marine waters surrounding the Tongass, but in proximity to the open ocean.	E
Sperm whale	*Physeter macrocephalus*	Typically, off-shore marine waters of the Bering Sea, Gulf of AK, Southeast AK and Aleutian Islands (Allen and Angliss 2014).	Yes, may occur seasonally in marine waters around Tongass, but in proximity to the open ocean.	E

Table 3.3b-1 (continued)
Federally Listed Threatened and Endangered Species and Candidate Species under the ESA, Forest Service Alaska Region Sensitive Species with Potential for Occurrence on the Tongass National Forest

Common Name	Scientific Name	Habitat Association	Potential for Occurrence in the Planning Area	Status[1]
Threatened or Endangered Species				
Bearded seal Ringed Seal	*Erignathus barbatus* *Phoca hispida*	Sea-ice habitats in Bering Sea, Chukchi Sea, Beaufort seas (77 FR 76740-76768, 77 FR 76706-76738).	No, outside of species' range.	T – bearded seal; T – ringed seal
Northern sea otter, SW Alaska population	*Enhydra lutris kenyoni*	Coastal marine habitats.	No, outside of species range.	T
Steller sea lion – Western AK DPS[2]	*Eumetopias jubatus*	Marine and terrestrial areas from Prince William Sound westward (west of 144° west longitude).	Yes, DPS occurs in waters surrounding the Tongass. Critical habitat has also been designated.	E
Green sea turtle Loggerhead sea turtle Olive Ridley sea turtle Leatherback sea turtle	*Chelonia mydas* *Caretta* *Lepidochelys olivacea* *Dermochelys coriacea*	Occur in the Gulf of Alaska and some species are found as far west as the Aleutian Islands. Adults are highly migratory, but the details and locations of migrations are largely unknown (NMFS 2009b).	No, only rarely observed in Southeast Alaska.	T T T E
Forest Service Alaska Region Sensitive Species[3]				
Steller sea lion – Eastern AK DPS[3]	*Eumetopias jubatus*	Marine and terrestrial areas in Southeast Alaska (east of 144° west longitude).	Yes, occurs in waters surrounding the Tongass.	S
Queen Charlotte goshawk	*Accipiter gentiles laingi*	Mature/old-growth forests.	Yes, known to occur on the Tongass.	S
Aleutian Tern	*Sterna aleutica*	Nests on islands, shrub-tundra, grass or sedge meadows and freshwater and coastal marshes.	Yes, known to occur on the Tongass.	S
Black oystercatcher	*Haematopus bachmani*	Rocky shorelines along the coast; forages in sheltered areas where low-sloping gravel or rock beaches with abundant prey occur.	Yes, known to occur on the Tongass.	S
Kittlitz's murrelet	*Brachyramphus brevirostris*	Breeds in the vicinity of glaciers and cirques in high elevation alpine areas with little or no vegetative cover; northern Gulf of Alaska and Bering Sea coast (Day et al. 1999).	Yes, known to occur on the Tongass.	S

[1] T = Federally threatened; E = Federally endangered; C = candidate for Federal listing; S = Alaska Region Sensitive Species
[2] DPS = Distinct Population Segment.
[3] Regional Forester's Sensitive Species List (February 2009). The Steller sea lion Eastern DPS was added as a sensitive species afte federal ESA delisting. The Western DPS remains federally endangered.

Humpback Whale, Fin Whale, and Sperm Whale
The federally listed wildlife species within the boundary of the Tongass National Forest include the humpback whale, while fin and sperm whales typically occurring in offshore marine waters of the Bering Sea, Chukchi Sea, North

Pacific Ocean and/or Gulf of Alaska (NMFS 2009a) and are rare visitors to the waters surrounding the Tongass National Forest (Dahlheim et al. 2009).

The ESA for the State of Alaska authorizes the Commissioner of the Alaska Department of Fish and Game (ADF&G) to list Alaska endangered species. Species listed as endangered by the State of Alaska include humpback whale, right whale, and blue whale. With the exception of the humpback whale, none of these species occur in Southeast Alaska and therefore are not considered further here. Pursuant to Section 7 of the ESA, a BA was prepared to assess the effects of the 1997, 2008, and 2016 Forest Plans on endangered or threatened species and ensure that proposed actions would not jeopardize the continued existence of listed species (specifically, humpback whale and the Steller sea lion). Only the humpback whale and Steller sea lion will be addressed further in this document,

Humpback whales are currently listed as endangered under the ESA and have been protected since 1965. Humpback whales generally migrate between temperate and tropical waters in the winter and spring where they mate and calve, and cooler northern coastal waters where they feed. Feeding occurs near the highly productive fjords of the Southeastern Alaskan panhandle and Prince William Sound, from approximately May through December, although some individuals can be seen every month of the year (Calkins 1986). Peak numbers of whales are usually found in nearshore waters during late August and September, but substantial numbers usually remain until early winter.

Humpbacks summering in Southeast Alaska have been linked to three wintering areas: the coastal waters along Baja California and mainland Mexico, the main islands of Hawaii, and the islands south of Japan (NMFS 1991). Those whales that feed in Southeast Alaska and migrate to Hawaii are referred to as the central North Pacific stock (NMFS 2018). The local distribution of humpbacks in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring (*Clupea harengus*) and euphausiids (small shrimp-like crustaceans such as krill), and adults consume up to 3,000 pounds a day outside the breeding season. Important feeding areas include Glacier Bay and adjacent portions of Icy Strait, Stephens Passage/Frederick Sound, Seymour Canal, and Sitka Sound.

Glacier Bay and Icy Strait appear to be an important feeding area early in the season, when whales prey heavily on herring and other small, schooling fishes. Frederick Sound is important later in summer, when whales feed on swarming euphausiids. During autumn and early winter, humpbacks move out of the Sound to areas where herring are abundant, particularly Seymour Canal. Other areas of Southeastern Alaska may also be important for humpbacks and need to be evaluated. These include Cape Fairweather, Lynn Canal, Sumner Strait, Dixon Entrance, the west coast of Prince of Wales Island, and offshore banks such as the Fairweather Grounds.

Recent estimates of the Central North Pacific stock of humpback whales found 1,115 unique identifications in Southeast Alaska and 583 in northern British Columbia, for a total of 1,669 individual whales (Calambokidis et al. 2008 [referred to as the SPLASH study]; NMFS 2018). From the SPLASH study, the estimates of abundance for Southeast Alaska/northern British Columbia ranged from 2,883 to 6,414. The estimates from SPLASH are considerably larger than the estimate from Straley et al. (2009). The population rate of increase was estimated at 7 percent for Pacific humpback whales (NMFS 2018).

Although the final rule for humpback whale ESA listing (81 *Federal Register* [FR] 62259, 8 September 2016) established 14 Distinct Population Segments (DPSs) with different listing statuses, the DPSs that occur in waters under the jurisdiction

of the United States do not equate to the existing Marine Mammal Protection Act (MMPA) stocks. Some of the listed DPSs partially coincide with the currently defined Central North Pacific stock. Because NMFS cannot manage one portion of an MMPA stock as ESA-listed and another portion of a stock as not ESA-listed, until such time as the MMPA stock delineations are reviewed in light of the DPS designations and Bettridge et al. (2015), NMFS will continue to use the existing MMPA stock structure and considers this stock to be endangered and depleted for MMPA management purposes. As a result, the Central North Pacific stock continues to be classified as a strategic stock.

Humpback whales are regularly sighted in the Inside Passage and coastal waters of the Southeastern Alaska panhandle from Yakutat Bay south to Queen Charlotte Sound (USDA Forest Service 1997a). Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Specifically, the greatest threats to humpback whales today are entanglements in fishing gear, ship strikes, and coastal habitat pollution. Marine mammals are protected under the MMPA as well as the Forest Plan standards and guidelines that ensure protection and maintenance of whale habitats and that permitted or approved activities are conducted in a manner consistent with the MMPA, ESA, and NMFS regulations for approaching whales, dolphins, and porpoise.

Steller Sea Lion, Western and Eastern DPS

The Steller sea lion (*Eumetopias jubatus*) was emergency-listed as threatened under the ESA in April 1990 by NMFS due to rapid population declines in the western portion of its range (55 FR 12645). In 1997, the NMFS designated two DPSs, occurring west and east of 144 degrees west longitude, respectively. Due to persistent decline, the western DPS was reclassified as endangered, while the increasing eastern DPS was delisted in November 2013. On November 4, 2013, NMFS issued a final rule (78 FR 66140) to remove the eastern DPS of Steller sea lion from the List of Endangered and Threatened Wildlife. A species removed from listing under the ESA because recovery criteria have been met will be automatically added to the Alaska Region Sensitive Species list for at least 5 years (FSM 2672.11, R-10 2600-2005-1). Until the Alaska Region Sensitive Species list is updated, the Steller sea lion will continue to be analyzed as a sensitive species. The western DPS is analyzed as an endangered species.

Steller sea lions are widely distributed over the continental shelf and throughout the coastal waters of the Gulf of Alaska. The Eastern DPS is known to occur in the waters surrounding the Tongass, although inter-migration between the eastern and western populations has been documented, particularly north of Frederick Sound.

Critical habitat was designated for the Steller sea lion by NMFS in 1993 and represents areas considered essential for the continued survival and recovery of this species (NMFS 1993). Adult Steller sea lions congregate at rookeries for breeding and pupping which are generally located on relatively remote islands, often in exposed areas that are not easily accessed by humans or mammalian predators. These rookeries, as well as haulouts, have been officially designated as critical habitat in Southeast Alaska (NMFS 2001).

To date, 3 major rookeries and 11 major haulouts have been identified as critical habitat on or adjacent to the Tongass. Two additional haulouts have been identified in Southeast Alaska (Cape Fairweather and Graves Rock) but these locations are within Glacier Bay National Park. In light of the delisting of the

Eastern DPS and listing of the Western DPS as endangered, as well as availability of new science, NMFS is currently conducting a review of critical habitat for this species.

Steller sea lions are sensitive to disturbance and harassment or displacement from haulouts and rookeries. Human activities such as boating, recreation, aircraft, log transfer facilities (LTFs), and log raft towing are concerns related to the long-term conservation of the sea lion in Southeast Alaska (NMFS 2018). Forest Plan standards and guidelines for Steller sea lions provide protection to sea lion habitats and regulate activities in proximity to this species (USDA Forest Service 2016a; WILD 1-Section X and WILD 4-Section A). Steller sea lions are also protected by the MMPA.

Alaska Region Sensitive Species

The Alaska Region Sensitive Species list was updated in 2009 and supersedes previous lists (USDA Forest Service 2009b). The current Alaska Region Sensitive Species list for animal species that occur on the Tongass National Forest includes the Queen Charlotte goshawk, Kittlitz's murrelet, black oystercatcher, Aleutian tern, and Steller sea lion (Eastern DPS), which was discussed above.

Although not on the 2009 list, the Steller sea lion (Eastern DPS) is now an Alaska Region Sensitive Species. On November 4, 2013, NMFS issued a final rule (78 FR 66140) to remove the Eastern DPS of Steller sea lion from the List of Endangered and Threatened Wildlife and, therefore, it continues to be analyzed as a sensitive species.

Queen Charlotte Goshawk

The Queen Charlotte goshawk (*Accipiter gentilis laingi*) is recognized as a distinct subspecies of the northern goshawk (*Accipiter gentilis*) that occurs only in coastal areas of British Columbia and in Southeast Alaska. The British Columbia DPS of the Queen Charlotte goshawk was listed as threatened under the ESA (FR 45870-45893) in August 2012; however, the Alaska DPS was not listed in part due to the protections provided by the Tongass Forest Plan Conservation Strategy.

The goshawk is a year-round resident in Southeast Alaska and may occupy different or overlapping breeding and winter territories. Goshawk breeding territories can be described hierarchically in terms of the nest site, the nest area, post-fledging area, and foraging area (see Reynolds et al. 1992 and USDA Forest Service 2008b). Goshawks in Southeast Alaska typically nest in large patches of tall, mature, and old trees with dense canopies. When mature and old-growth habitats are not available, they will nest in maturing young growth with sufficient structure (Reynolds et al. 2006; Boyce et al. 2006). Nesting in mature young growth is less common, and occurs in proportion to the amount of this habitat available on the landscape, suggesting goshawks neither prefer nor avoid its use (USFWS 2007).

Goshawk foraging areas typically consist of mature and old-growth forest stands, though they will also forage in young forest as well as along edges and in openings as long as suitable perches from which to observe and attack prey are present (Iverson et al. 1996; Bosakowski et al. 1999; McClaren 2004; Boyce et al. 2006; Reynolds et al. 2006). Prey species vary geographically, and include blue grouse, red squirrels, and a variety of forest-dwelling birds (spruce grouse, Steller's jay, and ptarmigan; Lewis 2001). High-volume POG represents optimal nesting and foraging habitat for goshawks due to the presence of large trees and

snags. Existing amounts of this forest type on the Tongass are discussed in the *Biodiversity* section. Approximately 84 percent of the original high-volume POG existing in 1954 remains on the Tongass National Forest (see Table 3.9-6 in Appendix B of this EIS).

Kittlitz's Murrelet

The Kittlitz's murrelet (*Brachyramphus brevirostris*) was retained as a 2009 sensitive species because it was a USFWS candidate for ESA listing. On October 3, 2013, the USFWS issued a 12-month finding (78 FR 61763) that listing the Kittlitz's murrelet was not warranted. However, until the Alaska Region Sensitive Species list is updated, the Kittlitz's murrelet will continue to be analyzed as a sensitive species (USDA Forest Service 2016b).

More than 95 percent of the global population is estimated to breed in Alaska, with the remainder occurring in the Russian Far East. The largest breeding populations are believed to be in Glacier Bay National Park and Preserve, Prince William Sound, Kenai Fjords, and Icy Bay (Kendall and Agler 1998 as cited in Day et al. 2000). Breeding season core population centers adjacent to the Tongass include Icy Bay, Malaspina Forelands, and Yakutat Bay where the species is closely associated with glacial habitats (Kissling et al. 2011). The Forest Plan contains direction to "provide for the protection and maintenance of known Kittlitz's murrelet nesting habitat."

Black Oystercatcher

The black oystercatcher (*Haematopus bachmani*) was added to the Alaska Region Sensitive Species list in 2009. The Alaska Shorebird Conservation Plan also notes it as a species of high concern due to concerns with population size, breeding and nonbreeding threats, and nonbreeding distribution (Alaska Shorebird Group 2008). It is also a Bird of Conservation Concern, and is on the Audubon Society's Watch List (Tessler et al. 2007).

The black oystercatcher occurs along the North American Pacific coast from the Aleutian Islands to Baja California (Andres and Falxa 1995), with over half of the global population residing in Alaska primarily in Prince William Sound and the Kodiak Archipelago (Tessler et al. 2007). Historically, they have been documented in Sitka Sound/Necker Islands, the Myriad Islands, the outer coast of Baranof Island, and the Forrester Island group but breeding birds are generally sparsely distributed (Tessler et al. 2007). They favor rocky shorelines and forage exclusively on intertidal macroinvertebrates (e.g., limpets and mussels).

Breeding oystercatchers are highly territorial and breeding pairs tend to be widely distributed but Kodiak Island is currently the only documented area in Alaska that supports large concentrations of black oystercatchers (Tessler et al. 2007). Limited surveys specifically targeting black oystercatchers in Alaska have occurred, but they have been observed and are known to nest in low densities along shorelines and intertidal areas adjacent to the Tongass National Forest. After breeding, black oystercatchers aggregate into winter flocks ranging from tens to hundreds of individuals. Winter flocks typically concentrate on protected, ice-free tidal flats or rocky islets with dense mussel beds. Because black oystercatchers solely use the intertidal zone, where they may congregate in large numbers, they are especially vulnerable to disturbance from marine industrial pollution and human disturbance from tourism and fishing. Threats include predation, recreational disturbances, flooding, vessel wakes, and shoreline contamination (Tessler et al. 2007).

Aleutian Tern
The Aleutian tern (*Sterna aleutica*) is a migratory seabird that breeds exclusively in Alaska and eastern Siberia. It is a USFWS Bird of Conservation Concern and is protected under the Migratory Bird Treaty Act (MBTA) and is listed as an Alaska Region sensitive species by the Forest Service. In Alaska, Aleutian tern colonies are located throughout the Aleutian Islands, north to the southeastern Chukchi Sea and east to the Alaska Peninsula, Yakutat, and Glacier Bay (USFWS 2012d).

Aleutian terns are ground nesters that breed in loose colonies, often in association with Arctic terns, in coastal sites located at the heads of bays, reefs, island, estuaries, and river mouths (USFWS 2012d). One of the largest breeding colonies of Aleutian terns occurs on Black Sand Spit in the Yakutat Forelands, which supports approximately one third of Alaska's population. Due to its importance as a breeding colony, Black Sand Spit has been identified as an Audubon Important Bird Area and is included in conservation priority areas identified by The Nature Conservancy (TNC) and Audubon Alaska (Audubon Alaska and The Nature Conservancy 2007).

Management Indicator Species

The 1982 Planning Rule directed the use of MIS in forest planning to help display the effects of forest management. The 1997 Forest Plan selected 13 wildlife MIS which carried through to the 2008 Forest Plan Amendment. Because the 2016 Forest Plan EIS analyzed an amendment to the 2008 Forest Plan done under the 1982 Planning Rule, these species were carried forward and analyzed even though the 2012 Planning Rule does not use MIS for evaluating effects. MIS are also addressed in this EIS, which summarizes, where appropriate, the detailed analysis completed for the 2016 Forest Plan Final EIS (USDA Forest Service 2016b). Most of these species are associated with POG forests of Southeast Alaska either directly or rely on prey species associated with these habitats.

Sitka Black-Tailed Deer
Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia. They are an important big game hunting and subsistence species. They are also an important prey species for the Alexander Archipelago wolf (discussed below).

Sitka black-tailed deer use lower elevation (below 800 feet elevation) POG forest habitats during the winter period. The quantity, quality, distribution and arrangement of winter habitat are considered the most important limiting factors for Sitka black-tailed deer in Southeast Alaska. However, spring, summer, and fall habitats (non-winter) are also important for deer reproduction and population recovery following severe winters, and for building up pre-winter body reserves. During these seasons, and during mild winters, deer will forage in young-growth stands less than about 25 years old and other open non-forested habitats.

As part of the 2016 Forest Plan Final EIS, the interagency deer habitat capability model was used to assess existing habitat capability within the planning area (see USDA Forest Service 2016b; *Wildlife* section). Table 3.3b-2 summarizes the modeled deer habitat capability by biogeographic provinces. Forest-wide, approximately 89 percent of the original (1954) habitat capability remains, ranging from 72 to 100 percent depending on the biogeographic province. The greatest reductions in deer habitat capability have occurred in provinces where timber harvest has been concentrated (the North Central Prince of Wales, East Baranof, and Etolin Island and vicinity biogeographic provinces).

Table 3.3b-2
Existing Forest-wide Deer Habitat Capability Using the Interagency Deer Model (NFS Lands Only)

	Biological Province	Existing Habitat Capability 2015 (Deer per Square Mile)	Original (1954) Habitat Capability (Deer per Square Mile)	% Original Habitat Capability Remaining	No. WAAs with Modeled Deer Density of at least 18 Deer per Square Mile[1/]
1	Yakutat Forelands	13.3	13.7	97%	2
2	Yakutat Uplands	2.3	2.4	98%	0
3	East Chichagof Island	11.7	13.7	86%	1
4	West Chichagof Island	14.5	14.5	100%	1
5	East Baranof Island	7.0	8.5	82%	0
6	West Baranof Island	12.2	13.7	89%	4
7	Admiralty Island	17.6	17.9	98%	10
8	Lynn Canal	5.5	5.8	95%	1
9	North Coast Range	6.2	6.2	100%	0
10	Kupreanof/Mitkof Island	16.9	19.2	88%	7
11	Kuiu Island	25.5	28.1	91%	7
12	Central Coast Range	9.0	9.5	96%	1
13	Etolin Island	15.7	18.9	83%	3
14	North Central Prince of Wales	17.7	24.5	72%	11
15	Revilla Island/Cleveland Peninsula	13.5	15.0	90%	7
16	Southern Outer Islands	28.1	32.1	88%	9
17	Dall Island and Vicinity	30.4	30.6	99%	3
18	South Prince of Wales	21.8	22.2	98%	5
19	North Misty Fiords	3.7	3.8	99%	2
20	South Misty Fiords	8.4	8.4	100%	0
21	Ice Fields	0.7	0.8	94%	0
	Forest-wide	**10.1**	**11.3**	**89%**	**57**

[1] For WAAs that overlap a biological province boundary only the overlapping portion counted toward the total.
[2] Note that the model treats harvested stands in the stem exclusion stage (25 years old or older) the same value regardless of thinning treatments that are implemented.[3] Note that wolves very rarely occur on Admiralty, Baranof, and Chichagof Islands.

In addition to the interagency deer model, the Forage Resource Evaluation System for Habitat (FRESH) model developed by the USDA Forest Service Pacific Northwest Research Station (Hanley et al. 2012; http://cervid.uaa.alaska.edu/deer/Home.aspx) was also used to quantify the relative value of available deer forage under different alternatives and described in detail in the 2016 Forest Plan Final EIS. The output of the model provides a "snapshot" of habitat conditions based on estimated food availability and quality at one point in time, which was used to make a relative comparison of conditions within a habitat patch or landscape under different conditions (i.e., before and after implementation of a management activity).

More detailed information on the FRESH model inputs and results can be found in the 2016 Forest Plan Final EIS, *Wildlife* section, and the model is not discussed further here.

Mountain Goat
Mountain goats (*Oreamnos americanus*) inhabit alpine and subalpine areas and adjacent POG forests on the mainland portions of the Tongass and have been introduced to several islands. Steep glacial valleys and peaks provide escape terrain from predation by wolves and bears. Adjacent meadows provide forage

and, at lower elevations, POG forests provide cover as well as evergreen shrubs and forbs for winter forage (Porter 2010).

Mountain goats are sensitive to human disturbance, which can cause the temporary or permanent abandonment of habitat, increased stress, altered behaviors, and potentially excess energy expenditure (Goldstein et al. 2005; Olliff et al.1999). Industrial activities such as timber harvest, mining, road construction, and hydroelectric development have the potential to have adverse effects on mountain goat populations through disturbance or removal of habitat. However, this species spends much of its time outside of areas where timber harvest has occurred or are likely to occur in the future. Existing Forest Plan standards and guidelines were developed to reduce the impacts of other activities (e.g., helicopter over-flights for recreation) and impacts associated with facilities.

Black Bear

Black bears are an important species for hunting, recreation, and tourism. In Southeast Alaska, black bears are present throughout the mainland and on the islands south of Frederick Sound. Black bears in Southeast Alaska are part of a population (Alexander Archipelago black bears) endemic to coastal British Columbia and Southeast Alaska, except Admiralty, Baranof, and Chichagof islands (Stone and Cook 2000; Peacock et al. 2007). Black bears will use habitats from sea level to the alpine but appear to prefer estuarine, riparian, and forested coastal habitats (USDA Forest Service 2008b). Black bears use small openings and areas such as wetlands, clearcuts, and subalpine meadows for foraging.

Past timber harvest, especially in areas adjacent to salmon streams, has decreased black bear habitat suitability through the removal of POG forest. While early successional habitats may provide abundant food (berries), over the long term dense young-growth stands provide poor habitat for black bears due to the lack of forage and large hollow trees for denning. Also, over the long term, reduction of den sites may result from a lack of availability of large tree root structures (Davis et al. 2012). Approximately 90,000 acres of young-growth (harvested and natural) occur in Riparian Management Areas (RMAs) and an additional 68,000 acres occur in Beach and Estuary Fringe outside of RMAs. Small old-growth reserves (OGRs) and other Non-development Land Use Designations (LUDs) provide some connectivity on a local scale to shoreline and riparian habitats preferred by black bears.

Timber harvest may also impact black bears through increased human access on roads. This can result in increased harvest-related mortality; however, it should be noted that black bear harvest risk has not been linked to a particular road density level.

River Otter

River otter (*Lutra canadensis*) are associated with coastal and freshwater aquatic environments and the immediately adjacent (within 100 to 500 feet) upland habitats. River otters are distributed throughout Southeast Alaska, and across the Tongass National Forest, along coastal and inland waters (MacDonald and Cook 2007).

Old-growth forests have the highest habitat value for river otters, providing canopy cover, large-diameter trees and snags, and burrow and den sites. River otters rest in cavities or beneath the roots of large conifers or snags in POG forests with open understories (high-volume POG forest; Ben-David et al. 1996; Bowyer et al. 2003). Young-growth forests provide lower quality habitat. There are approximately 2.1 million acres of high-volume POG forest on the Tongass. Approximately 90,000 acres of young-growth (harvested and natural) occur in Riparian Management Areas (RMAs) and an additional 68,000 acres occur in

Beach and Estuary Fringe outside of RMAs. Protection under the Forest Plan is provided through standards and guidelines for beaches, estuaries, and riparian areas (USDA Forest Service 2016a).

American Marten

The American marten (*Martes americana*) is an important furbearer that is associated with old-growth forests. Coastal habitats (beach fringe) and riparian areas have the highest habitat value for marten, followed by upland forested habitats below 1,500 feet in elevation (USDA Forest Service 2008a). Marten favor large- and medium-sized old-growth forests because they intercept snow, provide cover and denning sites, and provide habitat for marten prey species (Flynn and Schumacher 2001; Flynn et al. 2004). The quantity and quality of winter habitat is a limiting factor for marten in Southeast Alaska. Therefore, the availability of deep-snow marten habitat, defined as high-volume POG below 800 feet in elevation, provides a measure of habitat quality for marten. There are approximately 2 million acres of high-volume POG forest below 800 feet elevation on the Tongass National Forest (see Table 3.9-4 in Appendix B of this EIS).

Old-growth timber harvest reduces habitat quality for marten through the removal of forest cover, fragmentation of old-growth habitat (reductions in travel corridors and/or functional connectivity between spatially isolated populations), and reductions in habitat for some prey species. Increased human access associated with new roads may result in increased marten harvest-related mortality. Although closed roads still facilitate access (e.g., off-highway vehicle, pedestrian), open roads that receive the highest and most consistent use are likely to have the greatest effect on martens. Existing road densities (all elevations included) on the Tongass are listed in Table 3.3b-3.

Table 3.3b-3

Existing Estimated Average Road Densities and Percentage of WAAs in Road Density Categories on NFS Lands and All Lands Combined for All Roads and Open Roads Only within the Tongass National Forest Boundary (All Elevations)

Road Density Category (miles per square mile)	Existing Road Densities (percentage of WAAs)	
	NFS Lands	All Lands[1]
All Roads		
0	47.6%	43.5%
0 to 0.7	37.7%	35.1%
0.7 to 1.0	6.3%	5.8%
1.0 to 2.0	7.9%	12.6%
2.0 to 3.0	0.5%	3.1%
>3.0	0.0%	0.0%
Total	**100%**	**100%**
Average Total Road Density – All WAAs	**0.195**	**0.334**
Open Roads[2]		
0	57.1%	49.7%
0 to 0.7	39.3%	37.7%
0.7 to 1.0	2.6%	4.7%
1.0 to 2.0	1.0%	6.3%
2.0 to 3.0	0.0%	1.6%
>3.0	0.0%	0.0%
Total	**100%**	**100%**
Average Open Road Density – All WAAs	**0.089**	**0.218**

[1] Percentages are based on all 191 Wildlife Analysis Areas (WAAs) inside the Forest boundary, including Annette Island; includes roads and streets within municipalities.
[2] Open roads on NFS land were calculated using Maintenance Levels 2, 3, 4, and 5 (see *Transportation* section for maintenance level description).
Source: GIS data from 2016 Tongass EIS.

Roadless areas and OGRs and other non-development LUDs provide refugia for marten from trapping pressure. However, marten home ranges are well-distributed across the landscape and include areas with timber harvest and roads, emphasizing the importance of habitat within matrix lands. Legacy Forest Structure standards and guidelines, in combination with the beach fringe and riparian buffers, aid in providing habitat and connectivity for marten on NFS lands.

Brown Bear

Southeast Alaska is home to one of the highest concentrations of brown bears (*Ursus arctos*) in the world (ADF&G 2000). Brown bears are present on the mainland and on most the islands north of Frederick Sound. They are occasionally reported on Mitkof, Etolin, Revillagigedo, and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. Admiralty, Baranof, Chichagof, Kruzof, Yakobi, and neighboring islands consistently support the highest densities of brown bears on the Tongass National Forest (Game Management Unit [GMU] 4).

Brown bears are important both for hunting (including both outfitter guided and non-guided hunting) and to the recreation and tourism industry of Southeast Alaska. On the Tongass, ADF&G permits harvest of brown bears in GMUs 1, 3, 4, and 5. As tourism grows in Southeast Alaska, there is increasing demand for more bear viewing opportunities such as those provided by Pack Creek and Anan Creek.

Brown bears use areas from sea level to the alpine and are habitat generalists. The late-summer season has been identified as the most critical or limiting period for brown bears when they must build up energy reserves that are adequate to survive the winter and successfully reproduce (Hilderbrand et al. 1999). During this season, many brown bears concentrate along low elevation valley bottoms and salmon streams, with most use occurring within 500 feet of streams (Schoen and Beier 1990; Titus and Beier 1999), where their efforts focus on consuming large quantities of fish in order rebuild their body condition and lay on essential fat reserves. These are often the same areas of highest human use and most intense resource development activities (Flynn et al. 2007).

Roads and other human developments can also be detrimental to bears because they increase the opportunity for human-induced mortality of bears through legal hunting, defense of life or property kills, and illegal killing. Additionally, poorly maintained or constructed roads can affect water quality and productivity of salmon streams.

Alexander Archipelago Wolf

The Alexander Archipelago wolf (*Canis lupus ligoni*) is thought to be a subspecies of gray wolf endemic to Southeast Alaska and British Columbia. It inhabits the mainland of Southeast Alaska and coastal British Columbia west of the Coast Mountain Range, and larger islands (those south of Frederick Sound) except Admiralty, Baranof, Chichagof islands, and all of the Haida Gwaii or the Queen Charlotte Islands (USFWS 2015). Approximately 38 percent of the range-wide population of Alexander Archipelago wolves inhabits Southeast Alaska, where population trends are largely unknown, except for the population on Prince of Wales Island and the surrounding islands (collectively GMU 2), which appears to have declined in abundance over the past 20 years. A portion of Prince of Wales Island was sampled, and estimates expanded to the entire GMU 2 suggesting an apparent decline of potentially 75 percent. However, because GMU 2 constitutes approximately 4 percent of the range of the Alexander Archipelago wolf and 6 percent of the range-wide population, negative population

impacts in GMU 2 likely do not affect the range-wide population significantly (USFWS 2015). The majority (62 percent) of the Alexander Archipelago wolf population occurs in coastal British Columbia and is thought to be stable (USFWS 2015). Although some research suggests that wolves inhabiting Prince of Wales Island may be genetically isolated from other populations in Southeast Alaska (Person 2001; Weckworth et al. 2005, 2010, 2011), there remains uncertainty about the degree of isolation (see the Alexander Archipelago Wolf Species Status Assessment [USFWS 2015] for more information).

In August 2011, the USFWS received a petition to list the subspecies as threatened or endangered, and to recognize Prince of Wales Island as a significant portion ofits range (Center for Biological Diversity and Greenpeace 2011). The petition also requested that the USFWS consider those wolves found on Prince of Wales Island and adjacent islands (including Kosciusko, Tuxekan, Heceta, Suemez, Dall, and others proximate to Prince of Wales) as a DPS based on unique genetic, physical, and ecological characteristics. In March 2014, the USFWS issued a 90-day finding that the petition to list the subspecies presented substantial information indicating that listing may be warranted (79 FR 17993). A status review of the Alexander Archipelago wolf to determine if listing is warranted was published in November 2015. In January 2016, the USFWS published a 12-Month Finding that listing of the subspecies was not warranted. The 2016 amended Forest Plan facilitates a transition from harvesting old-growth forest to predominantly harvesting young-growth forest. After the USFWS decision in 2016 that listing was not warranted, and based on continued GMU 2 wolf population concerns, Forest Service leadership within the Tongass National Forest and Alaska Region directed staff to proceed with developing the Wolf Habitat Management Program and wolf management recommendations for GMU 2 (see Wolf Technical Committee2017).

Wolves feed primarily on deer in certain areas (especially in GMUs 1, 2, 3, and 4), though waterfowl, beaver, spawning salmon, sea otter, squirrels, mountain goat, and black bear represent important prey when available (Lafferty et al. 2014; Darimont and Reimchen 2002; Szepanski et al. 1999; ADF&G 2017). Wolves in Southeast Alaska also prey on moose and elk where available. Suitable habitats for wolves are those capable of supporting this prey base. Therefore, wolves in Southeast Alaska use a wide variety of prey habitats but spend most of their time in productive and unproductive old-growth forests at low elevations (below 270 feet); young-growth forests and clearcuts are typically avoided (Person 2001). Dens on Prince of Wales Island are located in root wads of large living or dead trees within old-growth forest stands less than 495 feet (150 meters) from freshwater (Person and Russell 2009). Roffler and Gregovich (2018) monitored 13 radio-collared wolves between 2012 and 2016 and documented 11 den sites. Although the mean minimum and maximum distance from the core area edge to the active den site (0.73 mile – 3.93 miles) varied widely, it was smaller for breeding wolves (0.46 mile – 1.43 miles), and all distances exceeded the existing recommended den buffer distance (1,200 feet or 0.23 mile).

Deer winter habitat was considered by Person et al. (1996) and Person (2001) to be a good measure of habitat quality for wolves in southern Southeast Alaska. Black-tailed deer are present in all Southeast Alaska GMUs where wolves occur. Forest Plan standards and guidelines state that, where possible, sufficient deer habitat capability should first be maintained to sustain wolf populations, and then to consider meeting estimated human deer harvest demands. This is generally considered to equate to the habitat capability to support a minimum of 18 deer per square mile (using interagency deer habitat capability model outputs; USDA Forest Service 2008a). However, other factors (e.g., local knowledge of habitat conditions, inherent capability of the landscape, spatial extent of the analysis) are to be considered by the

biologist, as well, rather than solely relying upon model outputs (USDA Forest Service 1997b-Appendix N; 2016a).

The interagency deer habitat capability model was used to evaluate wolf habitat capability based on modeled deer habitat capabilities (see the 2016 Forest Plan FEIS for discussion of model limitations and assumptions). Table 3.3b-4 summarizes existing conditions by biogeographic province. Forest-wide approximately 89 percent of the original (1954) habitat capability remains, ranging from 72 to 100 percent by biogeographic province.

Table 3.3b-4

Modeled Deer Habitat Capability Using the Interagency Deer Model for Comparison to Forest Plan 18 Deer per Square Mile Standard and Guideline (NFS Lands Only)

	Biological Province	Existing Habitat Capability 2015 (Deer per Square Mile)	Original (1954) Habitat Capability (Deer per Square Mile)	% Original Habitat Capability Remaining	No. WAAs with Modeled Deer Density of at least 18 Deer per Square Mile[1]
1	Yakutat Forelands	13.3	13.7	97%	2
2	Yakutat Uplands	2.3	2.4	98%	0
3	East Chichagof Island	11.7	13.7	86%	1
4	West Chichagof Island	14.5	14.5	100%	1
5	East Baranof Island	7.0	8.5	82%	0
6	West Baranof Island	12.2	13.7	89%	4
7	Admiralty Island	17.6	17.9	98%	10
8	Lynn Canal	5.5	5.8	95%	1
9	North Coast Range	6.2	6.2	100%	0
10	Kupreanof/Mitkof Island	16.9	19.2	88%	7
11	Kuiu Island	25.5	28.1	91%	7
12	Central Coast Range	9.0	9.5	96%	1
13	Etolin Island	15.7	18.9	83%	3
14	North Central Prince of Wales	17.7	24.5	72%	11
15	Revilla Island/Cleveland Peninsula	13.5	15.0	90%	7
16	Southern Outer Islands	28.1	32.1	88%	9
17	Dall Island and Vicinity	30.4	30.6	99%	3
18	South Prince of Wales	21.8	22.2	98%	5
19	North Misty Fiords	3.7	3.8	99%	2
20	South Misty Fiords	8.4	8.4	100%	0
21	Ice Fields	0.7	0.8	94%	0
	Forest-wide	**10.1**	**11.3**	**89%**	**57**

[1] For WAAs that overlap a biological province boundary only the overlapping portion counted toward the total.
[2] Note that the model treats harvested stands in the stem exclusion stage (25 years old or older) the same value regardless of thinning treatments that are implemented.
[3] Note that wolves very rarely occur on Admiralty, Baranof, and Chichagof Islands.
Source: Data from 2016 Tongass GIS.

Wolves are also a furbearer in Southeast Alaska. Harvesting of wolves is regulated by the Federal Subsistence Board and the State of Alaska Board of Game. Harvest regulations, both subsistence and sport, are intended to help ensure sustainable wolf populations. The ADF&G works cooperatively with the Alaska Board of Game and with federal land managers, including the Forest Service, to identify and address conservation concerns and propose regulation changes as needed for all wildlife in Southeast Alaska, including wolves.

Although wolves are often harvested by hunters and trappers working from boats (approximately 59 percent of harvest in GMU 2), harvest-related wolf mortality (both legal and illegal) is correlated with roads and other habitat features, which

influence their vulnerability to harvest (Person and Russell 2008; Person and Logan 2012).

The 2016 Forest Plan states that a road density of 0.7 to 1.0 mile per square mile or less may be necessary to reduce harvest-related mortality risk where locally unsustainable wolf mortality has been identified through interagency analysis (USDA Forest Service 2008a, p. 4-95; Person et al. 1996). Existing road densities are presented in Table 3.3b-3. Approximately 15.8 percent of Wildlife Analysis Areas (WAAs) exceed this guideline (all roads included), and approximately 7 percent exceed 1.5 mile per square mile. Current Standards and Guidelines provide protection for active den sites through the establishment of a 1,200-foot forested buffer and avoid road construction within established buffer where feasible (USDA Forest Service 2016a).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is associated with beach, estuary fringe, and riparian habitats. Bald eagles typically nest in large trees in spruce-hemlock forest, and over 90 percent of the nests are within 500 feet of a saltwater beach. Nests are located within beach, estuary fringe, and riparian habitats. Since 1967, the USFWS has monitored, via aerial surveys, bald eagle populations along the north Pacific coast from southern British Columbia to the Alaska Peninsula (Hodges 2011). In Southeast Alaska, the population increased until the 1980s, but since then has remained stable, with an adult population of approximately 13,000-26,000 birds (Hodges 2011).

Bald eagles are especially sensitive to disturbance early in the breeding season. Activities associated with timber harvest can result in reproductive failure or cause bald eagles to abandon their nests completely (Fraser et al. 1985 as cited in Isaacs et al. 2005). They are also susceptible to water quality impacts that adversely impact their prey populations (e.g., herring, flounder, pollock, and salmon). Under the 2016 Forest Plan, the availability of nesting habitat is not seen as a significant limiting factor, in part due to the current protection of the 1,000-foot shoreline beach buffer on the Tongass National Forest (Hodges 2011). Further protection to bald eagles is afforded by Forest-wide standards and guidelines that require the maintenance of estuarine and riparian buffers, raptor nest protection standards and guidelines (USDA Forest Service 2016a). Bald eagles are managed by the USFWS under the National Bald and Golden Eagle Protection Act and through the Bald Eagle Take Permit Program (USFWS 2009).

Red Squirrel

The red squirrel is abundant on many of the islands and mainland and are an important prey species for American marten and goshawk. It is an MIS because of its preference for cone-producing trees and tree cavities and snags, which they use for denning and nesting (USDA Forest Service 2016b). Red squirrels are abundant on many of the islands in the Alexander Archipelago and the mainland.

Red squirrels use POG forests, but may also use young-growth stands once cone production begins about 40 years after timber harvest (USDA Forest Service 2016b). There are approximately 9.9 million acres of forested land (including all age classes and types of conifer forests) on the Tongass National Forest that provide potential habitat for red squirrels (see *Biodiversity* section; Table 3.3a-1).

Old-growth timber harvest reduces habitat quality for red squirrels through the removal of forest cover and fragmentation of forest habitats. However, recovery of habitat capability after timber harvest is much faster for red squirrels than other

species because although post-harvest formation of structures favored for nesting and food storage (cavities) takes longer, the majority of habitat capability (food availability) is restored quickly as cone production typically begins 40 years after harvest. Commercial even-aged young-growth harvest returns stands to an early seral condition so would also delay development of habitat capability for red squirrels. Forest Plan Reserve Tree/Cavity-Nesting Habitat and Legacy Forest Structure standards and guidelines maintain habitat for this species.

Red-breasted Sapsucker, Hairy Woodpecker, and Brown Creeper
The red-breasted sapsucker (*Sphyrapicus ruber*), hairy woodpecker (*Leuconotopicus villosus*), and brown creeper (*Certhia americana*) are old-growth associated and snag-dependent species. Hairy woodpeckers and red-breasted sapsuckers are primary cavity excavators that require snags and dying trees for foraging and nesting. Although they may be found in a variety of forested habitats, the brown creeper prefers large diameter old-growth trees (Hejl et al. 2002). Although no historic population estimates exist, it is likely that timber harvest and associated activities have reduced populations from historic levels (Raphael 1988; Hejl et al. 2002). North American Breeding Bird Survey data collected between 2003 and 2013 suggest populations of all three species are increasing within the Northern Pacific Rainforest region, though none of the trends were statistically significant (Sauer et al. 2014).

All three species are associated with interior old-growth forest conditions (Kissling and Garton 2008). Old-growth timber harvest activities that remove large, live trees and dead or dying trees reduce nesting and foraging habitat for these species and may reduce local habitat quality by creating fragmented forest patches and thereby reducing the amount of interior old-growth forest habitat with which these species are associated.

Past timber harvest has reduced and altered the habitat used by the red-breasted sapsucker, hairy woodpecker, and brown creeper. Of the 5.0 million acres of POG forest on the Tongass National Forest, approximately 2.1 million acres are high-volume POG, and 790,000 acres are low-volume POG that provide potential habitat for these species (see *Biodiversity* section; Table 3.3a-2). Maintenance of habitat for these species under the Forest Plan is provided through the reserve tree and legacy standards and guidelines, beach and riparian buffers, and the Conservation Strategy (USDA Forest Service 2016a).

Vancouver Canada Goose
The Vancouver Canada goose (*Branta canadensis fulva*) is associated with wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the Forest (USDA Forest Service 2016a). The Vancouver Canada goose is primarily a non-migratory subspecies of Canada goose that occurs year-round throughout Southeast Alaska, with an estimated resident population of 25,000 birds (Hupp et al. 2010). This species nests in forested habitats associated with beach and estuary buffers, and riparian habitats. Hupp et al. (2010) documented nests in forests adjacent to muskegs. During winter, marine grasses and salt marsh plants commonly found in intertidal areas are important forage resources, and Vancouver Canada geese exhibit strong fidelity, returning repeatedly to such winter sites.

Timber harvest activities may result in disturbance to geese, particularly if they occur in the vicinity of nest sites or brood rearing areas, and habitat removal. However, timber harvest in these areas has generally been minimal because these sites are fairly unproductive. Modifications to shoreline and riparian habitats can occur in association with young-growth harvest and roads and utility corridors if these habitats are crossed. Protection from direct impact to habitat is

provided by Forest Plan Standards and Guidelines for waterfowl and shorebird, wetland, and riparian standards and guidelines; overall goose habitat is provided by the Forest Plan Conservation Strategy (USDA Forest Service 2016a).

Other Species

Migratory Birds

Executive Order 13186 provides for the conservation of migratory birds and their habitats and requires the evaluation of the effects of Federal actions on migratory birds, with an emphasis on species of concern. The Executive Order directs agencies to take certain actions to further comply with the migratory bird conventions, the MBTA, the Bald and Golden Eagle Protection Act, and other pertinent statutes. Agencies are required to support the conservation and intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.

Birds protected under the MBTA include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, including their body parts (e.g., feathers, plumes), nests, and eggs. The Tongass National Forest is located in the Northern Pacific Rainforest Bird Conservation Region (BCR 5). The Northern Pacific Rainforest BCR is one of five BCRs designated in Alaska to provide a framework to facilitate coordinated conservation efforts (U.S. NABCI Committee, September 2000; Rich et al. 2004).

Priority migratory bird species identified in the Landbird Conservation Plan (BPIF 1999; Rich et al. 2004; Rosenberg 2016) for Southeast Alaska with the potential to occur on the Tongass National Forest are listed and discussed in detail (See USDA Forest Service 2016b, *Wildlife* section; and Table 3.10-6 in Appendix B of this EIS). Migratory birds are likely to be present in upland forest, riparian, and coastal habitat. There are 5.0 million acres of POG on the Tongass National Forest that provide primary or secondary habitats for these species (note that many of these species are also shrub nesters and may use young-growth as well as unproductive forest types).

The main management issue for migratory birds in BCR 5 is the harvest of old-growth coniferous forests. Timber harvest directly removes perching, foraging, and nesting habitat and results in habitat fragmentation, which may reduce the suitability of remaining forest stands for species associated with old-growth interior forest conditions. Fragmentation may increase the exposure of birds to edge-related predators and parasites. As the landscape becomes more fragmented, forest buffers become increasingly important for migratory birds to mitigate the effects of habitat loss (Kissling 2003). There is already an existing level of fragmentation on the Tongass, both natural in association with the distribution of forested and non-forested cover types, and in association with past timber harvest and other development activities. Timber harvest and related activities may also directly impact migratory birds through disturbances of adults or young through the removal of active bird nests or by causing nest abandonment. Protection under the Forest Plan is provided by beach fringe and riparian buffers and standards and guidelines for waterfowl, shorebirds, raptors, legacy forest structure, and the Conservation Strategy.

Bats

There are seven species of bats that are known to occur in Alaska (Parker et al. 1996; Olson et al. 2014). Of the bat species that occur in Southeast Alaska, the

little brown bat (*Myotis lucifugus*) is the most common and wide spread. Others include the silver-haired bat (*Lasionycteris noctivagans*), Keen's myotis (*M. keenii)*, California myotis (*M. californicus*), the long-legged myotis (*M. californicus*), Yuma myotis (*M. yumanensis*), and the big brown bat (*Eptesicus fuscus*). All species are associated with mature forested habitats which provide roosting, breeding, and foraging sites, and bat activity appears rare, for most species, in second-growth forest (Tessler et al. 2014; Walton et al. 2013a-e; Parker et al. 1996). Tree-roosting species, such as the Keen's myotis and silver-haired bat, often roost in mature forest patches with large numbers of suitable cavity trees. Other species, such as the little brown bat, roost in caves associated with the karsts systems. Foraging activities vary depending on vegetation density, and studies have found higher foraging activity from bats in intact forest patches and along the patch edges, with less activity in clear-cut areas (Patriquin and Barclay 2003). Throughout its range, the little brown bat has undergone dramatic declines due to white-nose syndrome (a fungal infection that affects bats while in hibernation) and is of particular management interest as white-nose syndrome has not yet been detected in Alaska. Bats are relatively rare in Alaska and reproductive rates for bats in higher latitudes are generally lower than farther south. These factors may make these species more susceptible to habitat loss and other factors; however, further research is needed to better understand current bat populations and how they respond to habitat loss and other factors (Boland et al. 2009). Timber harvest, particularly even-aged harvest, has the potential to remove roosting and foraging habitat for bats.

Marbled Murrelet

In March 2006, a status review for the marbled murrelet was initiated by the USFWS for the northern part of the species range to support ESA deliberations over the listing of the species as threatened in the southern part of its range (California, Oregon, and Washington; Piatt et al. 2007). Genetic analysis conducted as part of the review identified three distinct population segments: one in the central and western Aleutian Islands; one ranging from the eastern Aleutians to northern California; and one in central California.

Marbled murrelets are widely distributed across marine waters in Southeast Alaska. They spend the majority of their lives at sea, but travel inland up to 50 miles to nest in old-growth forest stands (Piatt et al. 2007). Marbled murrelets typically nest on mossy-limbed branches of large, mature coniferous trees within stands of structurally complex, coastal high-volume old-growth forest (DeGange 1996; Kuletz et al. 1995; Ralph and Miller 1995). However, on some treeless islands in Southeast Alaska marbled murrelets lay eggs on bare talus slopes in mountainous areas (Piatt et al. 2007).

Timber harvest, through the removal of POG forest, can directly remove nest trees, and also increases habitat fragmentation and associated edge effects, such as increased rates of nest predation (Andren 1994; Chalfoun et al. 2002). Some avian predators of murrelets, especially corvids (i.e., ravens, crows, jays), are known to increase with both forest fragmentation and proximity to human activity (Burger 2002). In a study of the edge effects and nest predation risk on marbled murrelets, Malt and Lank (2007) found that disturbances by avian predators at nests were significantly more frequent at hard edges (clearcuts) relative to interiors, but less frequent at soft edges (regenerating forest); there were no edge effects at natural-edged (riparian) sites. Thus, edge-associated predation risk may subside with the progression of forest succession. Forest Plan standards and guidelines pertaining to marbled murrelets include maintaining a 600-foot radius no-cut buffer zone around identified murrelet nests; however, habitat protection is also provided through beach and estuary fringe buffers and

riparian standards and guidelines (USDA Forest Service 2016a), as well as the overall system of OGRs and other non-development LUDs.

Amphibians

There are eight species of amphibians known to occur in Southeast Alaska, two of which, the Pacific chorus frog *(Pseudacris regilla)* and the red-legged frog *(Rana Aurora),* are introduced (MacDonald and Cook 2007). Native species include the western toad (*Bufo boreas*), wood frog (*Rana sylvatica*), Columbia spotted frog (*Rana luteiventris*), rough-skinned newt (*Taricha granulosa*), long-toed salamander (*Ambystoma macrodactylum*), and northwestern salamander (*Ambystoma gracile*). Within Alaska, most of these species are confined to the southeast, with the exception of the western toad which ranges as far north as Prince William Sound (MacDonald and Cook 2007), and the wood frog, which is widespread throughout Alaska, and persists north of the arctic circle (Lee-Yaw et al. 2008). Amphibians have specific requirements for both aquatic and terrestrial habitats in order to complete their life-cycle. This makes them useful indicator taxa of forest change and effects on habitat elements such as canopy shade, soil moisture, and coarse woody material. Clearing of trees can result in increased solar radiation to the forest floor, resulting in changes in moisture and soil temperatures; these effects can be reduced using selective thinning (Verschuyl et al. 2011). Amphibians are often vulnerable to road construction and increased road traffic as many species migrate from streams and other waterbodies to upland habitats.

Endemism

The USFWS defines endemic as “a species native and confined to a certain region; having comparatively restricted distribution” (http://www.fws.gov/endangered/about/glossary.html). The 2016 Forest Plan standards and guidelines for endemic mammals direct the Forest to “maintain habitat to support viable populations and improve knowledge of habitat relationships of rare or endemic terrestrial mammals that may represent unique populations with restricted ranges.” Likewise, the National Forest Management Act (NFMA) directs that management prescriptions “shall preserve and enhance the diversity of plant and animal communities, including endemic(s).”

Centers of endemism (areas with the presence of a high number of endemic species) have been identified in Southeast Alaska which are thought to have been refugia during the last glacial event (Cook et al. 2001, 2006). Some of these locations coincide with areas that have also experienced high levels of timber harvest and which may be ready for young-growth harvest.

Due to their restricted ranges, specific habitat requirements, and sensitivity to human activity, insular endemic species (i.e., those restricted to islands or groups of islands) are highly susceptible to extirpation and eventually extinction (Soule 1983; Reid and Miller 1989; Burkey 1995). Species tied to island archipelagos are more sensitive to the effects of introduced non-natives, including pathogens and disease, and natural events, such as climate change, than other managed landscapes due to their limited mobility and isolation from other subpopulations (Cook et al. 2006). The 2016 Forest Plan FEIS (USDA Forest Service 2016b) provides a detailed discussion on endemism and its implications on the Tongass National Forest.

There are 24 known endemic wildlife species (mammals and birds) on the Tongass National Forest (see USDA Forest Service 2016b, *Wildlife* section; Table 3.10-7 in Appendix B of this EIS; ISLES 2013). The Alaska Natural Heritage Program (AKNHP) has established a working web-based interactive range map and list of endemic species for Alaska. Two of the more well-studied species, the Prince of Wales flying squirrel and Prince of Wales spruce grouse, are endemic to portions

of the Tongass National Forest where much of the past timber harvest has been concentrated and are described in more detail below. Other species include the Coronation Island long-tailed vole, Admiralty Island ermine and vole, and the Warren Island red-backed vole, which occur where little to no past harvest has occurred. The Alexander Archipelago wolf and Alexander Archipelago black bear are also thought to be endemic taxa and are described above.

Old-growth timber harvest has the potential to remove habitat used by some endemic species, such as snags and hollow trees used by the Keen's myotis and the Prince of Wales flying squirrel, but may also create habitat for some species e.g., regenerating forest stands for spruce grouse. Fragmentation of habitat patches could limit the ability of some species, e.g., flying squirrels, to disperse between areas of suitable habitat. In addition, for those species that are hunted, roads have the potential to increase hunter access and thus may increase harvest rates along the road system and the areas that these roads access (note that there are no known road thresholds relative to road density for these species).

Prince of Wales Flying Squirrel

The Prince of Wales flying squirrel is endemic to the Prince of Wales Island complex (Demboski et al. 1998; Smith 2005). Due to its close association with old-growth forest structure and processes and because of its specific habitat requirements for efficient movement, some authors have expressed concern about the long-term viability of this species because much of its range overlaps areas that have been affected by old-growth timber harvest (Carey 2000; Scheibe et al. 2006; Pyare et al. 2010).

Prince of Wales flying squirrels are associated with POG forest and den sites are typically located in areas with lower levels of fragmentation than elsewhere on the landscape (Pyare et al. 2010). Thus, successful dispersal of the species depends on the functional connectivity of the landscape (Smith et al. 2005).

Under the Forest Plan Conservation Strategy, the system of small OGRs was designed to provide for the distribution of flying squirrels in every major watershed and facilitate functional connectivity between larger reserves (USDA Forest Service 1997a). However, some biologists suggest that many reserves on Prince of Wales Island may be too small or spaced too far apart to support populations of Prince of Wales flying squirrels over the long term or maintain functional connectivity to support a back-and-forth exchange between flying squirrel populations (Pyare and Smith 2005; Smith et al. 2011). In addition to the system of OGRs, connectivity between reserves for flying squirrels is also provided by the legacy forest structure, stream, lake, and beach and estuary buffer standards and guidelines. These features represent significant structural elements providing functional connectivity among landscape elements.

Prince of Wales Spruce Grouse

The Prince of Wales spruce grouse (spruce grouse) is a subspecies endemic to Prince of Wales and nearby islands in southern Southeast Alaska. The spruce grouse is associated with muskegs, high-volume POG, and mixed conifer (scrub) habitats but will also use young-growth forest (15-30 years following timber harvest) with a well-developed middle story; they avoid clearcuts (Russell 1999). Though they are closely associated with conifer forests, the highest densities of spruce grouse are supported by areas with a mosaic of older coniferous habitats interspersed with regenerating patches of dense trees. Spruce grouse are poor long-distance flyers and are generally sedentary, with some limited migratory

movement (typically less than a mile; Dickerman and Gustafson 1996) between summer and winter habitats (Boag and Schroeder 1992; Williamson et al. 2008).

Spruce grouse are an important prey species for goshawks and marten. Forest birds, including spruce grouse, comprised a larger proportion of goshawk diets during the breeding season on Prince of Wales Island than elsewhere in Southeast Alaska (Lewis et al. 2006). Thus, impacts to spruce grouse could also impact goshawk and marten populations. Spruce grouse are managed as a game species by ADF&G.

Timber harvest and associated fragmentation may lead to population declines if open areas are too large or forested patches are spread too far apart to enable spruce grouse to move between them (greater than 1 mile). Clearcuts may also present a dispersal barrier to this species due to the thick logging debris often present which could inhibit walking, this species' preferred method of movement (Russell 1999).

Spruce grouse are a small game species that are particularly vulnerable to hunting along road systems, and thus are susceptible to overexploitation near roads and human populations (Williamson et al. 2008; Rabe 2009). Existing total road densities are provided in Table 3.3b-3. The current season for grouse is August 1 through May 15 with a bag limit of five per day in GMU 2 (ADF&G 2018). The Forest Plan Conservation Strategy maintains connectivity within matrix lands that will help facilitate dispersal and interchange between spruce grouse populations.

Environmental Consequences

This section describes effects on wildlife resources in the planning area.

The NFMA, as interpreted in the context of the Tongass Forest Plan Conservation Strategy, directs the Forest to manage wildlife habitat to maintain viable and well distributed populations to ensure continued existence in the planning area. Quantitative criteria for viability are not specified by the NFMA or associated regulations. For this analysis, the evaluation of viability includes considerations of the island archipelago environment as well as the best available science related to each species.

This section begins with an analysis of effects on the overall Tongass Conservation Strategy, which is addressed in detail in the 2016 Forest Plan FEIS Appendix D and discussed in the *Biodiversity* section of this EIS. The use of the word "wildlife" occurs frequently in this discussion without referencing a particular species because the intent is to consider each of the contributing elements of the conservation strategy and their ability to function as intended with respect to old-growth associated species under the alternatives. Modifications to various Forest Plan standards and guidelines occurred through interagency technical workgroups, workshops, and advisory groups during revisions to the 1997, 2008, and 2016 Forest Plans. Monitoring on the Tongass has helped inform that the management actions taken under the standards and guidelines have protected wildlife resources in the Tongass. The current Forest Plan considered the past actions related to timber harvest and other activities that have affected wildlife and their habitat. This Alaska Roadless Rule EIS evaluates how the alternatives would affect wildlife and their habitat under the current 2016 Forest Plan. Following this discussion, impacts to individual species are addressed.

Indirect Effects

Old-growth Conservation Strategy

The Tongass Conservation Strategy was designed to maintain well-distributed, viable wildlife populations across the Forest in the context of past and anticipated old-growth timber harvest. Since 1997, timber harvest rates have been far below those assumed in the 1997 Forest Plan Final EIS, the 2008 Forest Plan EIS, and the 2016 Forest Plan FEIS (USDA Forest Service 1997a, 2008a, 2016b). Under all of the alternatives, long-term protection of POG would continue to occur under the Conservation Strategy. The system of OGRs and other non-development LUDs is intended to maintain the ecological integrity of the old-growth ecosystem; all non-development LUDs would remain intact across all alternatives. Within the matrix, old-growth between reserves is maintained through Forest-wide standards and guidelines for stream buffers, the beach and estuary fringe, legacy forest structure, and others that preclude or limit POG timber harvest for other resources under all alternatives (USDA Forest Service 2016a). Collectively, these measures would facilitate and maintain connectivity and functionality of the old-growth ecosystem (USDA Forest Service 2016a).

Common to all alternatives, young-growth harvest within the reserve system, beach and estuary fringe, or RMAs has the potential to affect the integrity of the Conservation Strategy under the Forest Plan. Effects can include reduced functionality of these areas, reduced or fragmented buffers, and increased edge effects. However, the Forest Plan only allows RMA harvest outside of TTRA buffers, and beach fringe harvest is only allowed outside of a 200-foot buffer along the shoreline. Additional Forest Plan restrictions on harvest of young growth apply within these areas (created openings must be less than 10 acres and less than 35 percent of stand can be removed) and harvest is limited to a one-time entry within the first 15 years of Forest Plan implementation. Because of these strong limitations on harvest, Forest Plan modeling results for the selected alternative presented in the 2016 Forest Plan EIS (USDA Forest Service 2016b) estimated that only approximately 3,900 acres of young-growth within the beach and estuary fringe, 1,100 acres in riparian management areas, and 1,800 acres in Old-growth Habitat LUD would be harvested over 100 years. The selected alternative assumed application of the 2001 Roadless Rule an is represented by Alternative 1 in this EIS. For the action alternatives, the acres of suitable young growth in these special areas would not increase that much because most young growth occurs outside of roadless areas and is already captured under Alternative 1. The maximum increase in suitable young growth in these special areas under the action alternatives would occur under Alternative 5 and is 6 percent for RMA suitable, 5 percent for beach fringe suitable, and 12 percent for Old-growth Habitat LUD suitable. It is likely that any increase in harvest in these areas under the action alternatives, if any, would be a lower percentage than the percent increase in suitable. In addition, the effects of harvest in these areas would be localized. Ultimately, the substantial reduction in old-growth harvest through the transition to young-growth harvest under the Forest Plan would enhance biodiversity and the functioning of the Conservation Strategy over the long-term and would not change under any of the alternatives.

General Effects – POG and Roads

Relative to old-growth habitat conservation, all of the alternatives would allow old-growth harvest at levels similar to the level predicted in the Forest Plan FEIS (USDA Forest Service 2016b) though more areas would be available to choose from. The 2016 Forest Plan FEIS assumed under maximum timber harvest over the planning horizon (100 years), approximately 91 percent of the original total POG, 85 percent of the original high-volume POG, and 79 percent of the original large-tree POG will be maintained (USDA Forest Service 2016b; dee also Tables

3.9-12, 3.9-13, and 3.9-14 in Appendix B of this EIS). By biogeographic province, 72 to 100 percent of the original total, 62 to 100 percent of the original high-volume, and 33 to 100 percent of the original large-tree POG would be maintained. Overall, under the action alternatives, effects on wildlife resulting from these POG reductions are not expected to be substantially different from Alternative 1 (implementation of the Forest Plan under the 2001 Roadless Rule).

Timber harvest in newly opened areas and associated road construction or reconstruction has the potential to decrease the value of these roadless areas to wildlife through increased habitat fragmentation and reduced landscape connectivity. Additionally, species that are vulnerable to overharvest (e.g., wolf, marten, and spruce grouse) would be affected by potential increased hunter and trapper access along new or reconstructed roads, whether for young-growth or old-growth harvest or renewable energy projects. As with all alternatives, the specific magnitude of effects and where these would occur would be evaluated at the project level through a separate NEPA process.

Comparison of Action Alternatives

Although IRAs were not part of the original 1997 Conservation Strategy, they add value by providing larger expanses of roadless refugia, which are important to wide-ranging wildlife species such as wolves, brown bears, marten, and less mobile species such as flying squirrels and amphibians. Alternative 2, would open up areas identified as roaded-roadless (e.g., roaded before the 2001 Roadless Rule and during the 2001 Roadless Rule exemption period) which would allow slightly more access to harvest forest stands than under the current Forest Plan (Alternative 1), but would be limited to areas that already have a road system. Young-growth harvest within the Old-growth Habitat LUD, Beach Fringe, and RMAs would remain restricted to the first 15 years and under the additional harvest restrictions addressed earlier. There would be no difference in the amount of harvest under this alternative relative to Alternative 1.

Similar to Alternative 2, Alternative 3 would open up areas identified as roaded-roadless but would also include areas identified as logical extensions of existing roads. Alternative 3 would be less protective because it would remove approximately 1.1 million total acres of roadless designations but would still rank relatively high overall because it would maintain substantial roadless designations within Development LUDs and 8.1 million total acres would still be managed under a roadless priority designation. Although suitable acres would increase for old growth and young growth, there would be no difference in the overall amount of harvest under this alternative relative to Alternative 1.

Alternative 4 would remove the roadless designation on areas identified as roaded roadless, on areas identified as logical extensions of existing roads, and on some additional acres of development LUDs. Alternative 4 would be substantially less protective than Alternative 3 but would still include a high number of roadless acres within development LUDs. However, 861,000 roadless acres are designated as Timber Priority, which provides little or no protection of roadless characteristics and essentially eliminates the roadless protections provided in these development LUDs. Although suitable acres would increase for old growth and young growth, there would be no difference in the overall amount of harvest under this alternative relative to Alternative 1.

Whereas the roadless rule language under most action alternatives (2, 3, 4, and 6) would be modified, all roadless designations would be removed from all lands on the Tongass under Alternative 5 and, therefore, it would rank the lowest in terms of roadless protections. However, it would still be moderate in terms of overall protection due to the degree of protections provided by the underlying

Forest Plan LUDs and Forest Plan standards and guidelines, which would not change. Because overall harvest levels would not change relative to Alternative 1 and because the broader Conservation Strategy for the Tongass was developed prior to the roadless rule and would be maintained under the Forest Plan, the general effects of Alternative 5 on wildlife and the Conservation Strategy are expected to be relatively low but slightly greater than projected under Alternative 1 (existing Forest Plan).

Under Alternative 6, approximately 6.9 million acres would be maintained and managed as Roadless Priority or LUD II Priority. Roadless designations would be removed on all development LUDs and mineral overlay areas and, as a result, it would rank the second lowest in terms of roadless protections. However, it would still be moderate in terms of overall protection due to the degree of protections provided by the underlying Forest Plan LUDs and Forest Plan standards and guidelines, which would not change. Because overall harvest levels would not change relative to Alternative 1 and because the broader Conservation Strategy for the Tongass was developed prior to the roadless rule and would be maintained under the Forest Plan, the general effects of Alternative 6 on wildlife and the Conservation Strategy are expected to be relatively low but slightly greater than projected under Alternative 1 (existing Forest Plan).

Species-specific Effects

The following sections describe impacts to threatened and endangered species, MIS, Alaska Region sensitive species, migratory birds, and endemic species that could occur by implementing the Forest Plan under the Alaska Roadless Area alternatives.

Threatened, Endangered, and Candidate Species

Impacts on Threatened and Endangered species potentially occurring within the boundary of the Tongass are expected to be the same or similar to those addressed in the 2016 Forest Plan BA. All of the alternatives considered in this Roadless Rule EIS maintain the current 2016 Forest Plan LUDs, standards and guidelines, and predicted harvest amounts.

Humpback Whale, Fin Whale, Sperm Whale, and Steller Sea Lion (Western DPS)

Adherence to the ESA, MMPA, and NMFS guidelines for approaching sea lions and other marine mammals, as currently required under the Forest Plan, would continue under any alternative. The amount of human activity in the marine environment associated with Forest management activities is only a fraction of the total amount of human activity occurring in the marine environment. Some of the other activities include commercial fishing, sport fishing, hunting, subsistence, tourism, and mariculture. Many of these activities are not regulated by the Forest Service. The effect of such activities on listed marine species would depend on many factors such as size of the bay, depth of the waters in the bay, number of boats, individual behavior responses to disturbance. Currently, there is not a quantifiable way to estimate these possible effects. Land use designations and forest-wide standards and guidelines that have been developed for application on all Forest Service permitted or approved activities minimize or eliminate adverse impacts on marine species. Any Alaska Roadless Rule decision would not result in on-the-ground effects. Any future Forest Service actions or authorizations will be subject to additional Section 7 consultation under the ESA, as well as consultation required at the project-level.

Common to all alternatives, these species could be exposed to disturbance and noise associated with LTF activity, young-growth timber harvest in the beach fringe, energy development, mining activities, potential collisions with vessels, and fuel or oil spills associated with vessel traffic particularly if these activities occur in the vicinity of nearshore areas used by whales and major haul-outs or rookeries used by sea lions. Harassment or displacement of whales and Steller sea lions from preferred habitats by human activities such as boating, recreation, aircraft, log transfer facilities, and log raft towing, were identified as a concern with regard to long-term conservation in the BA conducted for the 2016 Forest Plan Amendment (USDA Forest Service 2016d). Exposure of whales and Steller sea lions to these impacts would be essentially unchanged under all of the alternatives because predicted harvest volumes would be the same under each alternative and the potential for other developments would be similar. The locations of timber harvest and associated nearshore activities may change under the various alternatives, but these are not known at this programmatic level of evaluation. When specific timber or other projects are proposed, site-specific NEPA analysis would be conducted at that time. For these reasons, the Roadless Rule (all alternatives considered) would not result in affects above what was analyzed in the BA prepared for the 2016 Forest Plan Amendment for whales and Steller sea lions.

Short-tailed Albatross

Short-tailed albatross occur in nearshore areas along the outer coast. Short-tailed albatross could be affected by reduced marine water quality due to activities in the nearshore environment, including LTF use, log raft towing, vessel traffic, and timber harvest within the beach fringe. However, vessel traffic, log raft towing, and LTF use are expected to remain comparable to that anticipated under the current Forest Plan with use occurring periodically over the planning horizon. Effects would be minor and effects would likely be limited to nearshore areas. The proposed Roadless Rule (all alternatives considered) would not result in effects above the level that was analyzed in the BA prepared for the 2016 Forest Plan revision for the short-tailed albatross (USDA Forest Service 2016e).

Alaska Region Sensitive Species

Queen Charlotte Goshawk

Timber harvest in both old-growth and mature young-growth forest may locally limit the availability of nest sites through removal of suitable nest trees, or through removal of forest surrounding these trees. Nest trees optimally should be surrounded by patches of mature or old-growth forest large enough to include several alternate nests and provide post-fledging habitat. Timber harvest may also decrease foraging habitat quality through reductions in prey abundance and availability. Dense young-growth stands are difficult for goshawks to hunt, reducing availability of prey, even where prey populations may otherwise be adequate. The availability of adequate prey resources has been linked to goshawk territory occupancy and breeding success (Doyle and Smith 1994; Salafsky et al. 2005; Keane et al. 2006; Salafsky et al. 2007).

Forest Plan Standards and Guidelines for this species include project-level survey requirements for nesting goshawks, retention of confirmed or probable nest stands, designing and maintaining a buffer area of not less than 100 acres of POG forest if it exists centered on or adjacent to the nest tree or nest site, timing restrictions during active nesting, and retention of legacy old-growth forest structure in old-growth harvest units larger than 20 acres, where logging has been most intensive (USDA Forest Service 2016a). The system of OGRs and other non-development LUDs also maintains habitat for this species, although a recent study suggests that some uncertainty remains with respect to the ability of

Forest Plan conservation measures to contribute sufficient habitat to sustain well-distributed, viable populations of northern goshawks throughout Southeast Alaska (Smith 2013). Continued inventories and monitoring of established nest protection buffers will help to inform future decisions.

Impacts to goshawks are assessed in terms of the reduction in total and high-volume POG, which provides potential high-quality nesting and foraging habitat. High-volume POG represents optimal nesting habitat due to the presence of large trees and snags. Reductions in forest cover, and the subsequent progression of forest succession in young-growth stands, also have the potential to affect the abundance and availability of prey. At a landscape level, reductions in the amount of POG and mature young-growth forest may result in portions of the landscape becoming marginal or unsuitable for goshawks. Under all alternatives, the projected harvest level would be about 42,000 acres of old growth and 284,000 acres of young growth over 100 years. Approximately 84 percent of the original high-volume POG existing in 1954, the time at which industrial scale logging began on the Tongass, remains (see Table 3.9-6 in Appendix B of this EIS). None of the action alternatives would increase harvest rates of POG above what was analyzed in the 2016 Forest Plan FEIS (refer to the *Biodiversity* section for a discussion of effects on POG by biogeographic province and the *Wildlife* section for additional detail).

Young-growth forest provides marginal goshawk habitat, but over the long term, if unharvested or thinned with an objective of accelerating old-growth conditions, would return to old-growth conditions. Young-growth stands ready for commercial harvest may be reaching an age to provide some benefits to goshawk (foraging, occasional nesting, post-fledging areas) if adequate structure is developed (typically 50 to 100 years following harvest, depending on site productivity). Under all alternatives, impacts to goshawks would still be greatest in the North Central Prince of Wales, Kupreanof/Mitkof Island, East Chichagof Island, and Revilla Island/Cleveland Peninsula biogeographic provinces where the most suitable young-growth forest is located. The beach and estuary fringe and RMAs provide connectivity for goshawks between reserve areas, and old-growth forest near beach, estuary, and riparian habitats generally support greater prey diversity and net prey productivity for goshawk foraging. Thus, young-growth stands in these areas have the potential to develop into productive habitats for goshawks. Pre-commercial and commercial thinning of young-growth stands, which would occur under all of the alternatives, would promote the development of stand conditions that provide foraging habitat for goshawks. However, even-aged harvest or group-selection of young-growth in these areas, as well as in the Old-growth Habitat LUD, would set back the stand development process (returning harvest units to the stand initiation stage). The creation of gaps several acres in size or more could result in localized reductions in goshawk foraging habitat quality and would delay the development of old-growth habitat capable of providing higher quality foraging, nesting, and post-fledging habitat. Effects to connectivity for goshawks are lessened through implementation of Forest Plan standards and guidelines (Beach and Estuary Fringe, RMAs, Legacy tree, goshawk habitat, and protection measures).

Despite these localized effects, the transition to young growth proposed under the 2016 Forest Plan, and unchanged by the Alaska Roadless Rule alternatives, is likely to benefit goshawks by reducing the amount of POG harvest that would occur over the planning horizon, thereby maintaining more old-growth forest that provides potential foraging, nesting, and post-fledging habitat.

Individual projects would be required to conduct goshawk surveys and implement the goshawk standards and guidelines which would minimize impacts to this

species at the project level. For these reasons, all the alternatives considered would not change the determination of may affect individuals but would not result in loss of viability of this species or a trend toward federal listing.

Kittlitz's Murrelet
The Kittlitz's murrelet is associated with glacial habitat and occupies areas outside of where timber harvest and associated activities and other development have occurred or are likely to occur. Consequently, implementation of the 2016 Forest Plan under any of the alternatives would not affect the Kittlitz's murrelet. The 2016 Forest Plan standard and guideline to "provide for the protection and maintenance of known Kittlitz's murrelet nesting habitats" would be unchanged. Project-level analysis would occur should any future development be proposed near tidewater glaciers.

Black Oystercatcher
The black oystercatcher is associated with rocky shorelines and tidal mudflats along the coast. They could be affected by oil or fuel spills associated with vessels in the vicinity of the LTFs and the transport of logs from harvested areas under all of the alternatives. They could also be affected by disturbance associated with management activities within the beach fringe.

However, black oystercatchers occur at low densities across the Tongass and the habitats it uses (intertidal areas) do not typically coincide with management activities, although there is the potential for ongoing effects associated with recreation and tourism activities on the Tongass, disturbance associated with young-growth harvest in the beach fringe, and energy development or other activities under all alternatives. The Forest Plan requires a minimum 330-foot buffer from human activities around concentration or nesting areas that would apply to future projects regardless of roadless status. For these reasons, all the alternatives considered would not change the determination of may affect individuals but would not result in loss of viability of this species or a trend toward federal listing.

Aleutian Tern
Threats to this species include human disturbance at nest sites, marine oil spills, and change in forage fish populations (USFWS 2012d). Common to all alternatives, timber harvest associated activities (i.e., log transport, use of LTFs, and helicopter activity) could have the potential to affect this species through disturbance to nesting colonies or through water quality impacts to prey species. Although most known colonies are in remote sites in areas surrounded by non-development LUDs, some do exist in areas where Forest Service permitting may have the potential to cause disturbance. There is no specific Forest Plan direction for this species but the standards and guidelines for Seabird Colonies apply (USDA Forest Service 2016a).

None of the alternatives would increase the potential of any young-growth or old-growth harvest or other management activities in the vicinity of Black Sand Spit, in the Yakutat Ranger District, where the largest known breeding colony occurs. Only Alternatives 5 and 6 would remove this area from roadless protection; however, harvest would not occur because it is in a non-development LUD as well as areas conservation priority areas identified by The Nature Conservancy (TNC) and Audubon Alaska (Audubon Alaska and The Nature Conservancy 2007). Therefore, the species determination for all alternatives would remain that the project may impact individual Aleutian terns but would not result in loss of viability of this species or a trend toward federal listing.

Steller Sea Lion (Eastern DPS)
Steller sea lions may occur in the nearshore and pelagic waters throughout the Tongass. Common to all alternatives, Steller sea lions have the potential to be exposed to disturbance and noise associated with LTF activity, potential collisions with vessels, and fuel or oil spills associated with vessel traffic particularly if these activities occur in the vicinity of major haul-outs or rookeries. All identified rookery sites occur in the outside waters of the Tongass far from expected activities. One site, Forrester Island, is a designated National Wildlife Refuge and is under the jurisdiction of the USFWS. Most of the known haulouts (Biali Rock, Cape Cross, Biorka Island, Cape Ommaney, Coronation Island, Timbered Island, and Cape Addington) occur in the outside waters of the Tongass and would not likely be impacted by any future activities permissible under any of the alternatives. Of the known haulout sites, only Gran Point, Benjamin Island, Sunset Island, and Lull Point occur in the inside waters of the Tongass. Gran Point is an area in Chilkoot Inlet near Haines; Benjamin Island is a small island in Lynn Canal north of Juneau; Sunset Island is a small island located in Stephens Passage between Hobart and Windham Bay; and Lull Point located on the south end of Catherine Island on the east side of Baranof Island. It is unlikely that any of the areas identified as critical habitat would be impacted by activities that would be newly permissible under the alternatives; if impacts do occur that create noise and disturbance (e.g., boating), the potential resulting disturbance would likely be minor and temporary and would be addressed at the project-level.

The amount of human activity in the marine environment associated with Forest management activities is only a fraction of the total amount of human activity occurring in the marine environment. Some of the other activities include commercial fishing, sport fishing, hunting, subsistence, tourism, and mariculture. Most of these activities are not regulated by the Forest Service. Adherence to the MMPA, ESA, and NMFS guidelines for approaching sea lions, as currently required under the Forest Plan, would continue under all alternatives. Young-growth timber harvest within the beach fringe or other developments in these areas have the potential to result in very localized, minor, temporary reductions in water quality to which Steller sea lions could be exposed. Therefore, the species determination for all alternatives would remain that this action may impact individual Steller sea lions but would not result in loss of viability of this species or a trend toward federal listing.

Sitka Black-Tailed Deer
Extensive analysis on deer was done for the 1997 Forest Plan and subsequent 2008 and 2016 Forest Plan Amendments. Analyses conducted during the 2016 Forest Plan amendment also included information on summer and winter forage and effects of roadbuilding, noting that the expected ecological response of deer to old-growth and mature young-growth timber harvest, road building, and vegetation succession would be similar to those predicted previously, but the extent of future impacts would be expected to be reduced from earlier analyses because lower levels of old-growth harvest were proposed in all action alternatives in the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

As part of the 2016 Forest Plan FEIS, the interagency deer habitat capability model was used to assess existing habitat capability within the planning area, and describes model limitations, and results (see USDA Forest Service 2016b, *Wildlife* section). Table 3.3b-2 summarizes the modeled deer habitat capability by biogeographic provinces. Forest-wide, approximately 89 percent of the original (1954) habitat capability remains, ranging from 72 to 100 percent depending on the biogeographic province. The greatest reductions in deer habitat capability have occurred, and will continue to occur, in provinces where timber harvest has

been concentrated (the North Central Prince of Wales, East Baranof, and Etolin Island biogeographic provinces). The analysis conducted for the 2016 Forest Plan EIS, including the results of that analysis, is detailed in the 2016 Forest Plan EIS (see the *Wildlife* section), and summarized below as it relates to potential impacts from the alternatives.

The 2016 Forest Plan FEIS recognized that there would be a reduction in deer habitat capability (based on Interagency Deer Habitat Capability model output) from then existing conditions due to the harvest of mature young-growth and POG forest. Immediately following young-growth and old-growth timber harvest, there is an increase in the amount of forage available to deer during the summer and mild winter months in response to increased understory growth responding to sunlight associated with opening the forest canopy, although it may be of lesser quality compared to the same species of plants grown in the shade (Person and Brinkman 2013; Happe et al. 1990). Therefore, reductions in deer habitat capability in summer and mild winters were not expected to be realized immediately after timber harvest due to the short-term increase in forage but were expected to be greatest in heavy snow winters during years immediately following harvest and after about 25 years, as forest succession progresses and harvested stands reach the stem exclusion stage. Over the long term, reductions in habitat capability are expected to reduce carrying capacity, or the numbers of deer an area is capable of supporting given the available resources. This could lead to a decline in the deer population, particularly following severe winters, if the demand for resources (e.g., food or habitat) exceeds that which is available. Potential declines in the deer population resulting from reduced habitat capability may decrease the availability of deer to wolves (Person 2001; Farmer et al. 2007; Brinkman 2009). Likewise, reductions in deer habitat capability over the long term may reduce the access to and availability of deer to wolves and subsistence hunters.

At the forest scale, the current Forest Plan maintains 89 percent of the existing deer habitat capability over the long term and this would not vary between Alaska Roadless Rule alternatives. Stand treatments (pre-commercial and commercial thinning) in young-growth forest are not reflected in the deer habitat capability, but would result in increased understory growth which improve forage resources for deer over the first 15-25 years following harvest.

Other developments, such as energy generation and transmission, and transportation projects, can affect deer during construction through disturbance and through habitat removal or alteration. Operational impacts due to disturbance would expected to be minimal. Forest Plan standards and guidelines, which are unchanged by any Alaska Roadless Rule alternative, include consideration of the most current science, guidance, and methodologies related to avoiding and minimizing wildlife impacts and minimize impacts to deer and/or areas of important deer habitat during construction and operation.

Mountain Goat

Mountain goats inhabit alpine and subalpine areas and adjacent POG forests on the mainland portions of the Tongass and have been introduced to several islands. Mountain goats are susceptible to over-hunting if road access is increased or improved, though most roads are located a long distance (both vertically and horizontally) from mountain goat habitat.

The amount of road access quantified in terms of the amount of road construction and reconstruction, common to all alternatives, is representative of the potential for over-hunting. Existing road conditions in 2016 included about 5,100 miles of existing road on NFS lands (see USDA Forest Service 2016b,

Table 3.4-6). The projection over the next hundred years was modeled to include an additional 1,000 miles of new roads, totaling about 6,100 miles of new roads over 100 years. This would be an increase of nearly 20 percent over existing conditions in 2016. Additionally, there would be about 500 miles of road constructed over decommissioned roads and another 1,100 miles of reconstructed roads. While there would be more acres potentially available for harvest with each of the action alternatives, there would be no change in the projected harvest amount. Therefore, new or reconstructed road miles would remain about the same for all alternatives. Alternatives 1 and 2 would have the same amount of road miles as indicated in the 2016 Forest Plan FEIS; Alternative 3 is expected to result in slightly more roads than Alternatives 1 and 2; and Alternatives 4, 5 and 6 would have slightly more road miles than Alternative 3. However, most of the roads, particularly those accessing young-growth units, would be below 1,500 feet in elevation and outside of mountain goat habitat. Additionally, note that many new or reconstructed roads would be closed or decommissioned after use, further reducing effects on mountain goats. Risk of over-harvest due to human access along roads is mitigated to some extent by Transportation Forest-wide standards and guidelines that require travel access road objectives to be developed for all roads, and mountain goat standards and guidelines would not be affected by any Alaska Roadless Rule alternative.

Energy, transportation, or other projects that may become permissible in new areas could affect mountain goats through direct disturbance or through removal or modification of habitats. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to mountain goats and their habitat during project construction and operation.

Black Bear

Preferred habitats for black bears, which include coastal, estuarine, and riparian areas, are protected by the Forest Plan Conservation Strategy. None of the alternatives would remove these measures. Common to all alternatives, harvest of mature young-growth and old-growth timber (both even aged as well as thinning) would increase forage availability (berries) for black bears over the short term in the resulting early-successional plant communities. However, this food source typically lasts only about 25 years post-logging and decreases over time in association with canopy closure. Over the long term, old-growth harvest would decrease habitat suitability for black bears, due to the reduced understory forage in young-growth stands and loss of denning habitat in upland areas (e.g., large woody structures such as hollow logs and hollow living trees; Davis et al. 2012). The transition to young-growth harvest under the current Forest Plan, which is not changed by any of the alternatives, is expected to increase forage availability over the long term by reverting young-growth stand in the stem exclusion stage back to the stand initiation stage but, development of old-growth stand characteristics used by bears for denning would be delayed in those stands. Effects to the contributing elements of the Conservation Strategy would be localized and common to all alternatives, with the maximum expected young-growth harvest affecting 0.4 percent of forest land in the beach and estuary fringe, 0.3 percent of the forest land within RMAs, and approximately 0.2 percent of the forest land (young-growth, POG, and unproductive forest) within the Old-growth Habitat LUD. (See USDA Forest Service 2016b, Appendix D for additional discussion of the Conservation Strategy). Therefore, these areas would continue to function as habitat for black bears.

Timber harvest may also indirectly increase the susceptibility of black bears to over-harvest if road access is increased or improved. An increase in open roads, particularly in open habitats such as clearcuts and muskegs, where bears forage

and are easier to see, can increase the potential for human-bear interactions. The amount of road access, quantified in terms of the amount of road construction and reconstruction anticipated under the current Forest Plan, is representative of the potential for over-hunting (see discussion above under *Mountain Goat* for a comparison of the alternatives). Average total road density on NFS lands (across all WAAs) in 100 years under Alternative 1 would be approximately 0.23 mile per square mile and is not expected to increase significantly above this road density under any of the action alternatives. Therefore, any potential increase in hunter access and risk of over harvest would be localized, and no measurable increase would be expected at the forest scale under any of the alternatives.

Energy, transportation, or other projects that may become permissible in new areas could affect black bears through direct disturbance or through removal or modification of habitats. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to black bears and their habitats during project construction and operation.

River Otter
River otters prefer habitats, especially POG forest, immediately adjacent to coastal and fresh water aquatic environments, with most use occurring within 500 feet of these areas. These old-growth habitats are protected by Forest Plan standards and guidelines for the beach and estuary fringe, riparian areas, and lakes which would be implemented under all alternatives.

Energy, transportation, or other projects that may become permissible in new areas could affect river otters through direct disturbance or through removal or modification of habitats, particularly if activities affect waterbodies. These effects would be evaluated at the project-level. Forest-wide standards and guidelines would minimize impacts to river otters and their habitats during project construction and operation.

American Marten
Through the removal of forest cover and old-growth ecosystem features such as decadent live trees and snags, timber harvest (POG harvest and young-growth harvest) under that could occur under all alternatives would reduce the vertical and horizontal structural complexity important to marten in relation to prey access, denning and resting sites, escape from predation, and thermoregulation (Buskirk and Zielinski 1997; Hargis et al. 1999; Flynn and Schumacher 2001). Forest fragmentation resulting from timber harvest may also alter patterns of occupancy by marten (Thompson and Harestad 1994; Bissonette et al. 1997; Chapin et al. 1998). Although more recent research indicates that marten use all forested stands relative to their ability, including young-growth stands mixed conifer and deciduous stands less than 40 years of age (Goldstein et al. 2013), harvests that result in the greatest reduction in deep snow marten habitat (high-volume POG at or below 800 feet elevation) are expected to have the greatest negative effects to marten. Reductions in deep snow marten habitat may result in localized reductions in the capability of the remaining habitat to support marten. The 2016 Forest Plan FEIS estimated that about 9,800 acres of deep snow marten habitat would be harvested in the next 100 years (see Table 3.10-13 in Appendix B of this EIS).

Increased human access associated with new roads may result in increased marten vulnerability to harvest, particularly along open roads (Flynn et al. 2004). Harvest under the Forest Plan, under all alternatives, would result in minor increased average total road densities; however, the proportion of WAAs within various road density categories would not likely change under any of the alternatives (see the discussion under Black Bear). Increased road densities have the potential to indirectly increase hunter access and associated trapping

pressure; however, these effects would be minor and would not significantly differ among alternatives as no increased harvest and only slight increases in roading (Alternatives 3, 4, 5, and 6) are anticipated.

Under the current Forest Plan, marten populations are supported by the Conservation Strategy which works to maintain old-growth forest cover and coarse woody debris to provide structure important to marten for resting, denning, escape from predators, trapping refugia, and facilitate marten dispersal. The beach and estuary fringe and RMAs provide travel corridors for marten, and old-growth reserves and other non-development LUDs provide refugia from trapping. Pre-commercial and commercial thinning of young-growth stands in these areas, which would occur under all of the alternatives, would promote the development of stand conditions that provide habitat structure for marten. However, even-aged harvest or group-selection of young-growth in the beach and estuary fringe, RMAs, and non-development LUDs would setback the stand development process (returning harvest units to the stand initiation stage). The creation of gaps several acres in size or more could result in localized reductions in marten movement, local reductions in prey availability, and would delay the development of old-growth habitat conditions in harvested stands. However, overall connectivity for marten would be provided through application of the Forest Plan requirement of maintaining the 1,000-foot buffer immediately inland of young-growth harvest units in the beach and estuary fringe and a 200-foot buffer along the shoreline.

Energy, transportation, or other projects that may become permissible in new areas could affect marten through direct disturbance or through removal or modification of habitats. These effects would be evaluated at the project-level. Forest-wide standards and guidelines would minimize impacts to marten and their habitats during project construction and operation.

Brown Bear
Brown bears are associated with low-elevation POG forests, particularly along Class I salmon streams. These habitats are protected to some extent by Forest-wide standards and guidelines for beach and estuary fringe and RMAs. However, young-growth harvest under the Forest Plan would occur in these areas under all alternatives. Young-growth harvest within beach and estuary fringe and RMAs are discussed above under Black Bear.

Road densities are another measure of the potential impact on brown bears. Primary concerns include increased hunting or poaching, and disturbance during critical life stages (e.g., late-summer feeding periods for bear). Habitat fragmentation, as well as habitat loss secondary to activities that are facilitated by vehicular access (e.g., timber harvest, mining, residential development, and renewable energy development) are other potential impacts. Open roads, which receive the highest and most consistent use, are likely to have the greatest effect on brown bears, although closed roads still facilitate access (e.g., off-highway vehicle, pedestrian) to roadless areas. There is no road density guideline for brown bears; however, it can be assumed that increased road density elevates the potential for human-bear interactions. Implementation of the Forest Plan under all alternatives would result in minor changes in total road density (see the discussion under Black Bear). Increased road densities have the potential to indirectly increase human-bear interactions; however, these effects would be minor. Alternatives 1 and 2 would be similar in their effects, Alternative 3 would be slightly greater, and Alternatives 4, 5, and 6 would be slightly greater than Alternative 3. Overall, there is little difference between the alternatives because predicted harvests levels are not changed.

Energy, transportation, or other projects that may become permissible in new areas could affect brown bears through direct disturbance or through removal or modification of habitat, particularly if developments affect Class I salmon streams. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to brown bears and their habitats during project construction and operation.

Alexander Archipelago Wolf

The 1997, 2008, and 2016 Forest Plan analyses contain extensive information on wolf ecology, building on the wolf assessment (Person et al. 1996). As outlined in the above Forest Plans and associated documents, scheduled harvest of POG forest has the potential to result in a small reduction of the wolf prey base (deer through decreased deer habitat capability) and increased human access along project roads, which could reduce the wolf population through increased legal and illegal hunting and trapping. It is assumed that a decline in the deer population would likely result in a decline in the wolf population (USDA Forest Service 2008b). Resonating effects could include reductions in opportunities to hunt or trap wolves (see USDA Forest Service 2016b, *Subsistence* section). These effects are of particular concern on Prince of Wales Island where the population has apparently undergone substantial declines over the last several decades; however, this population represents a small portion (approximately 4 percent) of the overall Alexander Archipelago wolf population and this decline is not anticipated to affect the status of the population at large (USFWS 2015).

Evaluation employing the Interagency Deer Carrying Capacity Model suggests that harvest of POG forest will decrease carrying capacity for deer over the long term because of reductions in the amount of available winter habitat due to the ultimate development of forest in stem-exclusion (see Table 3.10-11 in Appendix B of this EIS; see also discussion of effects to deer). However, this long-term decline in carrying capacity is lessened now due to the current Tongass Forest Plan's transition to young growth, which would not change under any alternative. Current deer habitat capability based on the interagency habitat capability model is below the Forest Plan guideline of 18 deer per square mile in many WAAs. This results from several factors and varies among landscapes. Contributing factors include lower inherent capability of some landscapes and habitats, reduced habitat capability from past timber harvest and associated succession, and the static nature of how the model expresses habitat capability during succession (e.g., one value for young growth from 25 to 150 years of age). Model results suggested that continued harvest of POG forest in some areas would result in higher risk that there will be insufficient deer to sustain predation by wolves and human deer harvest over the long term (see existing modeled deer densities in Table 3.10-2 in Appendix B). That concern exists despite the availability of alternative prey and current abundance of deer in some parts of the forest.

Projections based on the 2016 Forest Plan indicate a reduction in the existing percentage of WAAs with deer habitat capability of at least 18 deer per square mile by 11 percent after approximately 25 years (at stem exclusion) (see Table 3.10-14 in Appendix B). After 100 years of Forest Plan implementation the reduction in the percentage of WAAs with at least 18 deer per square mile would be 14 percent. WAAs with the greatest potential impacts are located in South Prince of Wales, North Central Prince of Wales, Kupreanof/Mitkof Islands, Revillagigedo Island, and Chichagof Island biogeographic provinces (see Table 3.10-14 in Appendix B). Reductions in habitat capability are due to both timber harvest as well as natural succession of stands harvested in the past. None of the alternatives would be expected to change the model results as there would be no increase in the overall harvest relative to the 2016 Forest Plan.

The transition to young-growth harvest under the current Forest Plan is not fully reflected in the interagency deer model results because the model does not assign different values to stands that have been pre-commercially or commercially thinned (i.e., it still treats them as stands in the stem exclusion phase with limited value for deer), or young-growth stands beyond the stem exclusion phase which become more suitable for deer. Harvest of young-growth stands would increase summer and low-snow winter forage availability for deer over the short term, providing temporary increases in habitat capability during most years, but reduced winter habitat capability in high-snow years. Over the long term as young-growth stands re-enter the stem exclusion phase, habitat capability for deer (and thus potential prey availability for wolves) would be expected to decrease (due to reduced forage availability) until the next stand treatment. Ultimately, the continued harvest of old-growth and young-growth forest that would be permissible under all the alternatives has the potential to result in localized reductions in deer habitat capability which may reduce prey availability for wolves in portions of the Tongass where deer are their primary prey (e.g., Prince of Wales Island and surrounding islands [GMU 2]). ADF&G recently updated its wolf management by game management area. All updated management reports and plans were reviewed but the discussion below focuses on GMU 2 (Porter 2018). The harvest data through 2014 was used for the 2016 Forest Plan. ADF&G plans for the next period (2015-2020) include the development of a more formal management plan for Unit 2 wolves (Porter 2018). Other recently updated management reports and plans for various GMUs note that changes to seasons and bag limits for wolves are currently not needed at this time.

All action alternatives would allow the construction or reconstruction of roads in some areas previously prohibited by the 2001 Roadless Rule, but the amount of roads would be similar. Roads associated with timber harvest may also increase the risk of both legal and illegal hunting and trapping related wolf mortality by increasing human access. Estimated total road densities and open road densities below 1,200 feet (representative of low elevation habitats used by wolves and deer) would increase by 0.07 and 0.01 miles per square mile (NFS lands only), for all roads and for NFS roads only for the current Forest Plan (see Table 3.10-15 in Appendix B). Therefore, at most, localized increases in hunter access would be expected under the action alternatives with no substantial increase across the Tongass. Alternative 2 would be the same as Alternative 1, Alternative 3 would result in slightly more roads than Alternative 2, and Alternatives 4, 5, and 6 would result in slightly more roads than Alternative 3. These effects would be lessened through road closures after use, through storage or decommissioning. The effectiveness of closure and storage, or decommissioning and ultimately the extent of mitigation will depend on both enforcement and the approach to closure. These decisions are made at the island, district, and project level through Access Travel Management Plans based on an evaluation of all resources.

Energy, transportation, or other projects that may become permissible in new areas could affect wolves directly during construction through disturbance at den and rendezvous sites and indirectly through effects to deer habitat and increased vulnerability to harvest. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to wolves, their habitats, and their prey base during project construction and operation, and through cooperation and coordination with ADF&G and the Wolf Technical Committee to meet the management intent to secure and support sustainable wolf population levels, particularly in GMU 2.

Bald Eagle
Common to all alternatives, timber harvest and associated activities, which create noise and disturbance (e.g., blasting and helicopter logging), have the potential to result in minor, temporary disturbance to individual bald eagles. As required by the Forest Plan, all activities would be conducted in accordance with the Bald and Golden Eagle Protection Act, including maintaining appropriate distances from active bald eagle nests. Riparian and beach and estuary standards and guidelines, as well as OGRs and other non-development LUDs, protect bald eagle habitat on the Tongass. Management activities in these areas could disturb eagles and reduce the protection afforded to suitable bald eagle habitat. Under all alternatives, commercial management of young growth (up to 10-acre openings) in the beach and estuary fringe and RMAs for the first 15 years after plan approval would continue. Harvest of young-growth in these areas would delay development of future trees/snags suitable for eagle nesting, perching, and roosting; however, it includes a minimum 200-foot forested buffer along the shore (beach) that would continue to protect some eagle perching or roosting trees during that time.

Many young growth trees harvested would be of insufficient size to be suitable for nesting or preferable for roosting. Harvest of young growth has potential to disturb eagles, especially if helicopter harvest methods are used. Timing restrictions would apply near active eagle nests in the vicinity of harvest activities to minimize disturbance to eagles or the abandonment of nests.

Energy, transportation, or other projects that may become permissible in new areas could affect bald eagles directly during construction through disturbance and through habitat removal or alteration. During operation, electrocution with powerlines and/or collisions with project structures are a potential risk. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to bald eagles, their habitats, and their prey base during project construction and operation. They would include adherence to the MBTA, Bald and Golden Eagle Protection Act, and guidelines such as APLIC standards for transmission lines (EEI et al. 2006).

Red Squirrel, Red-breasted Sapsucker, Hairy Woodpecker, and Brown Creeper
These species are associated with old-growth forest and extensive quality habitat is protected through the conservation system, particularly old-growth reserves and non-development LUDs. In the matrix, these species rely on legacy components (e.g., large diameter trees, snags) of the old-growth forest ecosystem for nesting and foraging. Harvests that could occur under all alternatives would result in the removal of nesting and foraging habitat (POG forest; see Tables 3.9-12, 3.9-13, and 3.9-14 in Appendix B). Red-breasted sapsuckers are most closely associated with low-volume old growth, whereas hairy woodpeckers and brown creepers are associated with high-volume and large-tree stands, respectively. Red squirrels are more versatile and will use young-growth stands as young as 40 years of age. Indirect effects to these species would be associated with fragmentation and the reduction in POG patch sizes. Fragmentation reduces the amount and effectiveness of interior old-growth forest habitat by creating habitat edges along which may increase rates of nest predation by avian predators (Kissling and Garton 2008). Harvest of young-growth stands would have minimal fragmentation-related effects to these species because old-growth interior forest conditions preferred by these species would not be affected. However, connectivity for red squirrels could be locally reduced because this species may use mature young-growth stands that are suitable for commercial harvest.

Legacy Forest Structure standards and guidelines which are intended to maintain old-growth structure in areas that are already highly developed, as well as areas that will experience increased harvest levels over the life of the Forest Plan would continue to be implemented under all alternatives. These components (large trees and snags) may provide nesting and foraging habitat for the red-squirrels, red-breasted sapsuckers, hairy woodpeckers, and brown creepers.

Energy, transportation, or other projects that may become permissible in new areas could affect red squirrels, red-breasted sapsuckers, hairy woodpeckers, and brown creepers during construction through direct disturbance or through removal or modification of habitats. During operation, the potential for collision with project structures is a risk. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to these species and their habitats during project construction and operation.

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 this subspecies are specifically provided for under the waterfowl standards and guidelines, which apply to specific sites, and a 100-foot buffer around lakes and streams. The beach, estuary, and riparian Forest-wide standards and guidelines provide additional protection to habitats used by Vancouver Canada geese. Harvest of young-growth within the beach and estuary fringe and RMAs under the Forest Plan could effect on this species. However, because of Forest Plan measures, effects on the Vancouver Canada goose should be minimal and would be similar under all alternatives.

Energy, transportation, or other projects that may become permissible in new areas could affect the Vancouver Canada goose during construction through direct disturbance or through removal or modification of habitats. During operation, collision with project structures is a risk. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to Vancouver Canada geese and their habitats during project construction and operation.

Other Species
Migratory Birds
Under all alternatives, harvest implemented under the Forest Plan would result in a reduction of perching, foraging, and potential nesting habitat and the increase in fragmentation associated with timber harvest and road building. After timber harvest, there would be a short-term increase in the habitat for species associated with early successional habitats and forest edges, which may result in short-term population growth for these species. However, extended local reductions in available habitat would be expected as forest succession progresses. Habitat removal would reduce the effectiveness of interior forest habitat, and increase the potential for nest predation and nest parasitism for some species, which can ultimately reduce reproductive success (Robinson et al. 1995). Migratory birds would be most susceptible to impacts from harvest activities occurring in suitable nesting habitat during the nesting/fledging period, which generally begins in mid-April and ends about mid-July, when young birds have fledged.

The migratory bird species most likely to be adversely affected by the harvest of POG forest under all of the alternatives are those that primarily nest in POG forests, including the Western screech-owl, rufous hummingbird, red-breasted sapsucker, Pacific-slope flycatcher, Steller's jay, northwestern crow, chestnut-backed chickadee, golden-crowned kinglet, varied thrush, Townsend's warbler,

blackpoll warbler, northern goshawk, and marbled murrelet. However, species associated with early successional or scrub habitats such as the MacGillivray's warbler, golden-crowned sparrow, and golden-crowned kinglet would benefit through increases in suitable habitat over the short- to mid-term from timber harvest. All migratory bird species would benefit from the transition to young-growth harvest continued under all alternatives due to the reduced long-term scheduling of POG harvest. Differences among alternatives would be very slight because of the fact that harvest levels would remain the same.

Under all alternatives, the Forest Plan Conservation Strategy would continue to provide for extensive areas in reserves of migratory bird habitat and distributed across the Forest. Legacy Forest Structure standards and guidelines that protect habitat features important for migratory birds on a stand level would be applied, as appropriate, under all alternatives.

Energy, transportation, or other projects that may become permissible in new areas could affect migratory during construction through direct disturbance or through removal or modification of nesting habitats. During operation, collision with project structures is a risk. These effects would be evaluated at the project-level. The Forest-wide standards and guidelines would minimize impacts to migratory birds and their habitats during project construction and operation.

Bats
All bat species known to occur in southeast Alaska are associated with mature forested habitats which provide roosting, breeding, and foraging sites, and bat activity appears rare in young-growth forest. Old-growth timber harvest would remove POG, thereby reducing the number of potential day-roosts available to tree-roosting bats and foraging habitat. Indirectly, timber harvest may also reduce the suitability of remaining roosting habitat through increased fragmentation (and decreased patch sizes) as day-roosts are more likely to be selected by some species (e.g., Keen's myotis and silver-haired bat) if they are located in stands with a higher number of trees in early to late decay stages (Boland et al. 2009).

Under all alternatives, harvest of POG that could occur under the Forest Plan would be expected to have some level of impact, but differences among alternatives would be very limited due to the uniform harvest level. It should be noted tree-roosting species may choose a large-diameter tree for roosting regardless of whether or not it is located in an area with past timber harvest (Boland et al. 2009). Habitat and landscape connectivity would be provided for these species by the Forest Plan conservation strategy.

Marbled Murrelets
Marbled murrelets nest in structurally complex old-growth forest stands (Piatt et al. 2007). As a result, timber harvesting and road construction within POG forest stands (especially high-volume POG) can remove nest trees or disturb nesting birds. Indirectly, timber harvest and road building increase fragmentation, reducing the effectiveness of interior forest habitat and creating habitat edges, which may result in increased rates of nest predation by avian predators. Under all alternatives, marbled murrelet nesting habitat would be protected by the Forest Plan conservation strategy.

The ongoing transition to young-growth harvest would benefit this species through the retention of a greater amount of POG forest on the landscape over the planning horizon. Moreover, many of young-growth trees harvested would be of insufficient size to be suitable for nesting. Additionally, harvest of young-growth stands that could occur under all alternatives would have minimal fragmentation-related effects to this species because old-growth interior forest conditions preferred by this species for nesting would not be affected.

Legacy Forest Structure standards and guidelines are intended to maintain old-growth structure in areas that are already highly developed, as well as areas that will experience increased harvest levels over the life of the Forest Plan. These components (large trees and snags) may provide nesting habitat for marbled murrelets. Differences in effects among the alternatives would be very slight because of the lack of differences in harvest volumes.

Energy, transportation, or other projects that may become permissible in new areas could affect marbled murrelets during construction through direct disturbance or through removal or modification of habitat. During operation, the potential for collision with project structures is a risk. The Forest-wide standards and guidelines would minimize impacts to marbled murrelets and their habitats during project construction and operation. Forest Plan standards and guidelines pertaining to marbled murrelets include maintaining a 600-foot radius no-cut buffer zone around identified murrelet nests; however, habitat protection is also provided through beach and esturary fringe and riparian standards and guidelines (USDA Forest Service 2016a), as well as the overall system of OGRs and other non-development LUDs.

Amphibians
Amphibians require both aquatic and terrestrial habitats in order to complete their life-cycle. Ponds, streams, and wetlands used by amphibians for breeding are protected by Forest Plan Riparian and Wetland standards and guidelines. However, increased sedimentation and the entry of contaminated run-off from roads resulting from timber harvest can reduce the quality of these habitats. Under all alternatives, standard best management practices (BMPs) for water quality would be implemented to minimize these effects (see the Fisheries section for additional discussion).

Timber harvest has the potential to result in the loss and/or degradation of terrestrial habitats through changes in microclimates, soil compaction, and leaf litter disturbance. Tree canopy removal increases solar radiation to the forest floor, resulting in changes in moisture and soil temperatures which can make terrestrial habitats unsuitable for amphibians. Thinning or uneven-aged harvest techniques may reduce these effects.

The effects of specific harvest treatments on amphibians is complex. Some amphibians in the aquatic stage may be affected positively by even-aged harvest techniques (clearcutting), whereas effects of these treatments on juvenile and adult terrestrial stages are mostly negative (Semlitsch et al. 2009). In addition, renewable energy, mining, and transportation projects could affect amphibians through direct disturbance or through removal or modification of habitats, particularly if activities affect water bodies. The Forest-wide standards and guidelines would minimize impacts to amphibians and their habitats during project construction and operation.

Endemism
By definition, endemic species occur in isolated populations and many have limited mobility or specific habitat requirements. Thus, they are vulnerable to the effects of habitat loss and fragmentation, introduced non-natives, pathogens and disease, natural events (i.e., climate change), and overharvesting (Dawson et al. 2007). Therefore, the ability to disperse and recolonize is an important factor in how endemic species are able to respond to environmental changes.

Under all alternatives, harvest and road construction/reconstruction implemented under the Forest Plan would affect endemic species through habitat loss (POG) and fragmentation (reduced patch size), and by altering the distribution of habitats across the landscape. This may inhibit the ability of individuals to move

between patches of suitable habitat, and therefore may further limit the distribution of a population or reduce genetic interchange between subpopulations. These effects would occur to a less extent in association with young-growth harvest as these stands provide lower quality habitat to most endemic species. Although timber harvest levels are the same among all alternatives, Alternatives 4, 5, and 6 would have the greatest potential for effects on endemics because of the degree of fragmentation is likely to be higher under these alternatives (landscape connectivity and fragmentation are discussed in detail in the *Biodiversity* section). Most endemic species would benefit from the transition to young-growth harvest continued under all alternatives due to the reduced amount of scheduled POG harvest over the long term.

Prince of Wales Flying Squirrel

A thorough analysis of this species occurred during the 1997, 2008 and 2016 Forest Plan efforts and results documented that the conservation strategy was functioning adequately to maintain the viability of this species in the planning area (USDA Forest Service 1997b, Appendix N; 2008b, Appendix D; 2016b). Prince of Wales flying squirrels are closely associated with old-growth structural characteristics and are limited by their dispersal capabilities. This subspecies has a limited gliding range (approximately 250 feet), a distance substantially less than the average clearcut width (Flaherty et al. 2008). Fragmentation resulting from old-growth timber harvest has the potential to reduce the value of residual patches of old growth in the matrix if they become isolated from adjacent patches either by distance or habitat type (young growth). Under all alternatives, old-growth timber harvest implemented under the Forest Plan could reduce the quality and quantity of flying squirrel nesting, foraging, and denning habitat. However, the Forest Plan Conservation Strategy would continue to maintain suitable old-growth habitat and provide landscape connectivity for flying squirrels.

Young-growth management (particularly commercial thinning) could benefit flying squirrels over the short-term by increasing canopy height and creating more open space in the midstory - conditions which facilitate efficient gliding (Scheibe et al. 2006). Over the long-term, commercial thinning would promote stand development toward conditions capable of supporting breeding flying squirrels and improve the functional connectivity between old-growth reserves (Smith et al. 2011).

Prince of Wales Spruce Grouse

Prince of Wales spruce grouse are associated with muskegs, high-volume POG, and mixed conifer (scrub) habitats but will also use young-growth forest (15-30 years following timber harvest) with a well-developed middle story. Because they are associated with microhabitats within POG forests, old-growth timber harvest would alter habitat availability for this species, though effects would change over time. Harvest of old-growth timber under all alternatives would have a short-term benefit to grouse due to increased forage availability, followed by an extended period in which habitat conditions in harvested units would not be suitable. Young-growth harvest would provide similar short-term benefits to this species in the years following stand treatments. However, even-aged harvest of both old-growth and young-growth forest would initially (i.e., within the first 5 years after harvest) result in habitat patches unsuitable for spruce grouse, which may result in local impediments to movement. Due to their generally sedentary nature and preference for walking rather than flying, fragmentation due to even-aged timber harvest can result in the isolation of local spruce grouse populations (i.e., if open areas are too large or forested patches are spread too far apart to enable spruce grouse to move between them). However, thinning and group selection treatments can promote the

development of structural and horizontal diversity beneficial to grouse (Russell 1999).

Increased road densities associated with timber harvest could also adversely affect spruce grouse by increasing hunter access (USFWS 2010). None of the alternatives would result in significant increases in average WAA road densities and therefore would not be expected to result in significantly increased harvest risk at the forest level. Localized increases in road densities would be managed through road closures and storage or decommissioning which would likely minimize the potential for increased harvest risk for spruce grouse over the long term.

Overall effects of the alternatives would be very similar due to the constant level of harvest among them. The Forest Plan Conservation Strategy would continue to provide suitable habitat and landscape connectivity for spruce grouse.

Cumulative Effects

Activities that occur on other land ownerships within and adjacent to the Tongass have the potential to affect the overall context within which effects to wildlife are considered. Appendix A provides a full list of all the activities considered in the cumulative effects analysis. Such reasonably foreseeable activities include, but are not limited to, timber harvest, community development, mining, recreation and tourism, and road construction. Typically, these activities have the potential to negatively impact wildlife populations through habitat conversion, fragmentation, and disturbance associated with road building, though some activities can have short-term or long-term beneficial impacts, depending on the species. Prediction of the future extent and intensity of such activities has a high degree of uncertainty associated with it on a Forest-wide basis over a broad time scale. The 2016 Forest Plan FEIS also summarizes a review of the overall wildlife viability analysis (see USDA Forest Service 2016b, cumulative effects discussion in *Wildlife* section).

Many private lands in Southeast Alaska are already highly developed in terms of roading and timber harvest and are likely to experience a continuing decline in old-growth forest in the future. Therefore, the cumulative long-term trend within the Forest boundary under all alternatives is likely to be a decline in optimum habitat for most old-growth associated species, with non-NFS land contributing to this trend. Additionally, land exchanges and conveyances (e.g., Mental Health Trust) have the potential to remove some lands from protection under the Conservation Strategy. The Forest Service would continue to evaluate opportunities to compensate for these losses by evaluating additional OGR modifications when these land exchanges or conveyances are implemented.

The transition to young-growth harvest on the Tongass would benefit wildlife species by reducing the overall amount of POG forest harvested over the planning horizon. Activities such as pre-commercial and commercial thinning would have both short-term (increased forage availability) and long-term (promotion of the development of old-growth forest stand characteristics) benefits to wildlife species that use POG forests on the Tongass.

When combined with other management activities occurring on non-NFS lands, implementation of the Forest Plan under any Alaska Roadless Rule alternative would produce additional impacts (noted above) associated with continued old-growth harvest to species for which this forest type is optimal habitat, such as goshawks, marten, mountain goats, red squirrel, red-breasted sapsucker, hairy woodpecker, brown creeper, marbled murrelets, and bat species. However, these declines in habitat (and associated effects such as fragmentation) would be lessened to some extent through the transition to young-growth harvest on NFS lands.

Approximately 875,700 acres of POG have been harvested across the Tongass, including both NFS lands and non-NFS lands, resulting in a reduction to 86, 79, and 68 percent of the original total, high-volume, and large-tree POG in Southeast Alaska, respectively (see Tables 3.9-16, 3.9-17, and 3.9-18 in Appendix B). Approximately 83 percent of the original POG would remain on the Tongass after full implementation of the 2016 Forest Plan (Alternative 1) and future non-NFS harvest in 100+ years. Future representation of high-volume POG and large-tree POG would be expected to be approximately 76 and 63 percent of the original amount, respectively, after 100+ years under the 2016 Forest Plan. The action alternatives would result in the same long-term estimates because harvest levels would be the same as Alternative 1.

Harvest associated with all alternatives would contribute to the cumulative reduction in POG and associated increase in fragmentation and loss of connectivity, which has the potential to reduce biodiversity. Timber harvest on NFS lands, as well as on non-NFS lands would result in similar effects; however, would not contribute above what was analyzed in the current Forest Plan. Collectively, the implementation of the Forest Plan under all of the alternatives in combination with ongoing and foreseeable projects would increase the number of smaller patches on the landscape, reducing the amount of interior forest and increasing the occurrence of forest edge habitat. Edge effects such as shifts in species composition may reduce natural biodiversity over time by favoring some species over others; however, effects would be lessened by the transition to predominantly young-growth harvest, which would reduce the long-term cumulative effects to old-growth ecosystem biodiversity by reducing the total amount of POG harvest and associated fragmentation. Note that the actual amount of harvest that has occurred to date on the Tongass is far less than that projected under all previous Forest Plan EISs and would likely continue to be less under all of the alternatives (see *Timber* section of this EIS for additional discussion).

Cumulative effects to modeled deer habitat capability would maintain 78 percent of the original level in 25 years and at 100 years. WAAs with the greatest impacts under the alternatives are located in GMU 2 (Prince of Wales and surrounding island) where concentrated past timber harvest has occurred. The USFWS Alexander Archipelago wolf species status assessment concluded that assuming continuation of current land use trends, the GMU 2 wolf population is anticipated to decline by another roughly 8 to 14 percent of current levels over the next 30 years (USFWS 2015). Although this could result in gaps in wolf distribution within GMU 2, given that it comprises just 6 percent of the population range wide, impacts to the overall distribution in Southeast Alaska or to species viability are not expected (USFWS 2015). The Forest Service will continue to coordinate with ADF&G and the Wolf Technical Committee to address future issues, especially within GMU 2.

Overall, biodiversity on the Tongass and in Southeast Alaska remains in good condition and the landscape continues to be dominated by old-growth forest ecosystems. As development continues through timber harvest and associated activities such as road building, and community expansion, particularly in areas where extensive development has already occurred (e.g., Prince of Wales Island), maintaining connectivity and roadless refugia will become increasingly important, particularly for wide-ranging species whose distribution depends on some level of connectivity across the landscape. In addition, the management of human resources will continue to play a role in maintaining biodiversity across the Tongass. Within the Tongass National Forest boundary, the Conservation Strategy was designed to address the more extensive harvest on non-NFS lands through the old-growth reserve system and Forest-wide standards and

guidelines, both of which were intended to maintain ecological components needed to maintain the ecological integrity important to a variety of organisms and maintain connectivity across the landscape, with or without much contribution from non-NFS lands. Note that the system of OGRs and overall Conservation Strategy approach was developed prior to roadless and would be maintained regardless of the alternative selected.

There are portions of the Tongass where cumulative effects become more important due to the level of past harvest that has occurred. Specifically, the North Central Prince of Wales and Kupreanof/Mitkof Islands biogeographic provinces have experienced some of the highest reductions in original (1954) POG forest on the Tongass and are also where much of the young-growth suitable for commercial timber production is located. Additional timber harvest, particularly when located adjacent to previously harvested areas, has a greater potential to result in localized reductions in landscape connectivity and gaps in species distributions in these more heavily harvested areas compared to portions of the Tongass that have less cumulative past timber harvest. These cumulative effects would be most likely to occur for species with very limited ranges (endemic species limited to individual islands or island groups, e.g., Prince of Wales flying squirrel, Prince of Wales spruce grouse) or with limited dispersal capabilities or capabilities that are dependent on certain mature forest structural characteristics (e.g., goshawks, amphibians, flying squirrels, spruce grouse).

Species with limited dispersal capabilities (i.e., flying squirrels and spruce grouse, which are also endemic species) are likely to be more sensitive to habitat loss and fragmentation than species with greater dispersal capabilities (i.e., goshawks, wolves, and brown bears; D'eon et al. 2002). Natural fragmentation of habitats can also affect the level of additional fragmentation that can be supported. The Forest Plan Conservation Strategy would continue to provide for extensive areas in reserves distributed across the Forest. The Legacy Forest Structure and other standards and guidelines that retain POG forest in harvested areas (e.g., beach and estuary fringe, RMAs, and Scenic Integrity Objectives) would also ensure the maintenance of a functional and interconnected old-growth ecosystem on the Tongass. These features are important for species associated with shoreline and riparian habitats such as river otters, black bears, brown bears, bald eagles, and Vancouver Canada geese. These measures, particularly when implemented in areas that have experienced concentrated past harvest increase the likelihood that the landscapes will continue to provide the full range of matrix functions that support viable and well-distributed populations of wildlife species.

Under all alternatives, activities implemented under the Forest Plan would result in vessel traffic and marine activity associated with LTF use and log transport, which would occur irregularly over the life of the Forest Plan (in association with individual old-growth and young-growth timber harvest projects as they are proposed). Therefore all of the alternatives would make a minor contribution to the existing potential for oil or fuel spills associated with existing vessel activity and bark accumulations near the LTFs to which marine and shoreline-associated species such as black oystercatchers, Aleutian terns, short-tailed albatrosses, humpback whales, and Steller's sea lions would be exposed. However, levels of marine activity are expected to remain within levels anticipated for the current Forest Plan (Alternative 1) under all of the action alternatives. Furthermore, all activities at the project level would be conducted in accordance with Alaska Water Quality Standards under Section 401 of the Clean Water Act for LTFs. These standards place restrictions on the types, quantities, and extent of discharges (including bark) to the marine environment and would limit the effects of the project on water quality. Therefore, very minor contributions to cumulative

effects in the marine environment are anticipated under all of the alternatives and these would be the same among the alternatives.

Climate change may also contribute to cumulative effects. Warmer temperatures and increased precipitation are anticipated to result in changes to vegetation and thus, the suitability of wildlife habitat, among other impacts (Haufler et al. 2010, Shanley et al. 2015; see *Climate* section). Although many species may benefit (e.g., greater overwinter survival of deer, and thus a greater prey base for wolves, resulting from warmer winter temperatures during normal years), habitat changes resulting from a longer growing season, wind, fires, insect infestations, and disease would have variable effects on others. The greatest concerns for wildlife populations in relation to climate change, however, are the weather extremes that can be expected to occur periodically (Haufler et al. 2010). Periodic severe winter snowfalls, which may seem counterintuitive given the general warming trend, are anticipated (SNAP 2013). These stochastic events would be of greatest concern for populations that are limited in number or distribution. The Forest Plan Conservation Strategy was designed to maintain a resilient old-growth forest ecosystem in the face of this uncertainty. The potential for contributions to climate change from continued old-growth timber harvest on the Tongass, which could indirectly affect wildlife species such as the Kittlitz's murrelet, is described in detail in the *Climate* section.

3 Environment and Effects

Fish

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Affected Environment

The important fish and aquatic habitat details of the Tongass National Forest were provided in the recently developed 2016 Forest Plan FEIS (USDA Forest Service 2016b). This section relies extensively on that information to characterize the current affected environment and refers the reader to that document for further details. The abundant aquatic systems of the Tongass provide spawning and rearing habitats for most 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.

Several watersheds and Value Comparison Units (VCUs) in the Tongass have been evaluated for relative importance for several metrics relating to fish and wildlife. Included among these are conservation priority areas identified by The Nature Conservancy (TNC) and Audubon Alaska (Audubon Alaska and The Nature Conservancy 2007), and the "Tongass 77" (T77)[1] watersheds identified by Trout Unlimited. Audubon Alaska and TNC identified conservation priority watersheds that include high-value intact watersheds in primarily intact conditions and generally encompass the highest current ecological values within each province; these areas were recommended to be managed for intact ecological values and habitat productivity.

About 46,000 stream miles and 213,000 acres of lakes and ponds are present on Tongass National Forest lands. Of these, approximately 14,900 stream miles and 3,300 lakes and ponds are mapped as anadromous or high-value resident fish habitat. Another 9,500 stream miles and 1,000 lakes and ponds are mapped as resident fish habitat. Many estuarine and marine, fish and shellfish resources are affected by actions on the Tongass that affect marine shorelines and stream runoff (USDA Forest Service 2016b).

[1] The Tongass 77 (T77) refers to VCUs, which approximate major watersheds located on National Forest System lands that Trout Unlimited, Alaska Program, identified as priority salmon watersheds. Four watersheds were removed from the T77 in 2014 as a result of the Sealaska Land Entitlement Finalization in the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291).

Subsistence, commercial, and sport fisheries are all important to the way of life for Southeast Alaskan residents and some forms occur in both marine and freshwater systems (USDA Forest Service 2016b). Major species include all five salmon species [pink salmon (*Oncorhynchus gorbuscha*), chum salmon *(O. keta*), coho salmon *(O. kisutch*), Chinook salmon *(O. tshawytscha*), and sockeye salmon *(O.nerka*)] for all activities, while various primarily trout species [e.g., rainbow trout/steelhead (O. *mykiss)* and cutthroat trout *(O. clarki*), Dolly Varden char *(Salvelinus malma*)] are important for sport, commercial, and subsistence fishing, while a variety of other marine species are also of importance. Hatcheries, and the enhancement of wild fish, among other aquaculture projects, contribute to resource availability and abundance.

Details of quantity and changes in harvest of salmon species in Southeast Alaska are provided in the 2016 Forest Plan FEIS (USDA Forest Service 2016b) and are summarized here. Commercial fish harvest in the waters of Southeast Alaska (includes Yakutat area harvest) can fluctuate widely from year to year but has remained typically in the tens of millions of fish for all five species. The annual average has ranged from a low of about 6 million in 1975 to a high of 112 million in 2013. Pink salmon make up the bulk of the harvest, averaging 76 percent since 1962.

Fish production from the Tongass is a primary source of fish for commercial, sport, and subsistence harvest. Based on the estimated portions of each species originating from the Tongass National Forest, about 80 percent of the total harvested fish began their life in streams and lakes within the Forest boundaries. The estimated annual average commercial salmon harvest (1984 to 2013) produced from streams originating in the Tongass National Forest was over 176 million pounds, with a wholesale value (ex-vessel value) over $93 million (adjusted to 2013 dollars). Approximately 85 percent of Southeast Alaska's sport fishing occurs in the vicinity of the Tongass National Forest. Sport fishing for salmon has been substantial over the last two decades (averaging over 400,000 fish per year (USDA Forest Service 2016b). Hatchery production has also contributed substantially in overall fish production regionally. Hatchery production statewide has greatly increased since 1977 with releases of more than 1 billion fish occurring annually since 1988, peaking in 2012 with about 1.7 billion juvenile fish released statewide (Vercessi 2014). State subsistence and personal use salmon fisheries averaged 50,000 fish from 2004 to 2013 for Southeast Alaska and Yakutat, down from an average of 61,000 fish in the 10 years prior (1994–2003).

Fish Habitat

Important Components of Fish Habitat

With more than 46,600 miles of streams and 212,000 acres of ponds and lakes, the Forest provides abundant fish habitat. Generally, salmon and trout require cool stream temperature to thrive in streams with stream temperature affecting fish rearing, migration and spawning success (Bjornn and Reiser 1991). The relative composition of stream substrate and sediment affects many factors in stream production, including spawning areas and spawning success for salmon and trout, and benthic organism composition and abundance, an important food resource for fish.

The amount of coarse sediment affects available spawning habitat and influences pool filling and bank stability (Spence et al. 1996). High levels of fines affect pool filling and survival of eggs and fry in spawning nests of salmon and (Chapman and McLeod 1987; Chapman 1988; Iwamoto et al. 1978; Gregory and Bisson 1997; McNeil 1964). Increased fines in streams also reduce interstitial spaces in large substrate that are important habitat for many common cool water mountain stream aquatic insects.

Large woody debris (LWD) is an important component of good trout and salmon habitat, especially in heavily wooded regions (Swanson et al. 1976; Bisson et al. 1987; Naiman et al. 1992; Beechie and Sibley 1997; Spence et al. 1996; Murphy et al. 1986), that provides channel complexity and cover, and is especially important in the formation of pools (Bisson et al. 1987; Sullivan et al. 1987; Benda et al. 2003). The primary timber-related actions that may affect LWD supply to streams include buffer width along streams, stream class and channel characteristics that buffers are placed on, size of trees remaining in the buffer area, and effects on windthrow from adjacent harvest. Additional information on LWD in Tongass streams and timber harvest practices of the past is presented in the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

Fish passage and access to suitable habitat in streams and lakes is critical to fish stocks. Natural falls and barriers in systems have been found in some areas to prevent the use of suitable fish habitat, especially for anadromous stocks in some natural systems. Man-made barriers in the form of dams, diversion, and road-crossing structures have been common partial or complete barriers to fish movement in much of the developed areas where fish are present. Road crossings (e.g., culverts) over much of the range of salmonids in the Pacific Northwest have often reduced or eliminated access to substantial portions of habitat to migratory fish use.

Effects of Past Forest Management Practices

Effects of past timber harvest practices on fish populations and habitat in the Tongass were addressed in the 2016 Forest Plan FEIS (USDA Forest Service 2016b). Older forest practices (mostly prior to 1980) in the Tongass National Forest have had adverse effects to anadromous fish habitat conditions, including spawning and rearing habitat, and migration conditions (Murphy and Milner 1997). Timber harvest during this timeframe accounts for about 60 percent of all timber harvest on the Forest. Generally, studies found that older harvested watersheds (mostly prior to 1980), which generally included clearcutting of riparian trees, had mostly lower fish production (Stillwater Sciences 2012). Modern forest practices under the Forest Plan are intended to prevent the habitat degradation in riparian areas and headwater streams that have contributed to adverse effects on fish and habitat. Monitoring of stream habitat, fish, and riparian conditions has not found marked problems with water quality, fish resources, or habitat with the implementation of current forest practices (USDA Forest Service 2004, 2007, 2014, 2015c). The results of the latest monitoring report, while indicating that some issues need further monitoring and analysis to fully assess effects, have not resulted in any recommendations to change the current standards and guidelines of the Forest Plan (USDA Forest Service 2015c).

Fish Habitat Enhancement and Restoration

Recent enhancements have included varied activities such as fishways, falls improvements, and lake and stream stocking, while restorations have been primarily culvert removal or repair and LWD management. Other watershed improvement activities include riparian and upland vegetation improvement, road storage and decommissioning, and improved road drainage structures to reduce sediment entry to streams and improve fish passage.

Special Status Species

Fish Management Indicator Species

National Forest Management Act of 1976 (NFMA) 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. For the 1997 Forest Plan, pink salmon, coho salmon, Dolly Varden char, and cutthroat trout were selected as MIS. Pink salmon were selected to represent anadromous fish that 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 ubiquitous 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, and their habitats, are described in the 1997 Forest Plan Revision FEIS (USDA Forest Service 1997a).

Sensitive Fish 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 (NFS) lands within the region. The goal of the Forest Service Sensitive Species Program (Forest Service Manual 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 NFS lands.

The Alaska Region Sensitive Species List was updated in 2009 (USDA Forest Service 2009b). There currently are no fish species designated as sensitive species in the Alaska Region.

Threatened and Endangered Fish Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), under authority of the Endangered Species Act of 1973 (ESA), as amended. An endangered species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

No federally listed fish species or stocks originate from Alaska streams. However, some federally listed fish stocks may occur in marine waters within the boundary of the Tongass National Forest (NMFS 2015a). These fish include the following:

Endangered species:

- Snake River sockeye salmon
- Upper Columbia River spring-run Chinook salmon

Threatened species:

- Upper Columbia River steelhead
- Snake River spring/summer Chinook salmon
- Snake River fall Chinook salmon
- Puget Sound Chinook salmon
- Lower Columbia River Chinook salmon
- Upper Willamette River Chinook salmon
- Hood Canal summer chum salmon
- Lower Columbia River coho salmon

- Snake River Basin steelhead
- Lower Columbia River steelhead
- Upper Willamette River steelhead
- Middle Columbia River steelhead
- Green Sturgeon (*Acipenser medirostris*) – Southern distinct population segment (DPS)

These listed stocks of salmon and steelhead do not spawn in Alaska but are known to seasonally inhabit marine waters on the outside coast to the west and occasionally in inside waters of the Tongass National Forest (McNeil and Himsworth 1980; Trudel et al. 2004; Trudel et al. 2009; Burgner 1991; Haggerty 2009; Groot and Margolis 1991; Tucker et al. 2011). They may feed on fish that are dependent on coastal marine waters of the Tongass National Forest at some stages of their lives. The southern DPS of the green sturgeon is an anadromous species that spawns in the Sacramento River in California (NMFS 2015b). Green sturgeon also do not rear or spawn in fresh waters of Southeast Alaska but have been rarely found to be present in marine waters of Southeast Alaska and may feed on benthic organisms found in these waters, likely in waters less than 100 meters deep (Lindley et al. 2008; Huff 2012; Colway and Stevenson 2007). Green sturgeon could be present in the inside waters of Southeast Alaska, particularly during the winter.

Pursuant to Section 7 of the ESA, a biological assessment (BA) was prepared to assess the effects of the 2016 Forest Plan Amendment on the above listed threatened and endangered species. The BA was submitted to NMFS for review and concurrence. The NMFS agreed with the Forest Service's assessment of effects to listed fish, as indicated in their concurrence letter of October 18, 2016.

Environmental Consequences

Indirect Effects

The current standards and guidelines in the 2016 Forest Plan were developed substantially through work that was done initially by the Anadromous Fisheries Habitat Assessment (AFHA) (USDA Forest Service 1995). Follow-up work in the Tongass after 1995 and other studies have contributed to modifications of these standards and guidelines in the 1997, 2008, and 2016 Forest Plans. Monitoring in the Tongass has helped confirm that the actions taken under the standards and guidelines have protected fisheries resources in the Tongass. The Alaska Roadless Rule alternatives will be evaluated on how these alternative associated actions would affect fish resources relative to implementation of the 2016 Forest Plan under the 2001 Roadless Rule (Alternative 1).

Fish Habitat

Roads pose the greatest risk to fish resources on the Tongass (Dunlap 1996), partly because they pose the largest risk of management-caused sediment input to streams (Reid and Dunne 1984; Furniss et al. 1991; Gomi et al. 2005; Hassan et al. 2005). Road construction, road drainage, level of road use, number of road stream crossings, watershed road density, and related actions in forested areas may all influence the amount of sediment to streams (Gomi et al. 2005; Furniss et al. 1991; Swanson et al. 1987; Chamberlin et al. 1991; Reid and Dunne 1984). Road effects to aquatic systems and fish are likely to vary little among the alternatives.

Roads

Roads have been found to contribute more sediment to streams than any other land management activity (Gucinski et al. 2001). Roads can contribute towards increases in peak flow to streams (Grant et al. 2008) that can result in stream

channel erosion and bed scour (Tonina et al. 2008), affecting stream bed and bank stability, and adverse effects on fisheries resources. Roads can also potentially create areas of hillslope instability resulting in landslide generation, contribute fine sediment from surface erosion, and alter surface and subsurface water flow patterns. Long-term sediment introduction from roads is influenced by the type of structure at the road–stream crossing, proximity of the drainage structures to streams, road slope, age, maintenance condition, time since last graded, seasonal timing of maintenance activities, amount of traffic, rock quality, weather, hillslope length, soil depth, and cutbank depth (Croke and Hairsine. 2006; Wemple and Jones 2003; Kahklen and Hartsog 1999; Reid and Dunne 1984). Although standards and guidelines are in place to help moderate these effects, some adverse effects, or increase in risk of adverse effects, would occur with these road parameters.

New road construction would be similar under all alternatives because roads on the Tongass are largely developed in support of timber harvesting, and the projected timber sale quantity (PTSQ) under the 2016 Forest Plan does not vary between the alternatives. Existing conditions in 2016 included about 5,100 miles of road on NFS lands (from the 2016 Forest Plan FEIS, see Table 3.4-6 in Appendix B of this EIS). The projection over the next hundred years was modeled to include an additional 1,000 miles of new roads, totaling about 6,100 miles of new roads over 100 years. This would be an increase of nearly 20 percent over existing conditions in 2016. In addition to new roads, roads would be constructed over decommissioned roadbeds or reconstructed. Reconstruction involves the rehabilitation of the original roadbed, and can include cleaning ditches, replacing drainage structures, re-installing bridges, and grading and shaping. By the same rationale, the estimated 500 miles of roads constructed over decommissioned roadbeds and 1,100 miles of road reconstruction over 100 years for the No Action alternative would be similar among all alternatives (from the 2016 Forest Plan FEIS, see Appendix B, Table 3.4-6).

Alternatives 1 and 2 would have the about the same amount of road miles as indicated in the current Forest Plan evaluation, with Alternative 3 a slight increase over 1 and 2, and Alternatives 4, 5 and 6 similar with slightly more road miles than Alternative 3 (see *Transportation* section). Overall, the potential effects to fish from road construction, reconstruction, and maintenance under projects that could be approved in the future would be similar and would be evaluated at the project-scale.

Fish Passage

Roads may also increase risk to fish movement due to improper construction affecting fish passage (Gibson et al. 2005) and blocked culverts. Stream-rearing fish, particularly cutthroat trout and Dolly Varden, which occupy the smaller headwater streams during some parts of their lives, are at the greatest risk. Fish passage guidelines (Forest Service Handbook 2090.21 Aquatic Habitat Management Handbook [USDA Forest Service 2001]) for culvert design greatly reduces the risk of new culvert installation impeding fish passage, but some risks remain.

As discussed above, road construction would be similar under all alternatives; thus, the number road crossings that could impede fish passage would also be similar. While the alternatives with the most potentially harvestable acreage (Alternatives 4 through 6) would appear to have the largest potential for increase in stream crossings, the lack of increase in actual predicted harvest would greatly limit additional construction of new roads, and respective increase in stream crossings, relative to implementation of the current Forest Plan under the 2001 Roadless Rule. Therefore, the total change in stream crossings, including fish

streams, with their associated impacts to fish and their habitat, is unlikely to vary substantially among the alternatives.

Timber Harvest
Timber harvest activities can increase risk to fish resources. Protection of riparian areas, including floodplains, areas of riparian vegetation, and certain wetlands associated with riparian systems, is of concern. Riparian vegetation serves many important functions for stream fish habitat, including supplying LWD, food input, and stream shade to name a few. The 2016 Forest Plan standards and guidelines associated with riparian areas, wetlands, and beach and estuary fringe are expected to protect fish resources from significant impacts associated with timber harvest, but there is still some level of risk.

All alternatives would have the same PTSQ as the current Forest Plan. Timber harvest activities projected under the current plan could potentially affect over 320,000 acres after full implementation of the Forest Plan over 100 years. The acres of harvest would not be substantially different from the current plan or among the alternatives. Therefore, effects on fish and fish habitat would be similar among the alternatives.

The Tongass 77 Watersheds and TNC/Audubon Conservation Priority Areas
The 2016 Forest Plan prohibits old-growth timber harvest in T77 Watersheds and TNC/Audubon Conservation Priority Areas, and this carries through for all Roadless Rule alternatives. Within Alaska Roadless Areas (AKRAs), harvests would generally be prohibited in watershed, Land Use Designation (LUD) II, and roadless priority AKRAs, with exceptions. The exceptions for timber tree cutting and harvest are presented in Chapter 2 (Table 2-1). However, there would be no prohibition on young-growth harvests within the timber priority AKRA (Alternative 4). Under Alternative 4, young-growth harvest could occur within timber priority AKRAs if other suitability requirements were met (such as occurring within a development LUD).

While the size and location of future harvests are unknown, Table 3.3c-1 presents the acres of suitable young growth and estimated harvest over 100 years within T77 Watersheds and TNC/Audubon Conservation Priority Areas.

Table 3.3c-1
Acres of Suitable Young Growth and Estimate Harvest within Tongass 77 Watersheds and TNC/Audubon Conservation Priority Areas

	Alternative					
Harvest Type	**1**	**2**	**3**	**4**[2]	**5**	**6**
Suitable YG	55,326	57,684	57,927	58,504	60,944	59,647
Increase in Suitable YG Relative to Alt. 1	0	2,358	2,601	3,178	5,618	4,321
Estimated YG Harvest	47,060	47,599	47,592	47,681	48,923	48,332
Increase in YG Harvest over 100 years	0	540	532	621	1,863	1,273

[1] Estimated harvest acres are derived by taking the total 100-yr harvest for young growth (YG), derived from Forest Plan modeling in 2016, and distributing it evenly across all suitable young growth for each alternative.
[2] Includes timber priority areas within Alternative 4 AKRAs.

Suitable young growth in T77 watersheds and TNC/Audubon Conservation Priority Areas would not increase much between the alternatives, with increases ranging from about 2,400 acres (4 percent) under Alternative 2 and about 5,600 acres (10 percent), as shown in Table 3.3-1c. Increases in estimated harvest

over 100 years ranges between 500 to 600 acres (1 to 1.5 percent) under Alternatives 2 through 4 and about 1,800 acres under Alternative 5.

All action alternatives would allow young-growth harvest in T77 watersheds and TNC/Audubon Conservation Priority Areas. Relative changes from current plans for all alternatives are slight and spread over a 100-year period resulting in no substantial change or differences among alternatives to fish resources. Further, the Record of Decision on the 2016 Forest Plan calls for a 5-year internal scientific review in collaboration with stakeholders to assess impacts resulting from young-growth harvest in these high-value areas.

Alternative Summary
While more suitable harvest acres would be open among the action alternatives than are currently available, none of the alternatives propose to increase harvest over the existing Forest Plan. While some of the metrics that have potential to cause adverse effect to fish and their habitat (e.g. road miles, road crossing of streams, total harvest acres) may slightly increase, their quantity is not expected to change substantially among any of the alternatives. Additionally, while there are minor differences among the alternatives, the overall risk to fish resources and watersheds is unlikely to be large or differ from current Forest Plan projected conditions. None of the alternatives would change Forest Plan standards and guidelines developed to protect fish and their habitat. Any potential site-specific effects will be addressed under separate site specific NEPA analysis, as this assessment will not authorize any site-specific actions.

Alternative 1: This alternative would have the lowest potential harvestable acres, the lowest number of new and rebuilt roads constructed, and likely the lowest number of new and reconstructed stream crossings of any alternative. However, these numbers are not substantially different than the other alternatives. All stream crossings increase risks to fish passage, and new crossings have a greater risk of sediment effects. Given that the expected number of new and reconstructed stream crossings under this alternative would be similar to other alternatives, there would be an overall similar risk of sediment addition and passage issues to other alternatives.

Alternative 2: The opening of roaded roadless areas would allow access to more acres of second-growth forest areas than under current conditions in areas that already have roaded systems. However, there would not be a substantial difference in harvest volume, road building or road reconstruction compared to Alternative 1. While young-growth harvest could potentially increase in key TNC/Audubon Conservation Priority Areas and T77 watersheds in formerly roaded roadless areas, the amount of overall potential harvest area added would not be substantial. Overall, the risk of adverse effects to fish or their habitat relative through future actions would be similar to that under the current Forest Plan (Alternative 1). Compared to the action alternatives, Alternative 2 would be more protective to fish resources within T77 watersheds and TNC/Audubon Conservation Priority Areas because it is the most restrictive on tree cutting and road building by assigning the watershed priority to nearly all of these lands within AKRAs.

Alternative 3: This alternative would open more areas to harvest and slightly increase road miles compared to Alternatives 1 and 2. The number of new road miles and road crossings would increase slightly (see *Transportation* section) relative to Alternatives 1 and 2 but overall harvest would not. While different areas may have harvest occurring and some additional roads may be constructed compared to the current Forest Plan, the change would be minor,

and effects would be similar for fish, fish habitat, and watershed conditions as under Alternative 1.

Alternative 3 would be less protective to fish resources within T77 watersheds and TNC/Audubon Conservation Priority Areas than Alternative 2 because it is moderately restrictive on tree cutting and road building in these areas, assigning the roadless priority to these lands within AKRAs.

Alternative 4: This alternative has the potential to add more roads in roadless areas beyond roaded roadless logical extensions into old-growth areas and has a slight increase in overall new road miles constructed than Alternative 3 but similar to Alternatives 5 and 6. While a potential slight increase in roads and potential harvest areas with associated effects to streams could occur, with the current project harvest remaining unchanged, harvest and road building in these areas would only occur, with minor exceptions, with an associated reduction in roads and harvest in other areas. Thus, there would be similar effects to fish and their habitat, though possibly in different areas, as under Alternative 1.

Alternative 4 would be less protective to fish resources within T77 watersheds and TNC/Audubon Conservation Priority Areas than Alternatives 2 and 3 because it is not restrictive on tree cutting and road building in these areas, assigning the timber priority to these lands within AKRAs. Forest Plan requirements would still apply, including the prohibition on old-growth harvests within these areas. However, there would still only be a slight potential increase in roads and essentially no change in harvest amount, so effects to fish and their habitat would be nearly identical to current plan conditions over the Tongass.

Alternative 5: This alternative drops all designations of roadless areas on the Tongass. This alternative has the potential to add more roads in currently roadless areas beyond the roaded roadless and logical extensions into old-growth areas accessible and has a slight increase in overall new road miles compared to Alternative 3 but similar to Alternatives 4 and 6. While a potential slight increase in roads and potential harvest areas with associated effects to streams could occur, with the current project harvest remaining unchanged, harvest and road building in these areas would only occur, with minor exceptions, with an associated reduction in roads and harvest in other areas. Thus, there would be similar effects to fish and their habitat, though possibly in different areas, as under Alternative 1.

Like Alternative 4, Alternative 5 would be less protective to fish resources within T77 watersheds and TNC/Audubon Conservation Priority Areas than Alternatives 2 and 3 because it is not restrictive on tree cutting and road building in these areas, removing all roadless protections. Forest Plan requirements would still apply, including the prohibition on old-growth harvests within these areas. However, there would still only be a slight potential increase in roads and essentially no change in harvest amount, so effects to fish and their habitat would be nearly identical to current plan conditions over the Tongass.

Alternative 6: This alternative drops all roadless rule designation and related restrictions in development. This alternative has the potential to add more roads in currently roadless areas beyond the roaded roadless and logical extensions into old-growth areas accessible and has a slight increase in overall new road miles compared to Alternative 3 but similar to Alternatives 4 and 5. While a potential slight increase in roads and potential harvest areas with associated effects to streams could occur, with the current project harvest remaining unchanged, harvest and road building in these areas would only occur, with minor exceptions, with an associated reduction in roads and harvest in other

areas. Thus, there would be similar effects to fish and their habitat, though possibly in different areas, as under Alternative 1.

Alternative 6 would be less protective to fish resources within T77 Watersheds and TNC/Audubon Conservation Priority Areas than Alternative 2 because it is moderately restrictive on tree cutting and road building in these areas, assigning the LUD II priority to about 130,000 acres and the roadless priority to about 2 million acres of these lands within AKRAs.

Special Status Species Assessments

Threatened and Endangered Species

Informal programmatic consultation on the Tongass Forest Plan Amendment under Section 7 of the ESA, as amended, was completed with the NMFS for the 2016 Forest Plan FEIS. The NMFS reviewed the BAs for threatened and endangered species under their regulatory jurisdiction. Resulting consultation with NMFS concluded that the 2016 Tongass Forest Plan Amendment was “not likely to adversely affect” threatened or endangered species occurring on the Tongass for the 2016 Forest Plan (NMFS 2016).

Formal and informal consultation procedures (as directed by the ESA, as amended in 50 CFR 402.02, and Forest Service Manual 2670) are used with NMFS on all projects that implement the 2016 Forest Plan Amendment and subsequent related actions. The considered Roadless Rule alternatives maintain the current 2016 Forest Plan procedures, standards and guidelines, and total harvest amount.

As stated in the Affected Environment section, there are six Chinook salmon, one sockeye salmon, one coho salmon, one chum, five steelhead, and one green sturgeon evolutionarily significant units/DPSs that are federally ESA listed that may be present in waters potentially affected by project alternatives. These are the same listed fish that were addressed during the 2016 Forest Plan Amendment.

No ESA-listed stocks of salmon or steelhead originate (spawn) in Alaska streams. Listed species and stocks originate in freshwater habitats in Washington, Idaho, and Oregon. Some of these listed species migrate into marine waters off the coast of Alaska. While distribution of these stocks is primarily in outer coastal waters, some are occasionally present in the inner waters of Southeast Alaska and they may feed on prey resources originating within marine and estuarine waters of the Tongass National Forest.

The southern DPS of the green sturgeon is rarely present in Southeast Alaska waters. Most are believed to stay south, but some could be present in the inside waters of Southeast Alaska, particularly during the fall and winter. They migrate south again in spring (Lindley et al. 2008). The adults live in nearshore waters typically less than 100 meters deep (Lindley et al. 2008). Based on their regional and seasonal distribution, they would be uncommon in nearshore areas where potential project actions may have some effect.

The potential project actions of concern for these ESA fish species would be those that directly or indirectly affect the nearshore marine and marine environments. Beach and estuarine fringe timber harvests under the 2016 Forest Plan have a chance of affecting nearshore habitat that may supply prey resources to listed salmon, steelhead, or green sturgeon. Currently, there are about 17,000 miles of shoreline in the Tongass National Forest lands, and about 500 miles have past harvest. A small subset of these areas would be harvested over a 100+-year period under all alternatives. The Roadless Rule alternatives

would not substantially or measurably change the quantity of these areas potentially affected. Nearshore marine bottom disturbance to intertidal and subtidal habitats could be caused by nearshore log yarding, vehicle travel on beaches, log rafting, and log loading and yarding vessel anchorage and associated activities. Sediment runoff to streams from land-based activities could have some effects to nearshore marine habitat where these species may be present. Site-specific nearshore marine habitat-disturbing actions, or any other ground-disturbing action, are not, however, directly authorized under the considered alternatives of the Roadless Rule alternatives. Thus, the considered actions of the Roadless Rule alternatives would not have any direct adverse effects to any of the listed species addressed in this section from potential nearshore marine disturbance or upslope activity.

These actions' effects to listed fish were considered in the 2016 Forest Plan Amendment which included informal consultation and NMFS concurrence with effects determination. The Roadless Rule alternatives will follow the 2016 Forest Plan standards and guidelines and total harvest amount. Therefore, the potential effects to ESA fish species from implementing any of the Roadless Rule alternatives would be essentially the same as those evaluated for the 2016 Forest Plan Amendment.

Any proposed actions indirectly resulting from the considered alternatives will be evaluated on a case-specific basis as to their effects to listed species. This may include formal or informal consultation with NMFS at the time of project-specific evaluations.

Sensitive Species
There are no aquatic sensitive species on the Tongass National Forest.

Cumulative Effects

General

The effects of the alternatives on fish resources may be influenced by other actions occurring in the project area. Appendix A provides a list of past, present, and reasonably foreseeable actions considered for cumulative effects and indicates which of these interact with aquatic resources affected by the Forest Plan alternatives.

The main factors affecting fish are related to land development actions that occur regionally. This primarily includes other timber harvest-related actions on non-NFS lands, especially associated roads. The total lands within the Tongass National Forest boundary, which includes all NFS lands and other non-NFS lands, is about 17.8 million acres. Of this, only about 6 percent (1.1 million acres) are non-NFS lands. However, development actions on these non-NFS lands, which include most cities and towns in Southeast Alaska, are moderately intense.

Cumulative effects to fish resources include those actions that affect water and watershed resources, such as the development of roads. Generally, overall average road density, which is an indicator of potential adverse sediment effects to streams, is expected to increase markedly on non-NFS lands, but across the region would only increase slightly over 100 years (see USDA Forest Service 2016b, *Water* section Table 3.4-12) under the current Forest Plan and would not change from this estimate among the alternatives.

Effects on fish resources are less directly tied to the amount of timber harvest than to roads, but harvest may affect fish through effects to water quality, riparian condition, and where the harvest occurs, as discussed under Direct and Indirect Effects. Existing conditions include retention of 86 percent of the original productive old-growth forest inside the Forest boundary and 95 percent of the land area remaining undisturbed from direct timber harvest (USDA Forest

Service 2016b, *Water* section Table 3.4-10). Overall, the cumulative effects to fish relating directly to quantity of timber harvest would be about 82 percent of the original productive old growth on all lands within the Forest boundary under the current Forest Plan in the future and would be unchanged by any Alaska Roadless Rule alternative.

While some local regions may have fish resources affected where watershed harvest levels and road density are high under the current Forest Plan, additional affects from any Roadless Rule alternative would not occur. Protections on non-NFS lands for stream buffers would be less but roadless alternative actions would not likely change cumulative effects to fish resources in these. There would be no difference in cumulative effects among the Alaska Roadless Rule alternatives and these cumulative effects would be unchanged from the current 2016 Forest Plan assessment. Again, effects of harvest activities on fish resources would ultimately be considered at the project-specific levels, ensuring minimal adverse cumulative effects.

Climate Change

Climate change is one factor that has some unquantifiable potential to affect fishery resources on the Tongass. In general, climate changes could affect stream temperature, snow accumulation and precipitation, stream flow and peak stream flow, and ocean water levels. The effects to fish resources in the Tongass National Forest from these changes would be both positive and negative and would vary by species, life stage, and location. Higher temperatures are expected in the winter months, with greater precipitation increases expected in winter and fall (EcoAdapt 2014). With warmer temperatures, much of the precipitation that currently is snow would fall as rain. The result would be higher peak flows in the winter and fall in most streams, and, even with increased precipitation, lower summer flows primarily in snowmelt- and rain-fed dominated basins, which would include most major fish-producing systems in Southeast Alaska (Shanley and Albert 2014; Shanley et al. 2015).

Higher stream temperatures would result in faster egg development and emergence of fry. This may affect when fish outmigrate to the ocean, which may have negative consequences (Heard 1991; Salo 1991). Elevated temperatures, however, may result in faster fish growth in these typical cool water streams of Southeast Alaska, which could be positive. If temperatures increase too much, fish may suffer indirect effect such as insufficient food supply to maintain growth even for temperatures well below physiological stress. Elevated temperatures may also increase the rate of predation on juvenile fish by other fish species (e.g., cutthroat trout and Dolly Varden char). Elevated temperatures in late summer or fall could also affect adult salmon survival and reproductive success (Bryant 2009). Changes in temperature could also affect life stage development possibly affecting whether fish out migrate or remain as resident fish (Kendall et al. 2015; Pearce et al. 2009).

Changes in flow could also have positive and negative effects. Higher flows in the winter may increase overwintering habitat for fish such as juvenile coho salmon, while high flows at this time could also scour streams beds affecting fish redds and habitat (Shanley and Albert 2014; Bryant 2009). Increasing precipitation in the winter likely increases the risk of landslides and debris flows that may enter streams (Bryant 2009). Areas that historically received precipitation as snow may get more as rain as estimated for climate change. Many species of Pacific salmon have adapted to high flows by selecting coarser spawning substrate (depending on species size) and locations away from the channel center (May et al. 2009). Sloat et al. (2016) modeled the likely effects of

future flow changes from climate change on spawning conditions in Southeast Alaska. They noted that median annual average flood flows would increase by 28 percent by 2080. The estimated effects on habitat varied by watershed and stream morphology–specific conditions.

Climate change could also result in sea-level change. This sea-level rise could inundate estuarine rearing areas for fish. Stream mouth areas of some low-gradient small streams, which are used by some rearing fish including coho salmon, could also be inundated with salt water if sea-level rises were substantial. Pink and chum salmon in some areas spawn in intertidal regions, which could be affected with sea-level rise. Current predictions are for a sea-level rise of 1.3 to 2.1 feet by 2081-2100 (Shanley et al. 2014). However, the Southeast Alaska land mass is rising in many areas; due to isostatic rebound from past glaciers, sea level in Southeast Alaska is decreasing by as much as about 3 centimeters/year (1.2 inches/year) (Larsen et al. 2005). Some areas, particularly in northern Southeast Alaska, may rise 1 to 4 feet over the next century (Kelly et al. 2007). This rate of land rebound increase would likely offset sea-level rises over most of the Tongass shorelines. Thus, overall effects on estuarine areas, coastal stream mouths, and fish stocks would vary considerably, and changes are difficult to predict and may even be difficult to detect.

In summary, there is general agreement that the climate is warming, precipitation will increase, and flows will increase in the fall and winter but decrease in summer in snow- and rain-dominated watersheds. However, there is uncertainty surrounding specific predictions and even more uncertainty regarding the effect of these changes on resources including fish. The cumulative effects of climate change are not clear but some of the changes could be detrimental to fish resources.

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Other Important Issues

Climate and Carbon

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Affected Environment

Climate

The Tongass National Forest occupies an archipelago and a narrow strip of the mainland between the Pacific Ocean and the crest of the coastal mountains. The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains combine to produce a cool, wet environment. Precipitation at sea level in Southeast Alaska ranges from 30 inches per year at Skagway to 220 inches per year at Little Port Walter, with precipitation rates increasing with elevation. Average annual precipitation can be as high as 400 inches on the mountains of southern Baranof Island and about 260 inches over the Juneau Icefield. Southeast Alaska has complete cloud cover approximately 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast. October is generally the wettest month. May through July are on average the drier months. The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average 28 degrees Fahrenheit (°F) in the winter and 52°F in the summer. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true. Storms and moderate to heavy precipitation occur year-round, but occurs most commonly in early fall. The abundant moisture supports an extensive temperate rain forest and feeds numerous streams, rivers, and lakes, which in turn provide valuable fish habitat.

Climate Change

Southeast Alaska experiences considerable year-to-year and decade-to-decade variability in its weather, associated with large-scale shifts in ocean temperatures, salinity levels, and ice conditions (as described in the 2016 Tongass Forest Plan Amendment [USDA Forest Service 2016a]). However, Southeast Alaska's climate has shown a strong warming trend since the middle of the 19th century (i.e., the end of the Little Ice Age), as has much of the Northern Hemisphere (Parson et al. 2001; Sullivan et al. 2015; Markon et al. 2018). A portion of this change in Southeast Alaska's average temperature is likely the result of the natural changes in the earth's climate, which are caused in part by "wobbles" in the earth's rotation around the sun resulting in changes to earth's position within its elliptical path (i.e., the precession of equinoxes) as well as the Pacific Decadal Oscillation (as described in the 2016 Tongass Forest Plan Amendment [USDA Forest Service 2016a]). However, recently (in geological terms) humans have contributed to the acceleration of natural climate change on a global level through multiple activities such as the burning of fossil fuels, which have released greenhouse gases (GHGs) into the environment, as well as reducing natural carbon sinks (Intergovernmental Panel on Climate Change [IPCC] 2014; USDA Forest Service 2015d; Markon et al. 2018). The potential impacts of accelerated global climate change on the ecosystems of Southeast

Alaska may include acidification of ocean waters; increasing the temperatures of ocean and streams; altering water input sources; changing precipitation rates and patterns; increasing the rate of glacier retreat; increasing storm intensities; altering ecosystem composition and structure; altering species distributions; and altering fire regimes (Wolken et al. 2011; EcoAdapt 2014; Shanley et al. 2015; Markon et al. 2018).

The impacts of climate change have been, and will likely continue to be, more pronounced in the most northern and southern regions of the globe. Alaska, which is located farther north than any other U.S. territory or state, has experienced an increase in annual temperatures at twice the rate of rest of U.S. (Haufler et al. 2010; Chapin et al. 2014; Markon et al. 2018). Alaska's annual average temperatures have increased by 3.4°F over the last 50 years, with an increase of 6.3°F in average winter temperatures (Haufler et al. 2010; Chapin et al 2014; U.S. Environmental Protection Agency [EPA] 2014a). The average number of snow-free days has also increased in Alaska by about 10 days (Chapin et al. 2014). The observed changes to the climate in Southeast Alaska have resulted in modifications to ecosystem processes and ecosystem services on the Tongass National Forest. For example, the warmer summers have led to longer growing seasons for trees and other vegetation, while warmer winters have resulted in more insect outbreaks, plant diseases, and population declines for some plant species.[1] The warming trend has also reduced snowpack in low-elevation areas, which may be contributing to ongoing yellow-cedar decline.[2] Drier summers may have also contributed to the number and duration of low stream-flow episodes, which can have adverse effects on salmon while warming of some watersheds may increase productivity for some fish populations (EcoAdapt 2014). The increase in the amount of precipitation falling as rain instead of snow since the 1970s has reduced the frequency of low- and moderate-elevation avalanches, which has allowed mountain hemlock to colonize some alpine areas (EcoAdapt 2014; Shanley and Albert 2014). Furthermore, although Alaska has not yet experienced the same extensive rate of establishment by invasive plant species that has historically occurred in the rest of the U.S., the current and predicted milder winter temperatures and the longer growing season in Southeast Alaska have created opportunities for the spread and establishment of invasive plant species within this region (Bauder and Heys 2004; McKee 2006; Wolken et al. 2011).

The ongoing changes to Alaska's climate, as well as to the temperate forests in this region, can have global consequences. For example, recent data show that the melting of glaciers and ice sheets in Alaska has contributed more to the global increase in sea levels over the past 50 years than any other glaciated region that has been measured, with the exception of the Greenland and Antarctic ice sheets (Wolken et al. 2011; Chapin et al. 2014). The coastal-temperate forests in Southeast Alaska comprise approximately 10 percent of Alaska's total forests and 19 percent of the world's coastal-temperate forests (Wolken et al. 2011). Although these coastal forest types are confined to a relatively small footprint globally (covering less than 0.5 percent of the earth's total forested area), they play a critical role in the delivery of dissolved organic carbon to coastal oceans (Wolken et al. 2011). In addition, these forests currently sequester and store large quantities of carbon (DellaSala 2014; DellaSala 2016;

[1] In 2014, Alaska Region Forest Health Protection surveyed 4.5 million acres of the Tongass National Forest and mapped 51,000 acres of insect and disease damage. The most widespread damage type was recorded for yellow-cedar (which had a decline of about 19,600 acres), followed by 12,000 acres of spruce defoliation. Seventeen other infestation/damages were mapped, most notably cottonwood defoliation, hemlock sawfly, and general conifer defoliation (Heutte, pers. comm. 2015).

[2] Almost 585,000 acres of yellow-cedar decline have been mapped in Alaska through aerial detection surveys since the surveys began in the late 1980s, with extensive mortality occurring in a wide band from the Ketchikan area to western Chichagof and Baranof Islands (USDA Forest Service 2015d).

Law 2014). As a result, Southeast Alaska plays an important role in the global climate and carbon cycle; however, the recorded and projected increases in temperature and precipitation in the region can affect these forests ability to sequester carbon (Parks 2013; Markon et al. 2018; see further discussion in the "Carbon Sequestration" subsection below).

Climate Models

There are several models that examine the potential future climate conditions and/or trends in Alaska's climate. The most reliable models suggest warmer, wetter conditions for Alaska. They generally state that rainfall may increase and snowfall may decrease at lower elevations in Southeast Alaska over the next 50 to 100 years (Bonsal and Prowse 2006; SNAP 2013; Markon et al. 2018). The Scenarios Network for Alaska & Arctic Planning (SNAP) developed a model for climate projections in Southeast Alaska (SNAP 2013 as cited in EcoAdapt 2014). SNAP's projections suggest that mean winter temperatures in Southeast Alaska may increase by an additional 1.8 to 6.3°F (or 1 to 3.5 degrees Celsius) by the year 2050 (SNAP 2013 as cited in EcoAdapt 2014). Their model also suggests that precipitation levels may increase in all seasons, with winter precipitation potentially increasing by 5 to 15 percent by 2050. Other more recent models predict that the average daily maximum temperatures in Alaska will increased by more than 10°F, with smaller projected changes in southeast Alaska, while average nightly minimum temperatures in the state will increase by more than 12°F by the year 2046 (Markon et al. 2018).

The effects that these changes in temperature and precipitation levels would have on local conditions would vary, with the increased precipitation potentially resulting in increased snow occurring at higher elevations where temperatures remain below freezing. Lower elevations could experience a shift from snow to rain and a decrease in snowpack as the lower elevations warm and the number of days with below freezing temperatures decrease (SNAP 2013 as cited in EcoAdapt 2014; Markon et al. 2018).

Carbon Sequestration

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Forests both take up carbon and release it into the atmosphere. Forests are dynamic systems that naturally undergo ebbs and flows in carbon storage and emissions as trees establish and grow, die with age or disturbances, and re-establish and regrow. Management activities, such as timber harvests and prescribed fire, tend to approximate and promote natural processes that would also release carbon to the atmosphere. Many management activities initially remove carbon from the forest ecosystem, but they can also result in long-term maintenance or increases in forest carbon uptake and storage by improving forest health and resilience to various types of stressors. Carbon can also be transferred and stored outside of the forest system in the form of wood products, further influencing the amount of carbon entering the atmosphere. Wood fiber can substitute for products that generate more GHG emissions to produce, such as concrete and steel, and it may be used as a renewable energy source ("substitution effect"). Substitution of wood for fossil fuel–intensive materials and energy can lower net carbon emissions.

Carbon, primarily in the form of carbon dioxide, is one of the major GHG being released into the atmosphere through both natural and anthropogenic (i.e., human-driven) influences (McPherson and Simpson 1999; IPCC 2014). This atmospheric carbon, as well as other gases (e.g., methane, nitrous oxide, and water molecules), trap the sun's heat in the lower atmosphere, thereby creating a natural "greenhouse effect" that makes life on earth possible (McPherson and

Simpson 1999). The amount of carbon dioxide in the atmosphere is regulated by complex interactions between the atmosphere, terrestrial environment, marine environment, and geologic processes. Recent changes to the global carbon cycle, driven in large part by human activities, have been cited as the leading cause of global climate change and the general global warming trend that has been detected (IPCC 2014, 2018).

The Tongass contains almost 10 million acres of forest land. About 5.5 million of these acres are considered to be productive forest land. The Tongass National Forest stores more forest carbon than any other national forest in the United States (Barrett 2014), due to its very large size and density of carbon. As such, an important ecosystem service sustained by this forest is carbon uptake and storage (i.e., the removal of carbon dioxide from the atmosphere and storage of it in live or dead biomass as well as organic soil matter). This makes the Tongass National Forest, along with forests worldwide, an important component in the global carbon cycle (DellaSala 2014; Law 2014).

Land Conversion

Important to the maintenance of this ecosystem service performed by the Tongass is the maintenance of its land base in forest. Although timber harvest has been a major disturbance factor on the Tongass since the mid-1950s, changes in land use have been minor. Development pressure for land use conversion has been slight. This is true for the non-National Forest System (NFS) lands as well. The only other disturbance factors of major importance on the Tongass have been windthrow and, to a lesser extent, insects; large windthrow events have occurred sporadically, but small windthrow disturbances are a common occurrence in southeast Alaska forests.

Timber harvest in southeast Alaska peaked in the 1970s and 1980s, and harvest on the Tongass declined after that, especially after closure of two large pulp mills in the 1990s. Beginning in the 1980s logging increased on Native corporation and state lands. But again, the conversion of non-NFS forest land to other land uses has not been significant. Therefore, the Tongass National Forest together with the non-NFS forest lands of Southeast Alaska continue to serve an important role in carbon uptake and storage.

Carbon Storage in Soils

Generally, the capacity of a forest system to take up and store carbon depends on the location (climate, disturbance), stand age, and species composition of the forest (Birdsey et al. 1993; McKinley et al. 2011). In some forests found in warmer climates, the accumulation of carbon can decrease overtime as the carbon stored in soils and dead vegetative materials are released through the process of organic decay, which includes biomass breakdown/decay and carbon release. However, the cool conditions on the Tongass National Forest produce a slower rate of decomposition. A portion of the dead or decaying plant matter is eventually incorporated into the soil's organic and mineral layers within the Tongass National Forest, where it accumulates and has varying degrees of recalcitrance (i.e., resistance to breaking down), decaying quickly or over centuries. Mature forests within the Tongass National Forest generally store considerable amounts of carbon in the soils. Smith et al. (2004) estimated that approximately 70 metric tons per acre of carbon are stored on the forest floor in the hemlock-Sitka spruce ecosystems found on the Tongass National Forest. Furthermore, some studies have indicated that individual live trees can continue to accumulate carbon at increasing rates as they mature, thereby resulting in large amounts of carbon stored annually within mature trees (Stephenson et al.

2014). Mature forests on the Tongass National Forest likely store considerably more carbon compared to younger forests in this area (within the individual trees themselves as well as within the organic soil layer found in mature forests). At the stand level, the rate of carbon uptake may decline and level off as forests reach older ages due to increases in mortality and subsequent respiration, although total carbon storage may continue to increase over time (Ryan et al. 1997; Pregitzer and Euskirchen 2004). However, this decline in the rate of carbon uptake may be slower and less pronounced than in other regions, given that decomposition rates in the Tongass are relatively lower.

Although the organic soils of the Tongass National Forest currently store considerable amounts of carbon, D'Amore and Lynn (2002) note that numerous studies have shown that carbon stored in soils may be released to the atmosphere in the form of carbon dioxide or methane, as the climate warms. Harvest activities can increase this effect by increasing the amount of solar energy that is allowed to reach the ground while the forest regenerates following a harvest. Davidson and Janssens (2006) noted that many factors can affect the sensitivity of soil decomposition rates to increased temperatures (e.g., the relative mix of organic to mineral substrates, soil moisture levels, as well as other biotic and abiotic conditions) and that not all organic soil types would be equally sensitive to increased temperature; however, D'Amore has indicated that the organic layers in the soil profile of mineral soils as well as organic soils in general on the Tongass National Forest may experience increased decomposition rates if average temperatures were to increase (D'Amore et al. 2015; D'Amore 2016). Based on a synthesis of information from a wide range of recent studies, Conant et al. (2011) state that the impacts of climate warming on decomposition dynamics have not been resolved due to apparently contradictory results from field and lab experiments, most of which has focused on labile carbon with short turnover times. But the majority of total soil carbon stocks are composed of organic carbon with turnover times of decades to centuries. They conclude that important advances in understanding the temperature response of the processes that control substrate availability, depolymerization, microbial efficiency, and enzyme production will be needed to predict the fate of soil carbon stocks in a warmer world.

Dissolved carbon may also be transported to streams and the ocean due to the increased precipitation predicted to occur over the next 50 to 100 years. Increased stream temperatures can also result in an increased rate of carbon released from aquatic systems.

Carbon Storage Aboveground

Previous studies have been conducted to determine how much carbon is stored on the Tongass National Forest. Barrett (2014) examined the storage and flux of carbon in live trees, snags, and logs in the Tongass National Forest.[3] On the Tongass National Forest, growth and recruitment of live trees removed an estimated 760 pounds of carbon per acre per year from the atmosphere, but net change in live carbon mass was not significantly different from zero, with mortality and harvest estimated at 670 pounds of carbon per acre per year (Barrett 2014). Estimates were based on plot data measured in 1999-2003 compared with plots measured in 2004-2010. Including wilderness areas, aboveground live and snag carbon on the Tongass National Forest is estimated

[3] A number of carbon pools and fluxes were not included in Barrett's report, including (1) carbon in non-forested lands, which includes alpine environments, wetlands, grasslands, and shrublands; (2) below-ground carbon, including roots, soils, and organic materials; (3) carbon in non-tree vegetation and litter within forest; (4) carbon in a few pools currently not measured by FIA, which includes stumps below 4.5 feet and dead saplings; and (5) carbon in forest lands in inaccessible wilderness.

to be 601 (± 21) million U.S. tons on an estimated 9.7 million acres of forest.[4] Some 233 million U.S. tons of this carbon are on lands that are legally excluded from timber harvesting, such as formally designated wilderness areas (Barrett 2014). Total carbon densities on unmanaged forests were estimated as 72 U.S. tons per acre, which comprised 7 percent logs, 13 percent snags, and 80 percent live trees. Carbon densities on managed forests were estimated as 45 U.S. tons per acre, which comprised 38 percent logs, 8 percent snags, and 54 percent live trees (Barrett 2014). On a per-acre basis, the Western hemlock and Sitka spruce forest types were found to have the highest amount of carbon (Barrett 2014). Using the per-acre values by forest types, and extrapolating to include wilderness areas, provides a rough estimate of about 650 million U.S. tons in aboveground tree carbon on the Tongass National Forest, equivalent to 2.4 billion U.S. tons of carbon dioxide (Barrett 2014). To put this in perspective, an estimated 83,500,000 billion metric tons of carbon are stored worldwide, primarily in the oceans and marine sediment, based on United Nations estimates. In 2005, Heath et al. (2011) estimated that the carbon stored in the Tongass National Forest makes up about 11 percent of the carbon currently stored in the national forests of the United States. Leighty et al. (2006) estimate that between 6.4 and 17.2 million metric tons (0.2 to 0.6 percent) of stored carbon has been lost on the Tongass National Forest since timber harvest began in the early part of the 20th century. For comparison, approximately 2,039 million metric tons of carbon were released to produce electric power in the United States in 2012 (U.S. Energy Information Administration [EIA] 2013). The total U.S. carbon emissions in 2012 (which includes the electric sector discussed above, as well as other sections such as industry, transportation, agriculture, and commercial/residential) were approximately 6,526 million metric tons (EPA2014b).

Timber Harvesting

Timber harvesting and active forest management can affect a forest's ability to take up and store carbon. Skog et al. (2014) noted that harvesting forests with high biomass and replanting with new forests would reduce carbon stocks more in the near term than if the high biomass forest were retained. They also note that increasing harvest intervals for forests harvested prior to peak growth rates begin to decline (culmination of mean annual increment [CMAI]) would maintain higher carbon stocks over time. DellaSala (2016) suggested that a logged forest would emit substantial amounts of carbon for at least the first 15 years following harvest, and that a young regenerating forest would remain a net carbon emitter for up to 50 years. Janisch and Harmon (2002) suggested that it can take more than 200 years following a timber harvest for forests to reach equilibrium (i.e., the point where carbon released from the initial harvest as well as ongoing decay of organic materials equals the amount of carbon that is absorbed into the system). However, the net effect of a timber harvest and active forest management action (i.e., amount of carbon released versus the amount stored) would depend on how the harvested timber was used (e.g., if it was used for durable timber products, paper, pulp, or biomass fuels), what substitute materials are available for construction purposes (i.e., non-wood materials), the amount of carbon emitted during harvesting activities, the amount of carbon emitted via decomposition of on-site wood and organic soil matter losses, and the influence of the harvested wood on timber markets elsewhere (McKinley et al. 2011; Jonsson et al. 2012). If the emissions are less than the carbon stored in utilized wood, and if the system can rapidly replace losses from decomposition through tree growth, the activity may ultimately yield a net gain of stored carbon over time; otherwise, the activity would result in a net loss of stored carbon (which

[4] Note that this does not represent a complete accounting of stored carbon, as it does not take into consideration carbon stored in the soil, nor does it take into consideration the stored carbon present in the final products of the harvested timber.

would have an adverse effect on carbon sequestering and potentially climate change rate).

Approximately 474,000 acres of productive old growth have been harvested on the Tongass, almost entirely from the 1950s and more recent. This represents about 9 percent of the original amount of productive old growth and about 5 percent of all forest land on the Tongass. About 76 percent of these acres were harvested prior to 1990. Current harvest rates (since about 2006) are around 1,200 acres or less each year. The USDA Forest Service (In Review) estimated that the 2011 carbon storage on the Tongass was reduced by less than 0.3 percent by all disturbances (including harvest, insects, wind, and fire) during the period from 1990 to 2011. This result includes all non-soil ecosystem pools. During this period, the harvest rate was approximately 5,100 acres of old growth per year. In the Alaska Region Climate Assessment the USDA Forest Service (2015d) concluded that, based on forest inventory data, total forest ecosystem carbon (in all seven ecosystem carbon pools) stored on the Tongass steadily increased from 2005 to 2013, although only slightly.

Environmental Consequences

Indirect Effects

Climate Change / Carbon Sequestration

Implementation of the Forest Plan under any of the alternatives would be similar to how the Forest is managed today and would not convert additional forest land to non-forest uses. The largest source of GHG emissions in the forestry sector globally and within the United States is deforestation, defined as the removal of all trees on forested land to convert it other land uses. Maintaining forest land is necessary to ensure carbon storage over time and to realize potential carbon benefits from management activities through regrowth. Forests would not be converted to other land uses but rather would be retained and managed to maintain a vigorous and healthy condition with a decreasing reliance on old-growth harvest and increased harvest of regenerated forest (young growth) over the next 15 years. Consequently, the alternatives would not result in major sources of GHG emissions relative to local, national and global emissions and can be important in maintaining forest carbon uptake and storage and other ecosystem services in the region.

Implementation of the Forest Plan under the nationwide Roadless Rule (i.e., the No Action Alternative) as well as the action alternatives would affect climate change and carbon sequestration; however, these effects would be small and there would be no differences among the alternatives because the harvest level and the mix of old growth and young growth to be harvested are expected to be the same. The volume of timber predicted to be harvested as well as the equipment that would be used to harvest this timber is not expected to significantly differ as a result of proposed changes to the roadless rule. As a result, the alternatives would not differ in regard to their contributions to GHG emissions, carbon sequestration, or global climate change.

The Tongass would incur a net loss of total ecosystem carbon storage through GHG emissions because of timber harvest under all alternatives. Harvests of forests with substantial carbon stocks (e.g., old-growth forests) can result in initial carbon loss that would require decades to recover as carbon stocks accrue via regrowth and sequestration in landfills, wood products, and with substitution effects (McKinley et al. 2011). Over the long term, the net contribution to atmospheric carbon on the Tongass would be lower due to regeneration, the long-lived nature of Tongass wood products (mostly cut for saw logs), and if biomass substitutes for local fossil fuel use.

This scope and degree of harvest effects would be similar and minor for all the alternatives, affecting an estimated 3 percent of the 9.7 million acres of forested land and less than 1 percent of productive old growth forests on the Tongass National Forest over 100 years. In addition, timber harvests mostly affect aboveground carbon stocks (live woody vegetation), while additional carbon stored in the soils represents a relatively stable and long-lived carbon pool (McKinley et al. 2011; Domke et al. 2017), However, there is growing evidence that carbon stored in soil is sensitive to change (Domke et al. 2017).

There is uncertainty regarding long-term carbon release particularly because of the importance of how the wood is used (durable or nondurable products), the regrowth of young forests, and market dynamics related to substitution. Given the level of uncertainty in parameters related to the net contribution of GHGs, an attempt to quantify the evaluation would not provide clarity but instead result in a false sense of certainty. In addition, based on the fact that all of the alternatives would result in the same harvest volumes, no differences would be shown. Given the fact that the average harvest rate over the next 100 years would be about 425 acres per year for old growth and 2,842 acres per year for young growth (with more old growth and less young growth in the early years and the opposite in later years), which is substantially lower than the harvest rate analyzed in the USDA Forest Service (2018) disturbance report (discussed previously), it is logical to assume that the rate of carbon storage reduction due to disturbances would be substantially less. In addition, given the maintenance of live tree carbon estimated on the Tongass by Barrett (2014) and the growth of total ecosystem carbon on the Tongass estimated by the USDA Forest Service (2015d) (both discussed previously) under the more intensive harvests that have taken place to date, it is logical to assume that ecosystem carbon will continue to grow with the harvests expected under all alternatives.

Some assessments suggest that the effects of climate change in some U.S. forests may cause shifts in forest composition and productivity or prevent forests from fully recovering after severe disturbance (Anderson-Teixeira et al. 2013), thus impeding their ability to take up and store carbon and retain other ecosystem functions and services. An evaluation of the relative stability of biomes and the climate niche of dominant tree species on neighboring Chugach National Forest suggests that the Chugach National Forest and Kenai Peninsula of Alaska are particularly resilient to expected changes in climate over the next 30 to 50 years (Hayward et al. 2017). However, there are considerable differences between the Tongass National Forest and the Chugach/Kenai assessment area and a comparable assessment has not yet been completed for the Tongass. On the Tongass, yellow-cedar is one species that is already demonstrating effects of climate change on its distribution (see below). Based on plot data, Parks and Barrett (2013) noted that live-tree biomass in higher elevation ecoregions of the Alaska temperate rain forest increased by 7 to 8 percent between 1995 and 2008, western redcedar showed a 4.2 percent increase in live-tree biomass, and shore pine showed a 4.6 percent decrease. They concluded that continued warming in Alaska's temperate rain forest could lead to further biomass increases at higher elevations via faster growth, more trees, and uphill migration of tree species. However, there is considerable uncertainty in the long-term response of Tongass forests in terms of forest composition, especially because the forest trees of southeast Alaska are so long-lived. But there is no direct evidence to suggest that that regenerating rainforest on the Tongass will have a reduced capacity for carbon storage under future climate conditions.

Cumulative Effects

Climate Change / Carbon Sequestration

This section will address two issues: 1) the cumulative effects of the alternatives and other past, present, and reasonably foreseeable actions on climate change and carbon sequestration; and 2) the cumulative effects of climate change on the Forest Service's future management of the Tongass National Forest.

The extent and scope of cumulative effects on climate change and carbon sequestration depends on the amount and condition of total forest land harvested (worldwide, as well as locally within Southeast Alaska); the use to which harvested wood is put; the use of the land post-harvest; how the non-NFS lands are managed (including private and state-managed lands within the U.S., as well as forests in other countries); on the amount of carbon released during harvest, processing, and transporting wood products; decomposition rates of organic materials; factors such as the amount of new hydroelectric or other renewable energy power projects that are built (e.g., those that might replace diesel-generated power); future community expansion and development; as well as emissions from ongoing and future activities in the region. It is likely that most of the state and private commercial forest land in Southeast Alaska, except for state parks and some other state lands, would be managed for the production of forest products under any of the alternatives considered in this analysis. A noteworthy exception to this is the recent decision by Sealaska to set aside 165,000 acres of forested land in Southeast Alaska for 110 years to store, or bank, carbon (Sealaska 2018).

Climate change could impact the resources currently managed by the Forest Service as well as how the Forest Service manages the Tongass National Forest in the future. While there is general agreement among scientists that the climate of Southeast Alaska is warming, there is considerable uncertainty concerning the exact scope of the effects of climate change on the forests of Southeast Alaska and how best to deal with possible changes to the many resources managed on the Tongass.

Shanley et al. (2015) predicted that the increased temperatures and precipitation events estimated to occur in the region as a result of climate change would have the following effects to coastal temperate rainforests like those found in the Tongass National Forest: increased frequency of flooding and rain-on-snow events; an elevated snowline and reduced snowpack; changes in the timing and magnitude of stream flow, freshwater thermal regimes, and riverine nutrient exports; changing non-forested habitats; altitudinal and latitudinal expansion of lowland and subalpine forest types; shifts in suitable habitat boundaries for vegetation and wildlife communities; adverse effects on species with rare ecological niches or limited "dispersibility"; and shifts in anadromous salmon distribution and productivity. Other effects on forests in the Tongass National Forest could include increased blowdown; increased tree mortality from insects and disease; increased fire frequency and severity; adverse effects on air quality; and changes to subsistence use and recreation.

If warmer winter weather results in higher insect populations and increased tree defoliation, there is a risk that increased dead material and warmer weather may spawn more fires than are normal for the area. However, as Berman et al. (1998) state, it is difficult to predict the magnitude of the area likely to be burned in a region without an historic fire record, but they estimate that most fires would be small and of low intensity, suggesting a scenario in which 5,000 acres might burn over a period of decades (an average of approximately 100 acres per year). Juday et al. (1998) and Shanley et al. (2015) suggest that the effects of fires on

resources are likely to be low in this region, but that the effects of insects and disease may increase.

Plant and animal species will respond to changing climates individually; and some species or individuals will be more sensitive and vulnerable than others (Millar et al. 2006). For example, forest losses (either from climate induced increases in insects, diseases, or fire) could harm wildlife habitat, which in turn could adversely affect subsistence resources; while conversely, Juday et al. (1998) suggested that warmer winters could result in sustained higher populations of Sitka black-tailed deer, one of the most important subsistence resources for residents of Southeast Alaska and a major prey species for wolves. Juday et al. (1998) also postulate that warmer, drier conditions could increase stream temperatures and cause seasonal low flows, both of which could adversely affect salmon (EcoAdapt 2014). Berman et al. (1998) estimated that a 25 percent decline in salmon stocks would result in a loss of $25 million a year (approximately $31 million in current dollars). However, Oswood et al. (1992) state that melting glaciers would result in more runoff entering streams. This could offset any decrease in summer flows due to reduced summer precipitation, at least in the short run. In time, glacial mass would be reduced and their contribution to stream flow would decrease (EcoAdapt 2014). The EPA (2017) predicted that the predicted changes to southeast Alaska would result in decreased stream flows during low flow periods, higher elevation runoff events, and more runoff occurring earlier in the year. Oswood et al. also believe that climate change would result in changes to the nutritional levels of leaf material entering streams, but could not predict whether this would have a positive or negative effect on fish. Some recent studies have postulated that watersheds currently fed by snow may transition to rain-fed systems, thereby altering water storage and flow dynamics that can affect salmon health (Wolken et al. 2011; Shanley and Albert 2014). The rate of decline and mortality of yellow-cedar in Southeast Alaska may be increased as a result of climate change (Hennon and Shaw 1997; Wolken et al. 2011; Hennon et al. 2016), as the snowpack in low-elevation areas may continue to be reduced due to the warming trend, resulting in greater exposure of yellow-cedar's fine roots to freezing, especially in the southern portion of the region (see the *Forest Health* section).

Shanley et al. (2015) hypothesized that climate change could also affect the quality of timber products that could be harvested from this region. For example, they state that "[a]ccelerated forest growth rates, if driven by [mean annual temperature] warming, may in turn increase the quantity but decrease the tight grain quality of forest products from second-growth forests, relative to those harvested from primarily forests during the 20th century." Furthermore, some studies have found reduced productivity of forests throughout Alaska as a result of recent changes to climatic conditions (Wolken et al. 2011).

All of these factors and anticipated effects related to climate change can have both local and global implications to communities as well as associated social costs (Larsen et al. 2007; IPCC 2014; EcoAdapt 2014). These include changes to subsistence and recreational resources, impacts to infrastructure and land-use, changes to transportation routes and options, and potential impacts to public health as a result of climate change.

The Forest Service will continue to work with local stakeholders and scientists to develop measures to alert the Forest Service to trends that may affect the health of the Forest and the species that depend on it, as well as measures that could be implemented to minimize or adapt to the effects of climate change on managed resources.

Karst Lands

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Affected Environment

The geology and climate of Southeast Alaska are particularly favorable for karst development. Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock in Southeast Alaska). The dissolution of the rock results in the development of internal drainage, producing sinking streams (streams that sink into the stream bed or karst features), closed depressions, sinkholes, collapsed channels, and caves.

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. 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 resources must be evaluated according to their vulnerability to land uses. Vulnerability mapping recognizes that some parts of the karst landscape are more sensitive than others to surface activities and groundwater contamination. These differences in vulnerability may be a function of the extent of karst development, the openness of the karst systems, and the sensitivity of other resources that benefit from karst groundwater systems. The vulnerability categories and their criteria are defined in the 2016 Forest Plan, Appendix H (USDA Forest Service 2016a). For projects that could affect karst, a four-step Karst Vulnerability Assessment is conducted that includes identifying potential karst lands, inventorying and characterizing karst resources in the project area, delineating karst hydrologic systems and recharge areas, and assessing the vulnerability of the karst terrain to management activities.

Applicable federal, state, and municipal laws, regulations, and policies that govern the management of karst include the Federal Cave Resources Protection Act (FCRPA) of 1988 (16 United States Code 4301-4309; 102 Stat. 4546), 36 Code of Federal Regulations (CFR) Part 290, 36 CFR part 261, Forest Service Manuals 2356 and 2880, and the Forest Plan (Karst and Cave Resources, Forest-wide Standards and Guidelines pp. 4-23 to 4-25, Plan Components for young-growth harvests on karsts pp. 5-5 to 5-6, and Appendix H).

Approximately 431,000 acres of karst underlies National Forest System (NFS) lands inside the Tongass National Forest. Of these acres of NFS karst lands, approximately 278,000 acres were originally productive old growth (POG). Based on geographic information system (GIS) queries conducted for the 2016 Forest Plan Amendment, about 82,000 of these POG acres (29 percent) have been harvested. Much of the karst land within development land use designations

(LUD) has been designated as high vulnerability karst land and is protected by standards and guidelines or included within geologic Special Interest Areas.

On the low to moderate vulnerability karst lands, where 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 because the displaced surface materials are retained within the epikarst channels (Harding and Ford 1993).

Recent monitoring has shown that the karst and cave standards and guidelines outlined in Forest Plan were implemented to the fullest extent practicable, and through effectiveness monitoring have shown that they ensure a high level of protection for significant caves and karst resources overall (USDA Forest Service 2015a).

For additional information on the importance and sensitivity of karst, and the effects of past and current forest management practices on karst, see the 2016 Forest Plan FEIS (USDA Forest Service 2016b, pp. 3-28 to 3-36).

Environmental Consequences

Indirect Effects

Potential effects from harvest that could occur under any of the alternatives could initially increase flow through karst systems after initial harvest in low and moderate vulnerability karst areas and subsequently (approximately 15 years post-harvest) decrease flow through these karst systems due to dense forest regeneration (Aley et al. 1993). Increase to turbidity and changes in water chemistry through the karst system could also occur due to these changes in flow (Aley et al. 1993). However, with implementation of the Forest Plan standards and guidelines, and site-specific mitigation measures (designed and implemented at the project level), the Forest Service expects to mitigate the effects of these activities.

None of the alternatives predict a projected timber sale quantity (PTSQ) greater than the amount disclosed in the 2016 Forest Plan EIS (46 million board feet [MMBF] per year) nor would they result in a considerable difference in suitable acres on mapped low or medium vulnerability karst lands (estimated to range from 64,000 acres for Alternatives 1 and 2 to 67,000 acres for Alternative 5 and 6, with Alternative 3 in the middle). Impacts to karst and cave resources would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to karst and cave resources from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan EIS due to implementation of the Forest Plan standards and guidelines. Karst inventories and vulnerability assessments would continue to be required before timber harvest could occur on suitable lands under all alternatives.

No additional harvest is anticipated in any areas mapped as high vulnerability karst under any alternative because they are included in the existing Special Interest Areas and are not suitable for harvest. However, where commercial thinning is determined to be an appropriate treatment on high vulnerability karst lands, effects to karst will be addressed through project-specific prescriptions and analysis to ensure karst management objectives can be met.

Cumulative Effects

There are approximately 549,522 acres (859 square miles) of karst lands within the boundaries of the Tongass National Forest. Some 431,000 acres (674 square miles) are on NFS lands. Past timber harvest has affected the epikarst landscape

on the Tongass National Forest. In some portions of the Tongass, 70 to 80 percent of the commercial forest land within specific karst blocks has been harvested. It is estimated that about 29 percent (82,239 acres) of the karst lands on NFS lands have been harvested (based on the GIS database). In addition, several hundred miles of authorized and unauthorized roads have been constructed on karst lands. All alternatives would allow additional future harvests and associated road building and reconstruction on karst lands to varying degrees.

Baichtal and Swanston (1996) observed sediment deposits and waterline marks in underground systems that suggested that past timber harvesting had increased sediment and debris transport and flooding of underground passages, many of which had not previously flooded for centuries. These timber harvests were conducted prior to the Karst and Cave Resources Standards and Guidelines implemented in the 1997 Forest Plan. As a result, they had more significant effects on karst lands than current and future harvest activities. At that time, many cave entrances were filled or blocked by logging slash, sediment, and debris. Additional runoff generated from road surfaces commonly had been diverted into karst features. They also noted strong evidence of greatly increased surface runoff on karst landscapes and adjacent surfaces after timber harvest, which increased sediment, nutrient, and debris transport capability of associated drainage networks.

Most easily accessible, low-elevation karst areas on Prince of Wales Island have been harvested. After the initial timber harvests, harvest activities concentrated on steeper, higher elevation karst landscapes characterized by shallower, excessively well-drained soils. Baichtal and Swanston (1996) suggested that trees were smaller and regeneration problems were greater on these steep, upper elevation sites. This condition possibly resulted from shallow soils with low nutrient availability, excessive drainage of surface and soil waters into subsurface karst systems, removal of much of the shallow soil because of inadequate log suspension, and continued desiccation of the soil once the protective forest canopy was removed. After timber removal, high rainfall rapidly transported fragile soils into the well-developed epikarst.

More recent monitoring of karst lands near harvested areas (USDA Forest Service 2015a) have confirmed that current timber harvest practices have adjusted substantially to accommodate Karst and Cave Standards and Guidelines. For example, karst resource input was provided for timber sales projects throughout the Tongass.

Extensive landscape changes and ground disturbance have occurred and are likely to continue to occur on non-federal lands in Southeast Alaska. These include timber harvest and road construction, mining, recreation and tourism, growth of human settlements, transportation projects, and energy and transmission projects. Forest Service regulations requiring protection of karst resources do not apply to non-federal lands.

Transfers of karst lands from NFS lands to other land managers or private owners could also occur under any of the alternatives through land exchanges or other types of land adjustments (such as the Alaska Mental Health Trust Land Exchange). This type of future action could increase the amount of karst lands in Southeast Alaska that are not in a protected LUD.

The Forest Service has identified a need to amend the 2016 Tongass Forest Plan. The amendment will focus on Standard S-YG-KC-02 related to commercial timber harvest on lands identified as moderate vulnerability karst to provide greater flexibility in managing harvests to protect the karst resource based on site-specific conditions.

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Sensitive and Invasive Plants

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Affected Environment

Threatened, Endangered, Sensitive, and Rare Plants

Threatened and Endangered Plants

There are no federally listed or proposed threatened or endangered plants under the Endangered Species Act known to occur on the Tongass National Forest. The only federally listed or proposed plant in Alaska is the endangered Aleutian hollyfern (*Polystichum aleuticum)*, which is only known to occur on Adak Island and is not expected to occur on the Tongass National Forest. A petition to list yellow-cedar (*Callitropsis nootkatensis*) was filed with the U.S. Fish and Wildlife Service (USFWS) on June 24, 2014. The 90-day finding of this petition, published on April 10, 2015 (80 *Federal Register* 19263), determined that the petition to list yellow-cedar presented "substantial scientific or commercial information indicating that the petitioned action [to list the species under the Endangered Species Act] may be warranted". This petition is still under review.

Alaska Region Sensitive Plants

Sensitive plants are those plants identified by the Regional Forester for which population viability is a concern on National Forest System (NFS) lands within the region. The objective of the Forest Service Sensitive Species Program (Forest Service Manual 2600 [USDA Forest Service 1991]) is to ensure that species numbers and population distributions are adequate so that no federal listing will be required and no extirpation will occur on NFS lands. The Alaska Region Sensitive Species list, updated in 2009 (Goldstein et al. 2009), includes 18 plants designated as sensitive; 14 of which are known to occur on the Tongass National Forest and an additional 2 that are not known but are suspected to occur. The 16 sensitive plants known or suspected to occur in the Tongass National Forest are listed in Table 3.6-1 along with habitat and occurrence information. Our understanding of sensitive and rare plant distribution across the Tongass is limited because of the enormous size of the Tongass coupled with the fact that most botanical surveys are focused within planning areas for specific projects.

Rare Plants

The 2016 Tongass Land and Resource Management Plan (Forest Plan) defines rare plants as:

> "…those with potential conservation concerns on the Tongass National Forest. They may be common elsewhere; however, the edge of their range is known or suspected to be on the Tongass National Forest, or disjunct populations of the plant species occur on the Tongass National Forest."

The Alaska Natural Heritage Program (AKNHP) maintains a list of plants that are rare in Alaska. The AKNHP Rare Vascular Plant List was most recently updated in 2013. This list contains 126 vascular plants documented to occur on the Tongass National Forest.

Under the 2016 Forest Plan, rare plants have similar protection in the Forest-wide standards and guidelines as sensitive plants. The AKNHP Rare Vascular Plant List is used as guidance for determining which rare plants may be evaluated in the project-level analysis. Generally, plants with a state ranking of S1 (critically imperiled in state) or S2 (imperiled in state) are given consideration during project analysis. Plants with a state ranking of S3-5 are sometimes given consideration if they are known to be rare in a specific location on the Forest.

Table 3.6-1
Alaska Region Sensitive Plants Known or Suspected to Occur on the Tongass National Forest[1]

Common Name (Scientific Name)	Habitat and Occurrences on the Tongass National Forest[2]
Eschscholtz's little nightmare (*Aphragmus eschscholtzianus*)	Grows in moist mossy areas, seeps, heaths, and scree slopes in subalpine and alpine areas. Suspected to occur in mountainous areas on the northern mainland of the Tongass, but has not been documented on the Tongass.
Spatulate moonwort (*Botrychium spathulatum*)	Habitat includes coastal forests, stabilized coastal dunes, upper beach meadows, well-drained open areas, alpine habitats, and riparian forests. In southeastern Alaska, populations are known from Kruzof Island (on lands managed by the State of Alaska) and one on Chicagof Island on the Tongass.
Moosewort (*Botrychium tunux*)	Grows on upper beach meadows, coastal dunes, stream terraces, river bars, and subalpine and alpine slopes. Ten known occurrences on the Tongass; 8 on the Yakutat Ranger District, 1 on the Wrangell Ranger District, and 1 in the Admiralty National Monument.
Giant moonwort (*Botrychium yaaxudakeit*)	Grows on upper beach meadows, beach dunes, coastal outwash plains, abandoned fields, and roadsides. Six known occurrences on the Tongass, one on the Hoonah Ranger District, and five on beach meadows on the Yakutat Ranger District.
Macoun's thistle (*Cirsium edule* var. *macounii*)	Grows in moist to dry open meadows, open forests in the upper montane to lower alpine zone, on scree slopes and talus slopes, and along glacial streams and lakeshores. Two known occurrences on the Tongass, both on the Ketchikan-Misty Fiords Ranger District.
Mountain lady's slipper (*Cypripedium montanum*)	Habitat includes upper beach meadows, areas along the beach-forest ecotone, open forests, muskegs, and wet meadows. Known from one population on the Tongass, on the Wrangell Ranger District.
Large yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens*)	On the Tongass, grows in peatlands on calcareous substrates. Two known occurrences on the Tongass, both on northern Prince of Wales Island.
Calder's lovage (*Ligusticum calderi*)	Habitat includes alpine and subalpine meadows, boggy slopes, open mixed conifer forests, and rocky areas. There are 24 known occurrences on the Tongass: 23 on the Craig Ranger District and one on the Thorne Bay Ranger District.

Table 3.6-1 (continued)
Alaska Region Sensitive Plants Known or Suspected to Occur on the Tongass National Forest[1]

Common Name (Scientific Name)	Range and Habitat[2]
Pale poppy (*Papaver alboroseum*)	Grows in open, well-drained areas, in rocky tundra of ridges and mountain summits, ash and cinder slopes, and sand and gravel of glacial outwash and river floodplains. Occasional disturbance can create or maintain habitat, including by humans (e.g., stabilized road sides, railroad trackbeds) can create habitat. Not known from, but suspected to occur on, the Tongass.
Lesser round-leaved orchid (*Platanthera orbiculata*)	Occurs in a variety of habitats including temperate, boreal, deciduous, and wetland forests. In Alaska, grows in low-elevation forested wetlands, medium to high volume old-growth hemlock forests with high bryophyte cover and red cedar, forest edges or near gaps in shady forests, near muskegs, open water, or boggy areas. Known from 291 occurrences on the Tongass, comprising 61 distinct populations.
Alaska rein orchid (*Platanthera*[4] *unalascensis*)	Habitat includes dry open sites, riparian areas, mesic meadows, drier areas in coniferous and mixed evergreen forests, and bogs and heath habitat from low to subalpine elevations. On the Tongass, generally grows in low-productivity forests at lower elevations in poorly drained soils. Known from 27 occurrences on the Tongass: 2 on the Ketchikan-Misty Ranger District, 6 on the Sitka Ranger District, and 19 on the Thorne Bay Ranger District.
Kruckeberg's swordfern (*Polystichum kruckebergii*)	Habitat includes ultramafic rock outcrops. Known from nine occurrences: five on the Ketchikan-Misty Fiords Ranger District and four on the Sitka Ranger District.
Lichen, no common name (*Ricasolia amplissima* (Scop.) De Not. subspecies sheiyi Derr & Dillman[3]	Grows on trunks and main branches of Sitka spruce, Pacific crab apple (*Malus fusca*), and western hemlock in old-growth beach fringe forest. There are 30 known occurrences on the Tongass: 6 on the Petersburg Ranger District, 9 on the Sitka Ranger District, 13 on the Thorne Bay Ranger District, and 2 on the Wrangell Ranger District.
Unalaska mist-maid (*Romanzoffia unalaschcensis*)	Grows on ledges and crevices in rock outcrops and in gravelly areas along stream banks, often along coasts. Two known occurrences on the Tongass, both on the Thorne Bay Ranger District.
Henderson's checkermallow (*Sidalcea hendersonii*)	Habitat includes wet meadows, estuaries, and tidal flats. Two known occurrences on the Tongas, both on the Juneau Ranger District.
Dune tansy *Tanacetum camphoratum* Less. (syn. = T*anacetum bipinnatum* (L.) Sch. Bip. pro parte)[5]	Habitat includes upper beaches, sand dunes, and well-drained and calcareous soils. Known from seven occurrences on the Tongass, all on the Sitka Ranger District.

[1] Sensitive Plant list updated February 2009.
[2] Habitat and occurrence information based on: AKNHP 2018; Dillman 2004, 2008, 2011a; Douglas et al. 1999; eFloras 2018; Goldstein et al. 2009; Nawrocki et al. 2013; USDA Forest Service 2012b, 2015e, 2019.
[3] New taxonomy (Karen Dillman, Matthew L. Carlson, Bonnie Bernard, and Justin R. Fulkerson 2017)
[4] New taxonomy (Timm Nawrocki, Justin R. Fulkerson, Karen L. Dillman, Matthew L. Carlson 2018)
[5] New taxonomy (Matthew L. Carlson and Justin R. Fulkerson 2018)

Invasive Plants

Executive Order 13112 (1999) defines an "invasive species" as a species that is 1) non-native (or alien) to the habitat under consideration, and 2) whose purposeful or accidental introduction causes or is likely to cause economic or environmental harm or harm to human health. This Executive Order directs all federal agencies to address invasive species concerns and refrain from actions likely to increase invasive species problems.

Invasive plants can negatively affect habitat by competing with native plants for resources such as water and light, establishing and changing the community composition, eliminating or reducing native plants, or changing the vegetation structure. The changes in community composition or vegetation structure can reduce native plant populations as well as negatively affect habitat for wildlife and fish. Compared to other states, Alaska has a low level of invasive plant infestations; however, invasive plant infestations within the state are increasing (Carlson and Shephard 2007; Nawrocki et al. 2011; Schrader and Hennon 2005).

Policy and guidance for managing invasive plants are provided by the Forest Service Manuals and Handbooks and Forest Service policy, including the Invasive Species Management Policy (Forest Service Manual [FSM] 2900), the *National Strategic Framework for Invasive Species Management* (USDA Forest Service 2013a), the Alaska Region Invasive Species Strategy (USDA Forest Service 2006), and the Tongass National Forest Invasive Plant Management Plan (Lerum and Krosse 2005). Additionally, the Tongass National Forest established an integrated weed management plan that includes manual and mechanical, as well as herbicidal, treaments of target invasive species on the Wrangell and Petersburg Ranger Districts (USDA Forest Service 2013b). FSM 2900 and Forest-wide standards and guidelines include direction to review proposed projects to determine the risk of introduction or spread of invasive plants and implement appropriate mitigation measures. They also include direction to control existing invasions and rehabilitate habitats impacted by invasive species.

Occurrences of invasive plants throughout Alaska are tracked by the Alaska Exotic Plants Information Clearinghouse (AKEPIC), a cooperative project between the Forest Service, State and Private Forestry, the National Park Service, U.S. Geological Survey, University of Alaska, and other federal, state, and local agencies. The AKEPIC database maintains a georeferenced inventory of Alaska's invasive plants (AKEPIC 2018). Additionally, all invasive plant surveys, invasive plant finds, and treatments are entered into the Forest Service's Natural Resource Information System (NRIS) georeferenced invasive species database (USDA Forest Service 2018j). As of January 2019, 125 species of invasive plants have been documented on the Tongass. The Forest Service database (NRIS-INVP) and associated map provides an estimate of the extent of infestations, as well as the locations of invasive species observed. Table 3.7-3 of the 2016 Forest Plan FEIS (USDA Forest Service 2016b) lists the invasive plants known on the Tongass, the number of observations of each species, and their invasiveness ranking. At the time of publication of the 2016 Forest Plan FEIS, there were 23,386 documented observations of 124 different invasive plant species on the Tongass. Currently, there are 24,257 known occurrences of 125 invasive plant species known on the Tongass.

Environmental Consequences

This section compares effects of the six alternatives on sensitive, rare, and invasive plants. There would be no effects to threatened or endangered plants under any of the alternatives because none are known on the Tongass.

The alternatives described in Chapter 2 differ in the locations and extent of land designated as roadless and the management categories designated for lands within roadless areas. None of the alternatives authorize any site-specific projects or other ground-disturbing activities; rather the alternatives describe exceptions under which certain activities might be allowed within roadless areas. Specific projects that include ground disturbance or tree cutting must undergo site-specific environmental analysis when they are proposed as required by the National Environmental Policy Act (NEPA). Additionally, the activities must still comply with applicable standards and guidelines identified in Forest land management plans.

Activities allowed under the action alternatives would primarily affect productive old-growth and young-growth forest habitats. Although there would be effects on unproductive forest, non-forest or other vegetation types, as roads are constructed through many types of habitat, these effects would be more limited since these vegetation types would not be the focus of any future timber harvest and associated road construction.

Indirect Effects

Sensitive and Rare Plants

Effects Common to All Alternatives

Direct effects of future timber harvest and road construction on sensitive or rare plants could include physical damage by cutting, trampling, or crushing them with vehicles, other machinery, foot traffic, or felled trees. Severe impacts may cause mortality or inhibit the vigor and reproductive capability of the plants.

Indirect effects to sensitive or rare plants from timber harvest or road construction and reconstruction involves alteration of habitat, such as changes in sunlight or hydrology, herbivore or pollinator behavior, soil structure and fertility, vegetation structure, fragmentation of habitat, and competition from other native plants as well as invasive plants. Some indirect effects, such as changes in sunlight or hydology, can be beneficial or harmful depending on the effect and the species' life history. Other activities likely to cause indirect effects to sensitive and rare plants include increased off-road vehicle use, increased access, and increased use and associated trampling by recreationists.

A biological evaluation (BE) was conducted for sensitive plants for the planning area during development of the 2016 Forest Plan (Krosse 2016). A BE is also conducted as part of the site-specific environmental analysis for individual project proposals. This type of sensitive plant review is required to include sufficient detail to determine how any proposed action may affect each sensitive species. In addition, existing Forest-wide standards and guidelines would be applied to avoid or minimize impacts to those sensitive plants and their habitat.

As a part of a NEPA analysis, an effects analysis may also be conducted for rare plants; however, a formal BE is not required. All alternatives would continue to follow the current Forest-wide standards and guidelines for rare plants.

Effects Specific to Each Alternative

In general, alternatives that are less permissive of road construction would have less risk of adverse effects to sensitive and rare plants and alternatives more permissive of road construction would have more risk of adverse effects. New road construction would be similar under all alternatives because roads on the Tongass are largely developed in support of timber harvesting and the projected timber sale quantity (PTSQ) under the 2016 Forest Plan does not vary between the alternatives. Thus, the predicted 1,000 new road miles on NFS lands over 100 years for the No Action alternative (from the 2016 Forest Plan EIS; see Appendix B, Table 3.4-6 in this EIS) would be similar for all alternatives, with minor variations. Under Alternatives 1 and 2, approximately 1,000 miles of new roads are estimated to be built on the Tongass over the next 100 years. Slightly more roads would likely be constructed under Alternative 3; however, the difference would likely be negligible. Alternatives 4, 5, and 6 are likely to result in the most road miles because they add the most remote suitable timber acres. However, the overall differences among alternatives in total new road miles are expected to be low because total harvest levels would remain the same among all alternatives.

Species-Specific Impacts to Sensitive and Rare Plants
Approximately 126 plants listed on the AKNHP Rare Vascular Plant List have been documented on the Tongass; because of the large number of rare plants, species-specific impacts to rare plants are not discussed in this document, but if, during project planning, they are known or suspected within the project area, they would be evaluated. Potential effects to the 16 sensitive plant species known or suspected to occur on the Tongass National Forest under each of the alternatives are discussed below.

As discussed above, 16 sensitve plant species are known or suspected to occur on the Tongass. Two of these 16 sensitive plant species, Escholtz's little nightmare (*Aphragmus eschoscholtzianus*) and pale poppy (*Papaver alboroseum*), are suspected, but not known to occur on the Tongass. Therefore, there is a very low risk that any of the alternatives would adversely impact these two sensitive species.

Potential impacts to the the 14 sensitive plant species that have been documented on the Tongass can be estimated by looking at the proportion of known occurrences of each sensitive plant species in areas suitable for young-growth and old-growth timber harvest, and the percentage of harvest expected in each of these suitable areas under each alternative. Only 4 sensitive plant species have known occurrences expected to be within suitable young-growth or old-growth harvest areas after 100 years (Table 3.6-2). As shown in Table 3.6-2, no known occurrences of Macoun's thistle (*Cirsium edule* var. *macounii*) or large yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens*) are expected within old-growth harvest areas under any of the alternatives. The proportion of known occurrences of Alaska rein-orchid (*Piperia unalascensis*) expected within old-growth harvest areas includes 0.6 occurrences under Alternative 1, 0.5 under Alternative 2, 0.4 under Alternative 3, and 0.3 under Alternatives 4, 5, and 6. For lesser round-leaved orchid (*Platanthera orbiculata*), the proportion of known occurrences expected within old-growth harvest units is 11.3 under Alternative 1, 11.1 under Alternative 2, 9.7 under Alternative 3, 7.6 under Alternative 4, and 7.4 under Alternatives 5 and 6. Therefore, Alternative 1 has the potential to impact a greater proportion of the known occurrences of Alaska rein-orchid and lesser round-leaved orchid than the other alternatives.

Within young-growth harvest areas, the proportion of known occurrences of Macoun's thistle expected within harvest areas is 0.9 under Alternative 1 and 0.8 under Alternatives 2, 3, 4, 5, and 6. The proportion of known occurrences of large yellow lady's-slipper and Alaska rein-orchid expected within young-growth harvest areas includes 1.7 under Alternatives 1 and 2 and 1.6 under Alternatives 3, 4, 5, and 6. Therefore, Alternative 1 has a slightly greater potential to impact Macoun's thistle, and Alternatives 1 and 2 have a slighter greater potential to impact large yellow lady's slipper and Alaska rein-orchid than the other alternatives. However, this difference is minimal.

The proportion of known occurrences of lesser round-leaved orchid expected within young-growth harvest units is 28.9 under Alternative 1, 27.6 under Alternative 6, 27.7 under Alternative 4, 27.3 under Alternative 5, 27.2 under Alternative 2, and 27.1 under Alternative 3. Therefore, Alternative 1 has the potential to impact a greater proportion of the known occurrences of lesser round-leaved orchid than the other alternatives; however, this difference is minimal.

Under all alternatives, if previously undocumented populations of any sensitive plant species are located during project surveys, Forest-wide standards and guidelines under all alternatives would consider protection to minimize impacts to these species on the Tongass. For additional discussion of potential impacts to sensitive plant species from future timber harvest, road construction, and other development projects on the Tongass, see the 2016 Forest Plan FEIS (USDA Forest Service

2016b). Additional details on the assessment of impacts to lesser round-leaved orchid are provided in the Plants BE (Krosse 2016).

Table 3.6-2
Known Occurrences of Sensitive Plant Species within Estimated Old-Growth and Young-Growth Harvest Areas over 100 Years by Alternative

		Species			
Alternative	**Harvest Type**	**Macoun's thistle (*Cirsium edule* var. *macounii*)**	**Large yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens*)**	**Lesser round-leaved orchid (*Plantathera orbiculata*)**	**Alaska rein-orchid (*Piperia unalascensis*)**
1	Known Occurrences in Est. YG Harvest Areas	0.9	1.7	28.9	1.7
	Known Occurrences in Est. OG Harvest Areas	0	0	11.3	0.6
2	Known Occurrences in Est. YG Harvest Areas	0.8	1.7	27.2	1.7
	Known Occurrences in Est. OG Harvest Areas	0	0	11.1	0.5
3	Known Occurrences in Est. YG Harvest Areas	0.8	1.6	27.1	1.6
	Known Occurrences in Est. OG Harvest Areas	0	0	9.7	0.4
4	Known Occurrences in Est. YG Harvest Areas	0.8	1.6	27.7	1.6
	Known Occurrences in Est. OG Harvest Areas	0	0	7.6	0.3
5	Known Occurrences in Est. YG Harvest Areas	0.8	1.6	27.3	1.6
	Known Occurrences in Est. OG Harvest Areas	0	0	7.4	0.3
6	Known Occurrences in Est. YG Harvest Areas	0.8	1.6	27.6	1.6
	Known Occurrences in Est. OG Harvest Areas	0	0	7.4	0.3

OG = old growth; YG = young growth

Invasive Plants

Effects Common to All Alternatives

Ground disturbance associated with timber harvest, road construction, and other development or management activity on the Forest provides an opportunity for invasive plant introduction or expansion. Introduction and spread of invasive plants can occur because these activities disturb soil and/or remove existing vegetation, providing openings for invasive plants to establish or spread. Additionally, movement of equipment and personnel can also provide opportunities for transport of invasive plant seeds or propagules into new areas. Indirect effects can include the establishment or spread of invasive plants through the use of roads after harvest for recreation or during road maintenance. Similarly, construction and maintenance of energy and utility line projects and associated road construction, maintenance, and use increases the risk of invasive species spread and colonization. The impacts of

invasive plant spread and colonization can often spread beyond the area of disturbance.

Effects Specific to Each Alternative

The potential for the introduction and spread of invasive plant species due to ground disturbance associated with timber harvest, road construction, and other development or management activity exists under all alternatives. Increased disturbance increases the risk of establishment or spread of invasive plants. As discussed above, the volume of timber anticipated to be harvested and the miles of new roads anticipated to be constructed are not expected to be significantly different under the six alternatives. As a result, the alternatives are not expected to differ significantly in regard to their contributions to the introduction and spread of invasive species on the Tongass. Timber harvest and road construction in inventoried roadless areas, however, could potentially lead to the introduction and spread of invasive species where these species do not currently exist. Thus, Alternatives 1 and 2 would have little effect on the spread of invasive species, and Alternative 3 would only have a slightly larger effect. Alternatives 4, 5, and 6 would have the largest potential to result in the spread of invasives into currently roadless areas.

The number of documented occurrences of invasive plant species within suitable young-growth and old-growth stands is similar under all the alternatives. Additionally, none of the alternatives authorize any site-specific projects or other ground-disturbing activities. Specific projects that include ground disturbance or tree cutting must undergo site-specific environmental analysis when they are proposed as required by NEPA, and the activities must still comply with applicable standards and guidelines identified in forest land management plans, including management of invasive species.

Cumulative Effects

Sensitive and Rare Plants

There are no federally listed or proposed threatened or endangered plants that are known to occur or are likely to occur on the Tongass National Forest; therefore, there would be no contribution to cumulative effects to threatened or endangered plants under any of the alternatives.

When considering effects to sensitive and rare plants, it is important to look at the cumulative effects of past, present, and reasonably foreseeable future activities on all land ownerships within the geographic area. The significance of any direct or indirect effect in contributing to the cumulative effects on sensitive and rare plants from management activities depend on the amount and type of disturbance in the cumulative effects analysis area and how that disturbance may affect known locations of sensitive and rare plants.

Past plus expected timber harvest, road construction, and implementation of other development projects on all land ownerships within the Forest boundary on all lands in Southeast Alaska can be used to compare the risk that each alternative would add to cumulative effects on both sensitive and rare plants. Therefore, all lands in Southeast Alaska constitute the cumulative effects analysis area for sensitive and rare plants. Appendix A provides a full list of all the projects considered in the cumulative effects analysis.

As stated above, overall timber harvest levels are not expected to vary significantly among the proposed alternatives. Therefore, the contribution of cumulative effects to sensitive or rare plants due to timber harvest and road construction would be similar for all alternatives. Other activities that have occurred in the past and are reasonably foreseeable to occur in the future that have the potential to add to cumulative effects to rare and sensitive plants include mineral extraction, energy and utility line

projects, hydroelectric projects, transportation developments, and urban and recreational site development (Appendix A). Each of the activities could include clearing vegetation and disturbing habitat for construction and maintenance; therefore, they have the potential to affect sensitive and rare plants and their habitat. These impacts would be considered in project analysis and an assessment of cumulative effects to sensitive and rare plants wiould also be done for individual projects as part of the NEPA process for the relevant analysis area.Timber harvesting on state, municipal, and private land is governed by the Alaska Forest Resources and Practices Act (AS 41.17). Alaska Forest Resources and Practices Regulations (ADNR 2013) do not address threatened, endangered, or rare plants; however, they do recommend minimizing road construction and limiting disturbance in marshes and muskegs, which would provide some protection for some of the sensitive and rare plants.

Changes in Alaska's climate (discussed in the *Climate and Air* section of this chapter) could affect the hydrology and other habitat conditions where sensitive and rare plants occur. While the models do not fully agree on the climate change predictions for Southeast Alaska, they generally predict warmer weather with increased rainfall, and a decrease of snowfall. Recent research by Shanley et al. (2015) predicted an increase in mean annual temperature of approximately 3 to 10 degrees Fahrenheit, a 3 to 18 percent increase in mean annual precipitation, and a 22 to 58 percent decrease in snowfall by the 2080s (Shanley et al. 2015). These changes would likely result in lower soil moisture due to increased evaporation during warmer summer months. Also, a precipitation shift from snow to rain could lead to more water running off the landscape rather than being stored as snow and feeding streams and wetlands in the late spring and summer, thus increasing evaporation and reducing water storage. These factors could lead to drier streams, meadows, and wetlands.

Changes in temperature and hydrologic conditions would likely favor some plants and stress others. There has been little research into the effects of changes in environmental conditions for each of the sensitive and rare species; consequently, there is uncertainty as to the effect of changes in the climate on sensitive and rare plant species known or suspected to occur on the Tongass.

Invasive Plants

Invasive plants on any land ownership in Southeast Alaska can affect establishment or spread of invasive plants on NFS lands and vice versa. As mentioned in the direct and indirect effects, activities can have wider effects on invasive plant spread than the specific area of land disturbance due to the interconnectedness of land. The cumulative effects of invasive plants from management activities would depend on factors such as the following:

- Amount and location of ground disturbance;
- Existence and extent of invasive plants at the time of project implementation;
- Overall habitat alteration due to invasive plants expected as a result of past, present, and foreseeable projects; and
- Anticipated response of invasive plants to the proposed actions and any management considerations or mitigation and monitoring that will be applied to each project.

Past, present, and future timber harvest, road construction, and other development activities on both private and public lands can be used to compare the risk of cumulative effects of the six alternatives on invasive plant introduction or spread. As stated above, overall timber harvest levels are not expected to vary significantly

among the alternatives. Therefore, the contribution of cumulative effects to invasive plants due to timber harvest and road construction would be similar for all alternatives.

As discussed under cumulative effects for sensitive and rare plants, there are fewer restrictions on timber activities on non-NFS lands than on NFS lands. Timber activities on non-NFS lands that can contribute to the introduction or spread of invasive plants are not specifically regulated by the State of Alaska. Other activities that have occurred and are reasonably foreseeable to occur in the future that have the potential to add to cumulative effects of invasive plants include mineral activities, renewable energy and utility line projects, hydroelectric projects, transportation developments, and urban and recreational site development (Appendix A). Each of these activities can include clearing vegetation, construction, transportation for construction and ongoing activities, and maintenance. Therefore, they have the potential to introduce or spread invasive plants in an area and would need to be considered in the project analysis.

Changes in Southeast Alaska's climate (discussed in the *Climate and Air* section of this chapter) could also create the conditions that encourage the spread of invasive plants by altering opportunities for invasive plants to colonize new areas, where could be compounded by climate change. Changing climate may also result in range extensions for some species that are native at more southerly latitudes, and they may become established or become more widespread on the Tongass, as a result. Changes in growing conditions would likely favor some plant species and stress others. There is uncertainty about the effect of changes in climate on invasive plants on the Tongass.

With any of the action alternatives, applying mitigation measures in the form of Forest-wide standards and guidelines as well as ongoing invasive plant control and management programs will contribute to lessening the cumulative effects of invasive plants across Southeast Alaska. For additional discussion of Forest-wide standards and guidelines and mitigation measures used by the Forest Service for prevention and control of invasive plants during implementation of management actions, see the 2016 Forest Plan FEIS (USDA Forest Service 2016b).

Transportation, Energy, Communications, and Infrastructure

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Affected Environment

Transportation

Residents of the region are dependent on air and water transportation for travel between most communities, rather than roads or rail. A roaded transportation system has developed on National Forest System (NFS) lands, largely in support of timber harvesting, but for the most part does not connect communities except on Prince of Wales Island. This section focuses on the road transportation system.

Regional Transportation System

The Alaska Department of Transportation & Public Facilities (ADOT&PF) issued the Final Southeast Alaska Transportation Plan (SATP) in 2004 (ADOT&PF 2004). The 2004 SATP called for transitioning away from the long line ferries to a system of expanded roads and shuttle ferries to fill the gaps in the road network. The 2004 SATP also identified 34 essential highway and utility corridors and requested they be reserved and incorporated into the Forest Plan.

A Draft SATP was published in June 2014 (ADOT&PF 2014). The Draft SATP includes the same 34 essential corridors and identifies two priority highway transportation projects that could be developed within the next 20 years: East Lynn Canal Highway (Juneau Access Project) and a road (with ferry segment) between Kake and Petersburg. The Draft SATP also identifies a road between Sitka and Warm Spring Bay on the east side of Baranof Island as a priority, but not likely to be developed within the next 20 years.

Because the ADOT&PF's Southeast Region lies largely within the Tongass National Forest's boundaries, many of the proposed road projects cross NFS lands and require Forest Service easements. The proposed linkages for the East Lynn Canal Highway (Juneau Access Improvement Project), the Kake to Petersburg road, and the Sitka to Warm Spring Bay road would each cross NFS land.

In August 2005, Congress enacted Section 4407 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act - A Legacy for Users (SAFETEA-LU; Public Law 109-59), which states: "Notwithstanding any other provision of law, the reciprocal rights-of-way and easements identified on the map numbered 92337 and dated June 15, 2005, are hereby enacted into law."

In September 2014, the Federal Highway Administration (FHWA) published a Draft Supplemental Environmental Impact Statement (SEIS) for the Juneau Access Improvement Project. The State of Alaska identified the No Action alternative as its preferred alternative, and subsequently the FHWA selected the No Action alternative in its July 2018 Final SEIS and ROD. While this project would have required road building within Inventoried Roadless Areas (IRAs), it was permissible under the exemption for roads "provided by statute or treaty" because it was authorized under Section 4407 of Public Law 109-59.

National Forest System Roads

NFS roads are constructed to provide access to NFS lands and are included in the Forest Development Transportation Plan (see Transportation Standards and Guidelines in Chapter 4 of the 2016 Forest Plan Amendment [USDA Forest Service 2016a]). Most NFS roads are unpaved, single-lane roads designed for off-highway loads.

On the Tongass, the demand for roads has primarily been 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. Future construction is anticipated to continue to be largely determined by the need to access timber resources. As of the 2016 Forest Plan Amendment, there were approximately 5,100 miles of roads on NFS lands (including both classified roads and unclassified roads), of which approximately 3,100 miles are not maintained for highway vehicles. There are another 4,300 miles of roads that are on non-NFS lands.

All harvest requires some road construction and maintenance and repair. If the planned harvest area is roaded, then the majority of the activity expected is road maintenance and repair. Otherwise, road construction is the primary activity. The amount of road construction or maintenance and repair required depends on the geographic location of the harvest area. Maintenance and repair are the only activities necessary once timber harvest comprises solely regenerated timber stands because the roads were built to the stands for the first harvest.

Road maintenance can include reconditioning the original road prism, grading the road surface, cleaning roadside ditches, maintaining culverts, and removing vegetation that may encroach upon the road or block vision.

Log Transfer Facilities

The transport of harvested timber from isolated islands in Southeast Alaska requires both land and water routes to reach processing facilities. Log transfer facilities (LTFs) are used to transfer logs to barges or rafts for towing. Over 100 LTFs exist on the Tongass. A Memorandum of Understanding (MOU) grants the Forest Service easements to use the 126 LTFs on state lands listed on Map 92337.

Transportation Systems in the Forest Plan

The 2016 Forest Plan applies the Transportation Systems Corridors Direction to existing and future transportation system corridors such as the those considered under the current SATP and applicable laws (i.e., Section 4407 of Public Law 109-59; Alaska National Interest Lands Conservation Act of 1980 [ANILCA] Title XI, Public Law 96-487).

Within IRAs, the Roadless Rule generally prohibits construction or reconstruction of roads with some exceptions. A Line Officer may authorize a road in an IRA if they determine it meets certain criteria (see Chapter 2).

Energy

Twenty-two operating hydroelectric projects are located either on NFS lands or on adjacent state or private land. These projects have a total installed capacity of 216.9 megawatts (MW) and range in size from less than 1 MW to 78 MW in size.

The existing transmission system in Southeast Alaska is limited. The electric systems in a few communities are currently interconnected. These may be summarized by region, as follows:

- Southeast Alaska Power Agency (SEAPA) Region—The SEAPA system connects Ketchikan, Petersburg, and Wrangell.
- Juneau Area—The Alaska Electric Light & Power (AEL&P) system connects Juneau, Douglas Island, Auke Bay, and Greens Creek.
- Prince of Wales Island—The Alaska Power & Telephone (AP&T) system connects the communities of Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, and Thorne Bay.
- Upper Lynn Canal Region—A separate AP&T system connects Haines and Skagway in the Upper Lynn Canal Region and is connected via an intertie to the existing Inside Passage Electrical Cooperative (IPEC) system that serves Klukwan and Chilkat Valley.

Inventoried Roadless Areas

Currently, there are five proposed or unconstructed renewable energy projects in IRAs (see Table 3.7-1). In addition, proposed transmission lines serving as power interties among Southeast Alaska communities also cross IRAs.

Table 3.7-1
Proposed or Unconstructed Renewable Energy Projects in IRAs

Name	Ranger District	Power Destination	IRA
Sweetheart Lake	Juneau	Juneau	302
Crooked Creek/Jim's Lake	Hoonah	Elfin Cove	311
Little Port Walter	Sitka	Little Port Walter Marine Station	334
Bell Island Geothermal[1]	KMF	Swan-Tyee Intertie	529
Mahoney Lake[2]	KMF	Swan-Tyee Intertie	524

[1] See *Minerals* section for geothermal discussion.
[2] Federal Energy Regulatory Commission licensed in 1998, unconstructed.

Commented [U19]: This does not include the Kake – Petersburg intertie, why not?

Hydroelectric projects are not prohibited in IRAs[1] on the Tongass. The Federal Power Act (FPA) grants the Federal Energy Regulatory Commission (FERC) the authority to issue and administer licenses for hydropower projects. For projects located on NFS lands, Section 4(e) of the FPA requires FERC to determine whether the project is consistent with National Forest purposes and the land management plan. Section 4(e) also gives the Forest Service authority to impose

[1] In reinstating the Roadless Rule on the Tongass, the Alaska District Court's judgement in *Organized Village of Kake, et al., v. USDA, et al.* clarified that "nothing in this judgement shall be construed to prohibit any person or entity from seeking, or the USDA from approving, otherwise lawful road construction, road reconstruction, or the cutting or removal of timber for hydroelectric development pursuant to the standards and procedures set forth in the Federal Power Act."

mandatory conditions in the FERC license to ensure the adequate protection and use of NFS land and resources.

The Roadless Rule does not prohibit the construction or maintenance of energy transmission lines that do not require road construction or reconstruction. Temporary or permanent roads are not permitted in IRAs, with exceptions, though temporary linear construction zones can be temporarily authorized. As of January 2018, 10 hydropower or intertie projects have been approved in IRAs in Region 10.

Communications and Infrastructure

Appendix E of the 2016 Forest Plan (USDA Forest Service 2016a) lists approved communication sites on the Tongass National Forest (Table E-1). Sites approved for telecommunication facilities are characterized by antennas, electronic transmitters, equipment shelters, and a wide variety of electronic communication support equipment such as those listed in Forest Service Handbook 2709.11, Chapter 90.

Proposals for new communications uses on the Tongass National Forest will be encouraged to co-locate on an approved communications site, unless the proponent demonstrates that communication sites approved in the Forest Plan are not technically feasible due to geographic location or are incompatible with the requested use.

Communication and infrastructure are not prohibited in IRAs.

Environmental Consequences

Transportation Effects

The following discussions address the indirect and cumulative effects of the alternatives on the transportation and other infrastructure of Southeast Alaska. Direct effects would result from future on-the-ground activities that could occur in or outside or roadless areas under the Forest Plan, which would be evaluated when they are proposed.

Effects on the National Forest Transportation Road System

New road construction would be similar under all alternatives because roads on the Tongass are largely developed in support of timber harvesting and the projected timber sale quantity (PTSQ) under the 2016 Forest Plan does not vary between the alternatives. Thus, the predicted 1,000 new road miles on NFS lands over 100 years for the No Action (from the 2016 Forest Plan EIS, see Table 3.4-6 in Appendix B of this EIS) alternative would be similar for all alternatives, with minor variations. Because the locations of future harvests and associated roadbuilding are unknown, a qualitative discussion of the predicted difference is used here.

Existing conditions in 2016 included about 5,100 miles of existing road on NFS lands (from the 2016 Forest Plan EIS; see Table 3.4-6 in Appendix B of this EIS). The projection over the next hundred years was modeled to include an additional 1,000 miles of new roads, totaling about 6,100 miles of new roads over 100 years. This would be an increase of nearly 20 percent over existing conditions in 2016. In addition to new roads, roads would be constructed over decommissioned roadbeds or reconstructed. Reconstruction involves the rehabilitation of the original roadbed, and can include cleaning ditches, replacing drainage structures, re-installing bridges, and grading and shaping. By the same rationale, the estimated 500 miles of roads constructed over decommissioned roadbeds and 1,100 miles of road reconstruction over 100 years for the No

Action alternative would be similar among all alternatives (from the 2016 Forest Plan EIS, see Appendix B, Table 3.4-6).

Alternatives 1 and 2 would have roughly the same amount of road miles as indicated in the current Forest Plan evaluation because additional timber harvest opportunities would be provided through the removal of roadless area protection within roadless areas that have roads (known as roaded roadless). In roaded areas, most of the activity expected is road maintenance and repair.

Alternative 3 is expected to result in more new road miles than Alternatives 1 and 2 because additional timber harvest opportunities would be provided through extending areas removed from roadless protection to forest lands adjacent to existing road and harvest systems in addition to the roaded roadless areas. Thus, some new roads may be constructed to access these adjacent areas, and road maintenance and repair would occur within previously roaded areas.

Alternatives 4, 5 and 6 would be similar and have the potential for slightly more road miles than Alternative 3 because they would allow harvests and roadbuilding in areas farther from existing road systems. However, the economics of building extensive roads to access forest land farther from the transportation system would be a limiting factor for new road construction.

Most roads would be closed to motorized traffic once their initial use is over. These roads are built for silvicultural purposes under exemptions granted under Section 404(f)(1) of the Clean Water Act. Roads constructed and maintained specifically for recreation or other uses do not qualify under this exemption (USACE 2004).

The effects of operation at LTFs are likely to be same under all alternatives because the PTSQ does not vary between the alternatives. Guidelines for LTF siting, construction and operation, and monitoring are provided in Appendix G of the 2016 Forest Plan.

Regardless, any decision on this Alaska Roadless Rule EIS would not result in any on-the-ground effects. Any future Forest Service actions that would result in road building, maintenance, or removal would be subject to additional project-level National Environmental Policy Act (NEPA) analysis.

Effects on Regional Transportation Opportunities

Alternative 1

Transportation Systems Corridor plan components under the Forest Plan would apply to major road systems such as state and federal highways, railroads, and those identified by the State of Alaska in the current version of the SATP and applicable laws (for example, Section 4407 of Public Law 109-59, Title XI of ANILCA, Public Law 96-487).

The 2001 Roadless Rule provides an exception to allow construction, reconstruction, or realignment of a Federal Aid Highway to occur in IRAs and pursuant to reserved or outstanding rights, or as provided by statute or treaty.

Action Alternatives

Each of the action alternatives would add or remove areas or roadless protection to varying degrees (Table 2-8) that would affect where and for what purpose roads could be developed. Generally, roads would be prohibited in Alaska Roadless Areas (AKRAs) unless they met the one of the exceptions listed in Table 2-1. The exceptions vary by AKRA priority areas. Watershed priority

AKRAs (Alternative 2) are the most restrictive to road building. Timber priority AKRAs (Alternative 4) place no prohibition on permanent or temporary roads. Land Use Designation (LUD) II and Roadless priority AKRAs fall in the middle.

The effect to the potential for development of regional transportation systems within each AKRA priority area is discussed below.

Watershed Priority (Alternative 2 only)
Watershed Priority AKRAs would be more restrictive on regional transportation routes than the current roadless rule because the exception for construction, reconstruction, or realignment of a Federal Aid Highway in IRAs would be removed. Roads needed pursuant to reserved or outstanding rights, or as provided for by statute or treaty, would still be allowable in watershed priority AKRAs. There is no exception for State highways.

LUD II Priority (Alternatives 2, 4, and 6)
Within LUD II priority AKRAs, regional transportation routes would be permissible when a road is needed for Federal Aid Highway projects (same as the 2001 Roadless Rule), a transportation need is identified by the State of Alaska, other vital linkage and no other feasible routes exist, or it can be demonstrated that routing through the LUD II area is clearly environmentally preferable. Site-specific measures would be designed to minimize effects on the primitive characteristics of the area or on recreational resources and scenery.

Roadless Priority (Alternatives 2, 3, 4, and 6)
Within Roadless priority AKRAs, regional transportation routes would be permissible when a road is needed for Federal Aid Highway projects, for the connection of communities and development of the regional transportation system as identified in the State of Alaska's SATP and roads identified in the easements Congress enacted in Section 4407 of Public Law 109-59, and no other feasible routes exist or it can be demonstrated that routing through the AKRA is the least environmentally damaging practicable alternative.

Timber Priority (Alternative 4 only)
Timber priority AKRAs would not prohibit road building and would make development of regional transportation systems easier.

Alternative 2
Alternative 2 includes watershed, LUD II, and roadless priority AKRAs. With 3.2 million acres (1.1 million acres of development LUDs) of watershed priority AKRAs, Alternative 2 would be more restrictive on regional transportation opportunities. However, the exceptions for regional road systems would be increased in LUD II (857,000 acres) and roadless priority AKRAs (5.2 million acres) compared to the 2011 Roadless Rule.

The 2004 SATP (ADOT&PF 2004) identified 34 essential highway and utility corridors distributed throughout the Southeast Alaska and the Forest. Roadless areas exist along many of these routes and, under Alternative 2, several of the crossed roadless areas would be designated as watershed priority AKRAs, which do not include the exception for State roads included in the LUD II and Roadless priority AKRA. However, most of these routes were granted by Congress in 2005 (Public Law 109-59). Routes identified in the 2004 SATP that were not granted by Public Law 109-59 that could be prohibited in watershed priority areas include:

- A route on the east side of Eastern Passage (SATP Map 13);
- Portions of the Kuiu Island Corridor (SATP Map 19);

- A route on the Cleveland Peninsula north of Ketchikan (SATP Map 23);
- A portion of the route on Chichagof Island between Pelican and Tenakee Inlet (SATP Map 17); and
- A beachfront segment along Clarence Strait southeast of Coffman Cove (SATP Map 14).

Alternative 3
Alternative 3 includes 8.1 million acres of roadless priority AKRAs and would be more permissive to regional road building than Alternatives 1 and 2 because it decreases roadless area acres by about 1.1 million acres (although 857,000 acres of this would be in LUD II areas). All remaining AKRAs would be roadless priority, which provide more exceptions for regional road systems compared to the 2001 Roadless Rule.

Alternative 4
Alternative 4 includes about 9 million acres of LUD II, roadless, and timber priority AKRAs. Alternative 4 would be more permissive to regional road building than Alternatives 1 and 2 because it decreases roadless area acres by about 224,000 million acres and applies the timber priority to about 860,000 acres roadless. Together, the area removed from roadless protection and the area of timber priority AKRAs would be about 1.1 million acres, similar to Alternative 3. Under Alternative 3 and 4, about 1.90 and 1.96 million acres, respectively, would remove roadbuilding restrictions imposed by the Roadless Rule within development LUDs. Of the remaining 1.1 million acres of AKRAs in Alternative 4, 7.3 million acres would be designated as roadless priority, and the remaining 857,000 acres would be LUD II AKRAs.

Alternative 5
Alternative 5 would be the most permissive to regional road systems because it would remove all 9.3 million acres of roadless areas.

Alternative 6
Alternative 6 includes 6.9 million acres of AKRAs and would be much more permissive to regional road building than Alternatives 1 through 4 because it decreases roadless area acres by about 2.3 million acres. All remaining AKRAs would be roadless priority, which provide more exceptions for regional road systems compared to the 2001 Roadless Rule. A total of 6.9 million acres would be roadless priority AKRAs and 0.8 million acres would be LUD II priority. The remaining roadless and LUD II priority AKRAs would have more exceptions for regional road systems compared to the current Roadless Rule.

Energy Effects

Five proposed energy projects are located in IRAs. All potential impacts to roadless areas would be addressed during the permitting and licensing of these projects, with most requiring NEPA analysis. Potential impacts would be mitigated, but some impacts, like the presence of a road or energy facilities in a roadless area, may be unavoidable.

No significant consequences related to energy projects and related infrastructure are anticipated for any of the alternatives. Removing roadless designations in areas under Alternatives 2 through 6 would simplify the process for projects but would not necessarily result in an increase in the number of projects developed. Where new roadless areas are added or expanded, the permitting process could

be more burdensome, but projects would not be prohibited. An exemption for public utility systems in Alaska Roadless Areas with roadless priority under Alternatives 2, 3, 4, and 6, would allow for tree cutting and road construction. Under Alternative 4, Roadless Areas with timber priority would not prohibit tree cutting or road construction at all. Where restrictions are removed, or exemptions added, the greatest effect may be in making the permitting process for developers less burdensome, resulting in more a rapid permitting process rather than an increase in the number of sites developed.

Effects on IRA characteristics under all action alternatives would need to be consistent with the 2016 Forest Plan components for Renewable Energy (Forest Plan Chapter 5). Existing and proposed renewable energy projects are widely distributed across the Forest, with six proposed renewable energy projects in roadless areas (Table 3.7-2). This would reduce the cumulative effects of these activities on any specific IRA. Overall, none of the alternatives would likely have much additional adverse effects to IRAs relative to current conditions.

Management and administration would remain the same regardless of the action alternative. For projects located on NFS lands, Section 4(e) of the FPA requires FERC to determine whether the project is consistent with National Forest purposes and the land management plan. The Forest Service will continue to use Section 4(e) to impose mandatory conditions in the FERC license to ensure the adequate protection and use of NFS land and resources. Non-FERC projects would continue to be administered through issuance of a special use authorization, with specified conditions and in accordance with other federal and state permits and/or permissions, to allow construction and operation of projects.

Table 3.7-2
Alaska Roadless Area Priorities at Proposed or Unconstructed Renewable Energy Projects IRAs[1]

Name	Roadless Area	Action Alternatives				
		2	3	4	5	6
Sweetheart Lake	302	W	R	R	D	R
Crooked Creek/Jim's Lake	311	R	R	R	D	R
Bell Island/Geothermal[2]	523	W	R	R	D	R
Little Port Walter	524	W	R	R	D	R
Mahoney Lake	524	R	R	R	D	R

[1] R = Roadless priority; W = Watershed Priority; D = Dropped
[2] See *Minerals* section for geothermal discussion.

Communications and Infrastructure Effects

Communications and infrastructure that do not require tree cutting or road building would be allowed in AKRAs.

Cumulative Effects

The road construction projected for non-NFS lands primarily includes roads needed for timber harvest, but also includes roads that may be built to serve or connect communities. Road corridors covered by Public Law 109-59 would, if developed, connect additional areas in Southeast Alaska to the continental highway system, and improve transportation between communities.

There is considerable uncertainty concerning the future development of Southeast Alaska's road system. As stated above, the ADOT&PF has prepared a Draft SATP. New roads linking communities and linking Southeast Alaska to the

continental highway system would be expensive to build and maintain, and funds have yet to be approved for their construction. The 2004 SATP estimated in 2004 that the cost would be $1.8 billion over 20 years. Most of the funding was anticipated to come from the federal government. To date, there has been no commitment for this level of funding from either the state or federal governments.

If new wood-processing facilities and markets are not developed, especially for young-growth products, the levels of harvest predicted in the 2016 Forest Plan EIS (USDA Forest Service 2016b) are unlikely to occur, and new road construction would be less than anticipated. There is also uncertainty concerning the funds to maintain the existing forest road network, to place existing roads into storage status, and to decommission roads that are no longer needed. Risks associated with inadequate funding include adverse effects to fish, water quality, and wildlife and increased safety hazards as older roads and stream crossings deteriorate.

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Timber Resources

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Affected Environment

Introduction

The forests of Southeast Alaska are primarily the western hemlock-Sitka spruce forest type. This forest type is part of the temperate rain forest that occupies a coastal strip 2,000 miles long from northern California to Southcentral Alaska. While western hemlock and Sitka spruce comprise the majority of the stocking in this forest type, associated species include, depending on location, yellow-cedar, western redcedar, mountain hemlock, and silver fir (Harris and Johnson 1983). Other forest lands support relatively small stands dominated by yellow-cedar, lodgepole pine (shore pine), red alder, or black cottonwood. Western hemlock is used for pilings, poles, railway ties, windowsills, doors, and construction lumber, and has been an important fiber source for pulp. Sitka spruce is used for lumber and commodity products, as well as specialty products, such as piano sounding boards, guitar faces, oars, planking, masts, and spars for custom-made or traditional boats, and ladders. For centuries Alaska Natives have used cedar species for canoes and paddles, housing (along with Sitka spruce), and totem poles. Today, redcedar is primarily used as a roofing material and yellow-cedar has many uses, including boats, utility poles, heavy flooring, framing, and marine decking and piling.

The forests of Southeast Alaska are the major source of raw materials for the region's wood products industry. Generally, timber harvested on National Forest System (NFS) lands is available for processing by the local wood products industry but most timber harvested on non-NFS lands is exported. Due to economic conditions in recent years, the exporting of timber from NFS lands has been allowed under certain circumstances. The wood products industry and associated regional employment is discussed in more detail in the *Key Issue 2* section of this document.

Current Condition of the Forest Land Base

Approximately 54 percent of the forest land on the Tongass National Forest (approximately 5.6 million acres) is classified as productive forest land; these lands are considered biologically capable of producing industrial wood products. Approximately 0.5 million acres of the productive forest lands on the Tongass have been converted to young-growth forest due to harvest or other disturbances such as fire or wind. This is approximately 3 percent of the total Tongass land base and 9 percent of the productive forest lands and represents approximately 15 billion board feet of harvested timber.

In addition to productive forest lands, the Tongass includes approximately 4.7 million acres of unproductive forest. These are lands that are not capable of producing industrial forest products, but are important for watershed protection,

wildlife habitat, recreation, and other uses. Unproductive forest 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 landslides or avalanches curtail timber development.

Currently, the forest land suitable for timber production covers approximately 564,000 mapped acres (230,000 old growth and 334,000 young growth). Following field verification, the suitable acreage is expected to amount to approximately 474,000 acres.

Current Condition of the Timber Resource

Age Class Distribution. The Tongass is a mix of old-growth stands and naturally regenerated young-growth forest, which consists of both wind-created and harvest-created young growth. Harvest-created young growth amounts to approximately 5 percent of the total forest land area. Suitable forest lands are classified into five stand conditions: 1) old-growth sawtimber, 2) young-growth sawtimber, 3) pole timber, 4) seedling and sapling, and 5) non-stocked. For timber inventory purposes, stands of trees 150 years old or older are designated as old growth. Over 85 percent of productive forest lands meet the criteria for old-growth sawtimber (USDA Forest Service 2016b). Forests less than 150 years (harvest and natural) cover approximately 0.6 million acres; forests that are 150 years of age or older cover over 5 million acres.

Approximately 46 percent of the area harvested over the past century is no longer suitable, due to Congressional designations such as Wilderness, State and Native land selections, or Forest Plan Land Use Designation (LUD) allocations. For example, areas designated as Wilderness or LUD II by Congress are no longer suitable.

Approximately 80 percent of harvested young growth stands on the Tongass are less than 55 years of age and about 10 percent of young-growth stands are 56 to 65 years of age. Because stands on the Tongass need to be about 65 years old or older to have a chance of being economic to harvest, less than 10 percent of the Tongass harvested young-growth stands are currently in this category.

Volume Strata

The Forest currently uses three volume strata to categorize commercial timber: high, medium, and low volume. Average volumes for each category vary with geographic area on the Tongass. In terms of net sawlog volume, the high-volume stratum averages about 25 to 33 thousand board feet (MBF) per acre, medium volume averages about 18 to 28 MBF per acre, and low volume averages about 5 to 15 MBF per acre, depending on geographic area (USDA Forest Service 2016b, Table 3.13-4).

While the three-strata approach is useful for estimating timber volume for forest planning purposes, it is not a good tool for identifying other important forest elements, including forest structure, ecosystem diversity, and wildlife habitat. For example, two stands may have the same volume, but one may be a dense stand of medium-sized trees with a single canopy layer, while the other stand may be a combination of widely- spaced large overstory trees and two or three lower canopy layers containing small- and medium-sized trees. To help account for these differences, the Size Density Model (SDM), which is based on a combination of tree sizes and tree densities (Caouette et al. 2001), has proven to be a better tool for representing these other forest elements. Using tree sizes and densities provides a more comprehensive forest measuring system for describing habitat than timber volume (Spies and Franklin 1991). The SDM (Caouette and DeGayner 2005) is described and used in the *Biodiversity* and other sections.

Non-National Forest System Lands

The State of Alaska, Native village corporations, Sealaska (the Native regional corporation), and individuals own over 1,186,000 acres of land in Southeast Alaska, inside the Forest boundary. Approximately 364,000 acres of this land currently consists of productive old-growth forest and 422,000 acres consists of young growth. This means that approximately 54 percent of the original productive old growth on non-NFS lands has been harvested (based on geographic information system analysis and information provided by the landowners; USDA Forest Service 2016b). Most timber harvested from Department of Natural Resources state lands in recent years has been processed locally, while timber harvested from University Trust and Mental Health Trust lands has been exported.

Current Practices

Young-Growth Management

Managing young-growth forests in Southeast Alaska will become an increasingly important component of forest management on the Tongass in the next decade. Young-growth stands can be treated through thinning and other intermediate treatments to concentrate growth in fewer, larger trees, improve lumber quality, and/or to enhance habitat conditions for wildlife. Zaborske et al. (2000) concluded that the types of treatments applied to young stands will have a profound effect on the types of materials available in the future, including log diameter, knot size, and wood strength.

Public Law 113-291 specifies that the Tongass may harvest trees prior to 95 percent of culmination of mean annual increment (CMAI) to facilitate the transition away from commercial timber harvest of old-growth stands.

Over 200,000 acres have been precommercially thinned on the Tongass since 1979. In recent years, precommercial thinning has averaged approximately 5,600 acres per year. The Forest has less experience with other young-growth management techniques, such as pruning and commercial thinning.

There has been increased interest in commercial thinning in recent years, not only to improve timber values, but as a tool to improve wildlife habitat. Studies in other forest types in the Pacific Northwest indicate that stand structures that are similar to old-growth forest conditions can be developed through thinning (Thysell and Carey 2000). However, there are many unanswered questions as to how to implement thinning treatments that provide a sustainable source of high-value wood products while maintaining biological diversity (Zaborske et al. 2000). In a study comparing the lumber harvested from thinned and unthinned, 90-year-old stands on the Tongass National Forest, Christensen et al. (2002) found that there was no difference in volume recovery or lumber grade in thinned and unthinned Sitka spruce. For western hemlock, the unthinned stands produced more wood volume, but the thinned stands produced more high-grade lumber. The Prince of Wales Commercial Thinning Study was awarded as an Integrated Resource Service Contract at the end of fiscal year 2008. This study looks at five different commercial thinning prescriptions that offer a range of potential treatments that could be used on the Tongass. The five different prescriptions were implemented at three replicates: near Harris River, in the Maybeso Experimental Forest, and near Naukati. The objectives of the study are to assess how mechanized equipment operates, how the different prescriptions hold up to Southeast Alaska's weather, and what the understory response is after treatment. A 5-year re-measurement of the sites was completed in 2014.

There is also increased interest in managing young-growth stands to increase and maintain understory vegetation, especially as forage for deer and other

wildlife. Hanley et al. (2005) noted that much research is needed on new approaches involving thinning of older stands, including red alder in the secondary successional sequence. Zaborske et al. (2002) found that thinning greatly increased forage production, though the amount of useful forage produced varied by the type of thinning implemented.

In addition to their continuing research on managing young forests, scientists at the Pacific Northwest Research Station joined with the Tongass National Forest in 2001 to establish an operational-scale adaptive management study of young-growth management options. This program, called the Tongass-wide Young-Growth Studies (TWYGS), is designed to evaluate the potential benefits of treating young-growth stands to increase wildlife habitat and wood production. Currently, TWYGS includes experiments that test the effectiveness of alder interplanting, precommercial thinning, slash treatments, girdling and pruning.

Regeneration Methods

Regeneration methods are the harvest methods used to create a new age class within a stand. The methods used on the Forest are not expected to differ when applied to old-growth or young-growth stands. A description of the primary methods is provided in the *Timber* section of the 2016 Forest Plan FEIS (USDA Forest Service 2016b). They cover even-aged, two-aged, and uneven-aged systems.

Species Composition

Of the four major commercial tree species on the Tongass, western hemlock is the most shade tolerant, followed by western redcedar, yellow-cedar, and Sitka spruce, in that order (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 has the lowest economic value of these four species. Having a diverse species mix contributes to wildlife habitat quality, economic value, and minimizes losses due to insect and diseases that are species specific.

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. Group selection with openings of at least 2 acres could also encourage germination and growth of Sitka spruce and the cedars, but to a lesser degree than clearcutting due to side shading. The amount of sun reaching the surface would vary depending on the size, shape, and aspect of the opening. 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 treatments with many reserve trees would encourage growth of western hemlock at the expense of the other species. However, limited retrospective studies indicate that Sitka spruce can be maintained in mixed hemlock-Sitka spruce stands over a wide range of cutting intensities if enough Sitka spruce trees are present in the stand after harvest (McClellan 2005). Two-aged harvest would be similar to even-aged harvest if leave trees are concentrated near the unit boundaries but may be more favorable for western hemlock regeneration if reserve trees are scattered through the unit, due to shading from the residual overstory.

Forest Health

Insects, diseases, related decay processes, and windthrow 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 in the *Biodiversity* section

of this chapter) and in providing wildlife habitat. The majority of the forests on the Tongass are old-growth forests. Losses to the timber resource caused by heart rot in live trees are considerable in old-growth forests. Approximately one-third of the volume of the old-growth hemlock-spruce forests in Southeast Alaska is decayed by heart rot fungi (USDA Forest Service and ADNR 2014).

In addition to heart rot, some of the more common destructive insects, diseases, and conditions within Southeast Alaska are the black-headed budworm (*Acleris gloverana*), hemlock sawfly (*Neodiprion tsugae),* hemlock dwarf mistletoe, (*Arceuthobium tsugense*) and other decays, Alaska yellow-cedar decline*,* and windthrow.

Decline and mortality of yellow-cedar continues to be one of the most widespread and important forest problems in Southeast Alaska. This decline is associated with wet, poorly drained sites, and recent research has demonstrated that no organism is the primary cause of the decline (Hennon and Shaw 1997). As the climate continues to warm, cedar decline is likely to continue to spread, especially in the south and east. Conversely, yellow-cedar appears to be spreading northward as climate warms, into areas that retain snow longer into the spring.

Windthrow is the dominant disturbance agent in Southeast Alaska. Two forms occur: small-scale events (gap disturbance) and large-scale events (catastrophic disturbance). Most of the Forest is subject to small-scale windthrow events. Individual trees or small groups of trees blow over during storm events, opening gaps in the canopy that allow young trees to grow to fill the openings. This results in complex, mixed-aged stands. Disease and decay agents also play a role in this process. Small-scale events occur on a regular basis and result in openings from 6 to 13 percent on the canopy (Nowacki and Kramer 1998). Areas not protected by topographic barriers from the severe effects of infrequent, major storms are subject to large-scale windthrow events that cause catastrophic damage. Entire stands have been blown down in the past, resulting in the regeneration of more even-aged stands with more uniform canopies (Nowacki and Kramer 1998). Both forms of windthrow are a part of the natural forest generation, growth, and development. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased large-scale blowdown across Southeast Alaska as well as increased windthrow around harvest units.

Reforestation

The National Forest Management Act (NFMA) requires assurance that all areas receiving final removal harvest can be adequately restocked with trees within 5 years of that harvest. On the Tongass, natural restocking is usually adequate to meet this objective because both western hemlock and Sitka spruce are prolific seed producers (USDA Forest Service 1983). The new stand originates from advance regeneration and from seeds that come from residual trees or from trees adjacent to the harvest unit.

Precommercial thinning is applied in young stands that have not reached merchantable size. It is the most commonly applied intermediate treatment in Southeast Alaska. It is used to:

- Favor preferred tree species.
- Concentrate tree growth on fewer individuals to produce larger trees in a shorter period of time.

- Increase the amount of light reaching the forest floor, thereby retaining understory vegetation that is valuable wildlife forage (DellaSalla et al. 1994).

Commercial thinning is applied to young stands that have reached merchantable size. The primary difference between commercial and precommercial thinning is that the trees cut in a commercial thinning operation are removed and sold. Commercial thinning can be used to:

- Meet market demand for wood products, either from suitable or unsuitable lands (harvest would only be used on unsuitable lands to meet resource objectives, such as improving wildlife habitat, and where no irreversible damage would occur).
- Maintain or increase the growth rate of dominant and co-dominant trees by removing trees in the lower crown classes, increasing merchantable yields over the rotation.
- Stimulate development of more complex canopy structures or enhance forage in the understory in order to meet wildlife habitat needs.
- Maintain or improve scenic quality.

By maintaining or increasing growth rates, commercial thinning lengthens the time needed for a stand to reach CMAI, extending the rotation length (Daniel et al. 1979).

Precommercial thinning is implemented under the current Forest Plan based on funding. Commercial thinning is expected to play a larger role in meeting future demand over the next few decades, as areas harvested in earlier decades reach commercial size.

Yarding Methods

On the Tongass, most logs have been yarded downhill using cable logging systems such as highlead and skyline. Access has usually been from valley bottoms, because road building on steep slopes is difficult and costly. Most logging occurs inland, with logs transported via road systems to marine access points, also referred to as log transfer facilities, at tidewater (see the *Transportation* section). Harvest by tractor (shovel yarding) has proven effective on flat to moderate slopes; it is not practical on steep slopes. Harvest by helicopter is typically the costliest method, but also has fewer adverse effects on other resources.

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 ground-based and cable logging systems used in areas where access is relatively easy and helicopter logging with distances of up to 0.75 mile. These areas have the lowest logging costs. Difficult operability includes long-span cable systems and helicopter logging with distances between 0.75 and 2.0 miles, occurring where ground access is challenging or not possible. Difficult operability involves higher costs. The third class, isolated operability, consists of isolated stands 2.0 miles or more from a helicopter landing site. These tend to be uneconomical under even high timber markets. The 2007 Logging System and Transportation Analysis indicates that approximately 89 percent of the suitable timber land would be accessible using normal harvest methods, 10 percent would be difficult, and 1 percent would be isolated.

Tongass Timber Sale Program

The primary sources of timber within Southeast Alaska are the Tongass National Forest, private corporations (principally Alaska Native Corporations formed

through the Alaska Native Claims Settlement Act of 1971 (ANSCA), and the State of Alaska. Between 1980 and 1990, harvest from the Tongass contributed about 50 percent of the timber supply in Southeast Alaska; timber harvest peaked at almost 1,000 MMBF per year in the late 1980s. From 2002 to 2017, Alaska Native Corporations harvested an average of 63 MMBF and the State harvested an average of 24 MMBF while the Tongass harvested an average of 36 MMBF. In the last 2 years since implementation of the 2016 Forest Plan, harvest has averaged about 20 MMBF per year. Also see the *Key Issue 2* section of this EIS.

One objective of the Alaska National Interest Lands Conservation Act (ANILCA) was the maintenance of timber supply for the Southeast Alaska timber industry because of its contribution to the local and regional economies of Southeast Alaska. For similar reasons, the Tongass Timber Reform Act (TTRA; Section 101) directs the Forest Service to seek to provide a supply of timber from the Tongass that meets annual market demand and 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 current Tongass timber program is composed of a large-sale program, a small-sale program, and a firewood and personal-use program. The timber sale program has been in transition since the end of the long-term contracts. Many operators are in the process of developing direct markets for value-added products, such as molding, tongue-in-groove, paneling, and furniture.

Most importantly, the Tongass has initiated a formal transition from predominantly old-growth harvest to predominantly young-growth harvest. The 2016 Forest Plan prescribes an average of 46 MMBF per year while transitioning to dominantly young growth harvest after about 16 years. See a more complete discussion of the market demand, the young-growth transition strategy, and the export policy in the *Key Issue 2* section of this EIS.

Environmental Consequences

The analysis of the potential effects of the alternatives addresses the following questions:

- How much land would be allocated to timber production?
- What would be the future condition of the Forest in 100 years?

The analysis of timber supply and demand for timber products, as well as how existing sales under contract and timber volume in preparation may be affected by the alternatives is discussed in the *Key Issue 2* section of this EIS.

The effects on the timber industry infrastructure and employment levels are also discussed in that section.

Suitable Timber Lands

There are approximately 5.6 million acres of productive forest land on the Tongass. Approximately 1,000,000 acres were mapped as suitable for timber production under the 2008 Forest Plan (which included roadless areas). Under the 2016 Forest Plan (which excluded roadless), approximately 564,000 acres (230,000 acres of old growth and 334,000 acres of young growth) were mapped as suitable for timber production. In this EIS, the amount of suitable land would vary by alternative for both young growth and old growth (Table 3.8-1).

Table 3.8-1
Mapped Suitable Acreage of Old-Growth and Young-Growth under Each Alternative (thousands of acres)[1]

Classification	Alternative 1	2	3	4	5	6
Suitable Forest Land						
Mapped Suitable Old Growth	230	248	298	388	396	396
Mapped Suitable Young Growth	334	344	346	349	354	351
Total Estimated Suitable Old Growth	**564**	**592**	**644**	**737**	**750**	**747**

[1] Sums and differences may not appear exact due to rounding.

Mapped suitable old-growth acreage would range from 230,000 acres under Alternative 1 to 396,000 acres under Alternatives 5 and 6, which is a 72 percent increase relative to Alternative 1. Mapped suitable young-growth acreage is relatively consistent among alternatives, however, ranging from 334,000 to 351,000 acres, only a 5 percent increase. The vast majority of suitable young growth is already suitable in Alternative1. An exception is the roaded roadless areas, which are roadless but include 10,000 acres of suitable young growth along with their access roads. These roaded roadless areas are incorporated into Alternative 2 and the other action alternatives.

Projected Timber Sale Quantity

The projected timber sale quantity (PTSQ) of each of the alternatives is an indicator of possible future timber supply level that each alternative would produce. PTSQ is the estimated quantity of timber meeting applicable utilization standards that is expected to be sold during the plan period.

The PTSQ for the Tongass under the 2016 Forest Plan, based on an annual average, is 46 MMBF in the initial years (about 15 or more years). The projection is 34.5 MMBF from old growth and 11.5 from young growth for the first decade. Full transition is expected about Year 16 with 41 MMBF of young growth and 5 MMBF of old growth. After that, young growth harvest is permitted to grow, but old growth harvest must remain at 5 MMBF per year.

Projected Timber Harvest

All alternatives would have the same PTSQ. There would be no change in young-growth or old-growth harvest. Aside from the changes in suitable timber land acres, none of the alternatives include any changes to the 2016 Forest Plan, so the only changes are the removal of the roadless designation overlay.

The main effect of the alternatives on timber would be the ability to develop economic sales. Although no additional harvest would take place, the expansion of suitable areas means that greater area is available for the development of sales, allowing more choices for the development of economic ones. Therefore, the resultant effect would be the same harvest spread out over a larger area. Alternative 2 would add suitable acres from the roaded roadless areas, which, because of their existing infrastructure and connection to the existing road systems should include some of the most economic areas. Alternative 3 would result in even more added suitable acres in areas where roads already exist or could be logically extended within the same watershed and, therefore, are also generally considered relatively economic to harvest. Alternatives 4, 5, and 6 would result in a greater increase in harvest in remote areas; however, a number of factors would limit this increase. First, remote areas almost entirely consist of old growth, so once transition starts resulting in a greater proportion of young growth in the harvest in 10 to 15 years, there is little reason to move away from existing roads. Second, current economic conditions suggest that economic sale requirements may limit the level of entry into remote areas, at least for the next 5

or 10 years. This suggests that while Alternatives 2 and 3 may result in improvements in sale economics because they open up areas that appear likely to be more economic due to accessibility, the additional expansion produced by Alternatives 4, 5, and 6 may not produce further improvements in economic sales.

Cumulative Effects

In 1954, there were approximately 6.3 million acres of productive forest land on all ownerships inside the Tongass Forest boundary (including Annette Island). The amount of forest land in Southeast Alaska that is available for timber management has declined over the past century, largely due to Wilderness and LUD II designation by Congress, land selections by the State and ANSCA, land restricted by roadless designations, and land allocated to non-development LUDs in the current Forest Plan. This, along with mill closures and changes in timber markets, has contributed to a decline in timber harvest. Harvest on all lands in Southeast Alaska peaked from the late 1960s through the early 1990s and has been in decline since then. Total harvest on federal, state, and private lands declined from just under 1,000 MMBF in 1989 to less than 80 MMBF in 2017. Approximately 722,000 acres of productive forest land have been harvested since 1954 in this portion of Southeast Alaska; approximately 64 percent of this is NFS land and 36 percent is on Native corporation, state, and other lands. (USDA Forest Service 2016b).

Currently, there are between 0.56 and 0.75 million acres of NFS lands considered suitable for timber management on the Tongass, depending on the alternative. In addition, approximately 0.5 million acres of state, Native corporation, and other private lands are available for harvest. Potential annual harvest on state and private land is estimated to be approximately 90 MMBF (Daniels et al. 2016). Based on past experience, most of the harvest on private land would be exported and would not contribute to meeting local demand. Using this estimate, cumulative harvest in Southeast Alaska would be about 136 MMBF for the next decade, increasing slowly in succeeding decades, and would be the same for all alternatives. Table 3.8-2 displays the cumulative harvest under the alternatives.

Table 3.8-2
Maximum Estimated Average Annual Timber Harvest in Southeast Alaska during the Next Decade (MMBF)

Alternative	National Forest[1]	State and Private[2]	Total
1	46	90	136
2	46	90	136
3	46	90	136
4	46	90	136
5	46	90	136
6	46	90	136

[1] PTSQ in the current Forest Plan
[2] 70 MMBF/year from Native corporation lands and 20 MMBF/year from state land (Daniels 2015). Most harvest on private land is exported.
MMBF = million board feet.

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Minerals

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Affected Environment

Mineral deposit types and mineral resource occurrences were described thoroughly in the 2016 and 2008 Forest Plan Amendment Environmental Impact Statements (EIS; USDA Forest Service 2016b, 2008b) and the 1997 Forest Plan EIS (USDA Forest Service 1997a).

With respect to National Forest management, mineral resources are divided into three groups: locatable minerals, leasable minerals, and salable minerals. The Forest Service manages mineral resource programs that are specific to each group of minerals.

The Tongass Forest Plan, as amended, allocates about 249,570 acres of the Forest to the Minerals Land Use Designation (LUD). The intent of the Minerals LUD is to encourage exploration and development of locatable minerals in areas of high mineral potential, while taking other resource values into account.

Locatable Minerals

A locatable mineral is any mineral that 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, and zinc. 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.

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 project-specific environmental analysis, approving only those activities that are reasonably incident to the proposed operation, monitoring operations to ensure environmental standards are met, and ensuring prompt and reasonable reclamation of disturbed areas.

By law, designated Wilderness, National Monuments, Research Natural Areas, Enacted Municipal Watersheds, and Wild Rivers (when designated by Congress) are withdrawn from mining claim location, subject to existing rights.

On the Tongass, Modified Landscape, Scenic Viewshed, Recreational Rivers, Timber Production, and Minerals LUDs are open to mineral entry. The Primitive Recreation, Semi-Remote Recreation, Old-growth Habitat, Experimental Forest, Special Interest Areas, Scenic Rivers, and LUD II LUDs remain open to mining activities; however, special stipulations and more stringent mitigation measures

may be required for mining activities in these LUDs. Similarly, roadless areas within any of these LUDs are open to mineral entry.

Leasable Minerals

Certain types of minerals, primarily energy resources (e.g., oil, gas, coal, and geothermal resources), are not subject to mining claim location but are available for exploration and development under provisions of the Mineral Leasing Act of 1920. Access to these types of minerals is provided through leases, permits, or licenses that include fee and/or royalty payment conditions. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management (BLM) in cooperation with the Forest Service. National Monuments, Wilderness Areas, and Wild Rivers are withdrawn from mineral leasing.

No leasable minerals are presently being produced on the Tongass National Forest, and the anticipated demand is expected to remain low. Previous assessments have indicated a potential for oil and gas occurrence in the Yakutat region (BLM 2006; URS Corporation 2006); however, the resource development potential is considered low. Outside of the Yakutat area, oil and gas occurrence potential elsewhere in the Tongass is considered low to none.

Coal is found at several locations in Southeast Alaska; however, the development of these resources is considered uneconomic, other than possibly for local use, and exploration or development activity is unlikely.

Geothermal resources occur in 19 known locations in Southeast Alaska. Thermal springs in several locations have been developed for small-scale commercial uses such as tourism, aquaculture, community bathhouses, and district heating of buildings (URS Corporation 2006). There has been some recent interest in geothermal resources in the Bell Island area, but no projects are currently under consideration. In 2012, the Forest Service issued a consent determination on the Bell Island lease application areas being made available for leasing and the adjacent mainland (USDA Forest Service 2012c). Of note, the consent determination included restrictions on new road construction or reconstruction (Roadless Area Stipulation) on any leases within NFS Inventoried Roadless Areas (IRAs).

While the occurrence potential for geothermal resources is considered high in several locations and some exploration could occur, geothermal development activity is not anticipated in the near future.

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. Crushed rock is the most common saleable mineral extracted on the Tongass National Forest and is often used to construct roads. The supply of quality rock sources is largely dependent upon the locations of active logging operations.

Mineral Resource Inventory and Development Potential

The 2008 Forest Plan Amendment provides a summary of Mineral Resource Inventory and Development potential on the Tongass including identified mineral resources and undiscovered resources. There has been no update to mineral inventories since that time.

Mineral Resource Demand

The extent to which identified and undiscovered mineral resources on the Tongass will be exploited in the future depends largely upon the level of demand for those resources. 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. 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 (USDA Forest Service 1997a). Exploration expenditures increased drastically for the 1988 to 1991 period, when the industry spent more than $20 million each year. Expenditures generally declined for the next 10 years, reaching $1.6 million in 2001, before increasing again to a level of $9.9 million in 2006 (Alaska Department of Natural Resources [ADNR], Alaska's Mineral Industry annual reports and summaries for 1997 to 2005). Annual exploration expenditures remained high between 2007 and 2013, averaging $20 million with a high of $34.3 million in 2011. Recently, statewide exploration spending increased significantly to $120.8 million in 2017, doubling 2016 exploration spending (Athey and Werdon 2018), but exploration spending for Southeast Alaska alone was not provided.

Environmental Consequences

Indirect Effects

None of the alternatives propose any changes to the Forest Plan relating to minerals management. Mineral entrants will continue to submit plans of operation to the Forest Service 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.

Future exploration, mining, and mineral processing activities would continue to occur in Alaska Roadless Areas (AKRAs) where valuable deposits exist. When necessary, construction or reconstruction of roads for locatable mineral exploration or development is part of the reasonable right of access provided under the General Mining Law. Therefore, none of the alternatives would affect rights of reasonable access to prospect and explore lands open to mineral entry and to develop valid claims.

All proposals for locatable mineral exploration or development are subject to the planning and design requirements governing locatable minerals in 36 CFR 228, subpart A, and the appropriate level of environmental analysis. The plan of operations would be approved subject to modifications identified in the environmental analysis and would be binding on the operator.

Leasable Minerals

The effects of any mineral leasing activity would be analyzed at the appropriate future time if the Forest Service receives specific requests for access to leasable minerals.

Alternative 1
The Tongass has no current leasable mineral activity, and the anticipated demand for leasable minerals is expected to remain low. The Forest Service is aware of some level of interest in leasable minerals in specific areas of the Tongass. Consistent with the current Forest Plan, any mineral leasing activity would need to be consistent with the standards and guidelines for the respective

LUDs affected by the leasable mineral activity. The Forest Service currently prohibits roadbuilding for any new leasable projects, including geothermal projects, within IRAs. Although the road building is prohibited, these projects may include the incidental cutting, sale, and/or removal of trees.

Alternatives 2, 3, 4, and 6
Roadless areas would be added and dropped under Alternatives 2, 3, 4, and 6 (see Chapter 2, Table 2-8). The Forest Service currently prohibits roadbuilding for any new leasable projects, including geothermal, within IRAs. This prohibition would continue in newly designated Alaska Roadless Areas with watershed (Alternative 2) and LUD II priorities. Following project-specific analyses, roads could be approved for leasable projects within Alaska Roadless Areas with timber (Alternative 4) or roadless priorities.

Regarding the Bell Island geothermal site, the island would retain its roadless designation under each of these alternatives. It would be designated a roadless priority AKRA under Alternatives 3, 4, and 6, which allows road building associated with leasable projects. Under Alternative 2, Bell Island would be designated a watershed priority AKRA, which does not allow for road building associated with leasable projects.

The effects of any geothermal or other leasable project would be analyzed at the appropriate future time if the Forest Service receives specific requests for such projects.

Alternative 5
Under Alternative 5, there would be no areas under a roadless designation. Consistent with the current Forest Plan, any mineral leasing activity would need to be consistent with the standards and guidelines for the respective LUDs affected by the leasable mineral activity.

Salable Minerals

The predominant use of salable minerals is to construct roads in support of the Tongass National Forest transportation system. Since road construction is not expected to vary much between alternatives, there would be little difference in salable mineral development between the alternatives.

Cumulative Effects

Under all alternatives, the right to prospect and explore public domain lands open to locatable mineral entry are preserved. Existing mineral projects are expected to continue and new projects are expected to be explored and developed. The effects of any mineral activity operating under the standards and guidelines of the Forest Plan would be evaluated at the time appropriate future time if the Forest Service receives specific requests for such projects.

In September 2018, the Forest Service published two separate Advance Notices of Proposed Rulemaking in the *Federal Register* as first steps to update the agency's regulations that address surface activities associated with exploration and development of locatable minerals, and to update regulations that address leasing and subsequent development of oil and gas resources. Revision of the regulations governing both locatable minerals and oil and gas resources should help achieve more efficient permitting processes, which in turn reduces regulatory burdens.

Recreation

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Affected Environment

Southeast Alaska 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 outdoor recreation experiences. 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 in a wild and “unspoiled” state, but also expect 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.

The Tongass National Forest includes approximately 17 million acres of land available for recreation. This land contributes greatly to the feeling of vastness and solitude that dominates the region; however, much of the land is not suitable for outdoor recreation. Difficult and steep terrain, wetlands, icefields, glaciers, and heavy vegetation confine most recreation activities to accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Extensive use is made of some of the icefields and alpine areas (above tree line), but access to these areas is usually by aircraft. Both residents and visitors use the developed campground and picnic areas,

beaches, trails, cabins, shelters, and visitor centers that are located near communities. An inventory of developed recreation sites on the Tongass is presented in Table 3.10-1.

Table 3.10-1
Tongass Recreation Facilities, 2015

Type of Facility	Number
Anchor Buoys	42
Boating Sites	7
Campgrounds	15
- Number of Sites	220
Camping Areas	7
Day Use Areas	10
Picnic Sites	33
Group Picnic Sites	2
Hotel, Lodge, Resort	2
Interpretive Site	3
Interpretive Visitor Centers	3
Lookout/Cabin	147
Shelters	39
Observation Site	2
Recreation Residence	3
Swimming Site	2
Trailheads	120
Trails (number of miles):	
– Nonwilderness	900
– Wilderness 93	
Total Trail Miles	**993**
Wildlife Viewing Sites	10

The National Park Service (NPS) and the State of Alaska also provide recreation opportunities in Southeast Alaska. The NPS manages 3.3 million acres in three park units, with the majority of this land located within the Glacier Bay National Park and Preserve. Alaska State Parks manages about 80,000 acres and 34 park units, including 16 marine parks, in Southeast Alaska. In addition, the Alaska Department of Fish and Game (ADF&G) manages two state wildlife refuges, two critical habitat areas, and one wildlife sanctuary, and the Alaska Division of Forestry manages the 247,000-acre Haines State Forest.

Community road systems are limited and heavily used for access to recreation sites and attractions near local communities. Existing 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 Prince of Wales Island, as well as road systems 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. Independent visitors from outside the state and residents from other parts of Southeast Alaska use road systems that are accessible from the Alaska Marine Highway System ferries or from local communities for recreational purposes. Roads in locations where there are no communities or interconnecting ferry access receive relatively low levels of recreation use. However, recreation-related vehicle use has been growing on some remote islands, including Kruzof, Zarembo, and Etolin Islands, and isolated systems on Kuiu and Kupreanof Islands. While the total amount of recreation use on these islands is low, it can be heavy at times, such as during hunting season.

Supply of Recreation Opportunities

Recreation Opportunity Spectrum

The 2016 Forest Plan (USDA Forest Service 2016a) uses the Recreation Opportunity Spectrum (ROS) to help identify, quantify, and describe the range of recreation settings provided by the Forest. The ROS system portrays the combination of activities, settings, and experience expectations along a continuum that ranges from highly modified to primitive environments. The following seven classifications are identified along this continuum from most to least developed:

- Urban (U)
- Rural (R)
- Roaded Modified (RM)
- Roaded Natural (RN)
- Semi-Primitive Motorized (SPM)
- Semi-Primitive Non-Motorized (SPNM)
- Primitive (P)

The setting indicators and applicable standards and guidelines for the seven ROS classes are described in Appendix I to the 2016 Forest Plan (USDA Forest Service 2016a). These classes and associated indicators may be used in recreation planning and project analysis to describe the current condition across the landscape (ROS inventory) and assess the potential effects of the alternatives on recreation settings. Viewed in terms of acres, the Primitive ROS setting is the largest on the Tongass, with approximately 62 percent of the forest (10.4 million acres) allocated to this setting (Table 3.10-2). SPNM accounts for a further 18 percent (3.1 million acres), followed by RM (10 percent) and SPM (9 percent) (Table 3.10-2).

Table 3.10-2
Forest-wide Recreation Opportunity Spectrum Acres

ROS Class	Acres	Percent of ROS Total
Primitive (P)	10,357,832	62
Semi-Primitive Non-Motorized (SPNM)	3,052,410	18
Semi-Primitive Motorized (SPM)	1,458,528	9
Roaded Natural (RN)	157,386	1
Roaded Modified (RM)	1,662,825	10
Rural and Urban (R and U)	5,618	<0

Note:
The total acres by Recreation Opportunity Spectrum (ROS) class shown in this table are slightly lower than the Forest-wide total because the ROS inventory does not include the entire Forest.
Source: USDA Forest Service 2016b, Table 3.15-3

Recreation Places

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” on the Tongass. A total of 1,436 recreation places, encompassing approximately 3.6 million acres, were identified as part of the planning process for 1997 Forest Plan Revision (USDA Forest Service 1997a). Recreation places are classified in two basic ways. First, recognizing that access plays a key role in recreation in Southeast Alaska, “home ranges” were defined for each community. Inventoried

recreation places were classified into two categories: those located within a radius of approximately 20 miles from communities ("home range") and those farther than 20 miles from a community. Almost half (48 percent) of the identified recreation place acres are within a community home range. Second, recreation places were identified as either important or ordinary/common based on five categories: facilities, marine, hunting, fishing, and tourism. Recreation places may be important for one, several, or none of the identified categories. Important recreation places by category are summarized in Table 3.10-3 and discussed further in the *Recreation and Tourism* section of the 1997 Forest Plan Revision FEIS (USDA Forest Service 1997b, pp. 3-109, 3-111).

Table 3.10-3
Important Recreation Places by Category[1]

	Number of Places	Percent of Total[2]	Acres (1,000s)	Percent of Total[2]
Facilities[3]	402	28	1,053	29
Marine[4]	617	43	1,089	30
Hunting[5]	373	26	1,452	40
Fishing[6]	187	13	472	13
Tourism	876	61	1,924	53
Total	**1,436**	**NA**	**3,630**	**na**

na = not applicable
[1] Recreation places are rated as either important or common/ordinary.
[2] The Percent of Total columns sum to more than 100 because a recreation place can be rated important in more than one category.
[3] All recreation places with facilities were rated as being important. In addition, other recreation places with some type of facility, such as a viewing platform, and facilities authorized by a special use permit for recreation purposes, were identified as important.
[4] The marine category identified here is different to the marine type identified in Table 3.15-6 (USDA Forest Service 2016b). The marine category in this table only includes those recreation places that are truly unique or typify the Southeast Alaska marine experience.
[5] Important hunting areas were distinguished from ordinary hunting areas based on a number of factors, including heavy recurring use, hunter success, ease of access, opportunities for several species, and prized species, such as mountain goats and moose.
[6] Important fishing recreation places were identified using ADF&G ratings for recreational fishing.
Source: USDA Forest Service 2016b, Table 3.15-7

Recreation Use and Levels

Types of recreation use on the Tongass include tourism (including package and independent visitors), outfitter/guided fishing and hunting, wildlife viewing, hiking, and many others. Many residents and nonresidents seek the same type of recreation experiences and many engage in similar activities. Most recreation activities take place in and depend upon settings that are primarily undeveloped and widely dispersed. Much of the recreation on the Forest occurs as day trips originating from a nearby community. Trends in visitation in areas near communities that serve as large cruise ship ports (such as Juneau, Ketchikan, Sitka, and Hoonah) include a desire for shorter, "softer" adventure excursions that don't require "hard" skills to experience wild Alaska (Zegre et al. 2012).

Although there are some locations on the Tongass where fees are collected and locations where people can be easily counted, much of the information regarding general public use has been historically based on long-term observations, anecdotal information, and professional estimates, adjusted by quantitative indicators where available. Anecdotal reports and recreation site monitoring provide some indication of the amount, type, and extent of unguided or independent use on the Forest. The Forest Service's National Visitor Use Monitoring (NVUM) program found that half of Southeast Alaska

residents surveyed reported using a boat or plane to access the Forest (USDA Forest Service 2013c).

The Tongass is home to a vibrant and growing tourism industry. Cruise ship and other package visitors are a very large group that uses the Tongass National Forest primarily as a scenic resource. These visitors spend less time in the area and generally follow preplanned and regimented itineraries. Shore excursions have, however, become an important part of the cruise ship experience, with much of this activity centered around ports of call that accommodate large or mid-sized cruise ships. Half-day and day excursions into the Forest have also increased in popularity, providing increased revenues for ship operators and opportunities for local entrepreneurs.

Independent visitors, who constitute a much smaller group, tend to arrive by air, ferry, and highway and engage in a variety of activities. Independent visitors 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. Independent travelers tend to plan their own itineraries, but often secure the services of mini-packages, such as day excursions or fishing charters. These types of visitors compete more directly with residents for recreation opportunities on the Forest.

Lodges have grown in popularity in recent years, with fishing lodges in particular playing an important role in the tourism industry in some areas. This is, for example, the case with Elfin Cove, a small town located west of Hoonah, where nine recreational fishing lodges are located in the vicinity of the town (Dugan et al. 2009). Fishing lodges accounted for 79 percent of the non-cruise, multi-day packages identified in Summer 2016, with wilderness lodges and adventure tours accounting for a further 6 percent of the total each. Rail packages (1 percent), motor coach tours (1 percent), rental car/recreational vehicle package (2 percent), and hunting (less than 1 percent) accounted for the remaining share of multi-day packages (McDowell Group 2017).

The marketing of recreation opportunities by commercial suppliers has important similarities to resident recreation concerns. For example, many businesses that 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 is dependent on meeting customer expectations of seeing and experiencing vast, untamed land and its wildlife. Resident recreationists who traditionally use an area may, however, be discouraged by commercial businesses operating in the same area. Commercial businesses are discussed in the next section.

Commercial Outfitter/Guide Use

The Forest Service authorizes outfitter and guiding services to provide for public health and safety and foster successful small businesses consistent with the Forest Plan. Outfitters and guides are normally skilled and experienced individuals who conduct activities in a manner that protects environmental resources and ensures that national forest visitors receive high-quality services. Due to its remote and rugged nature, recreation use on much of the Tongass National Forest requires good outdoor skills and/or specialized equipment. Commercial outfitters and guides provide access and equipment to assist people who might not otherwise be able to pursue certain recreation activities on the Forest. Outfitter/guides on the Tongass range from small

family-run operations to larger corporations and non-profit organizations, with activities ranging from fishing and hunting to helicopter flights and photography. Both residents and nonresidents use the services of outfitter/guides, but nonresidents tend to use outfitter/guides more often because they do not have the local knowledge or necessary equipment. Outfitter/guides are an authorized use through special use permits to operate on the Tongass and are required to report annual use as part of their permit.

While people often participate in several different activities in one or more settings on any given trip, different activities result in different numbers of people in a group and different amounts of time spent on the Forest. At one end of the spectrum, guided bear hunting consists of many small groups of one or two people. (State regulations require non-resident hunters to use guides for hunting brown bear and mountain goats which are present in Southeast Alaska). Hunters are dispersed across a large area and are on the Forest for long periods of time, typically 5 to 10 days, during spring and fall. At the other end of the use spectrum are mid-sized nature-viewing tour boats with relatively large group sizes (from 12 to 70 people). These groups are typically concentrated in a few areas of the Forest. Their use is short-term and concentrated in the summer season.

Using information provided by outfitter/guides as part of their permit requirements, the Forest Service compiles data for 143 separate outfitter/guide use areas, which are used to identify and manage recreation use. These use areas are subdivisions of the Guide Use Areas that ADF&G uses to manage commercial big game guiding. Use areas are distinct geographic areas that range in size from about 500 acres to more than 1.3 million acres. Outfitter/guide use areas consist of a mix of Inventoried Roadless Areas (IRAs), Wilderness, and Land Use Designation (LUD) II areas, as well as other areas managed for a range of non-development and development use under the 2016 Forest Plan. Thirteen outfitter/guide use areas have no IRA acres and 11 more include less than 100 acres. IRAs make up more than half the total acres of 96 of the 143 use areas (66 percent), with the roadless area share ranging from 51 percent to 100 percent.

A total of 3.1 million outfitter/guide service days were reported on the Tongass from 2013 to 2017, for an annual average of 632,100 service days. Reported use in 2017 was 641,149 service days, higher than the five-year average. Average annual use is presented by ranger district and activity in Table 3.10-4. The following sections provide an overview of existing outfitter/guide use by ranger district.

Admiralty National Monument

Admiralty National Monument is composed of 11 outfitter/guide use areas, 8 of which do not include any IRAs. The roadless share of the other three areas ranges from 14 percent to 31 percent. A total of 14,221 outfitter/guide service days were reported on Admiralty National Monument from 2013 to 2017, for an annual average of 2,844 service days (Table 3.10-4). Viewed in terms of service days, wildlife viewing at Pack Creek Zoological Area was the most popular activity, accounting for 23 percent of total outfitter/guide use on Admiralty National Monument. Pack Creek Zoological Area is located in the Pack Creek use area, which does not include any roadless areas and would not be affected under any of the alternatives. Freshwater fishing was the next most popular activity making up 21 percent of service days. The Greens Creek use area accounted for almost half (47 percent) of total freshwater fishing service days.

Craig Ranger District

Outfitter/guide data are compiled for the Craig Ranger District as a whole. Approximately 77 percent of the 0.93 million acres that comprise this area are roadless. A total of 9,343 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 1,869 service days. Wildlife viewing was the most popular outfitter/guide activity in this area, accounting for 84 percent of total service days (Table 3.10-4).

Table 3.10-4

Outfitter/Guide Average Annual Use 2013 to 2017 by Ranger District and Activity

	Ranger District									
Reported Activity	**Admiralty**	**Craig**	**Hoonah**	**Juneau**	**Ketchikan-Misty Fiords**	**Petersburg**	**Sitka**	**Thorne Bay**	**Wrangell**	**Yakutat**
Total Service Days	2,844	1,869	6,079	575,802	17,399	8,266	13,431	1,239	2,346	2,831
Percent of Total by Ranger District										
Camping	1	1	5	0	0	18	5	26	42	1
Fishing	21	2	4	0	3	2	10	23	2	90
Flightseeing	0	0	0	0	36	0	0	0	0	0
Helicopter ski/tours	0	0	0	15	0	0	0	0	0	0
Hiking/Mountaineering	17	0	52	7	31	63	43	28	8	0
Hunting	14	9	1	0	0	6	5	4	1	3
Nature Viewing	1	0	0	0	0	0	2	0	0	0
Non-Motorized Boating	1	0	1	3	3	0	0	0	0	0
Other	0	1	0	2	0	0	5	0	0	0
Remote-Setting Nature Tours	15	2	10	0	12	6	14	3	12	0
Road-Based Activities	0	1	26	0	2	1	15	0	0	0
Sightseeing	7	1	1	0	0	3	1	16	4	2
Visitor Center	0	0	0	71	1	0	0	0	0	0
Wildlife Viewing	23	84	0	0	12	0	0	0	29	0

Hoonah Ranger District

The Hoonah Ranger District includes 10 outfitter/guide use areas and parts of two others, Tenakee Inlet and West Yakobi Island, which are also partially in the Sitka Ranger District. Four of the 12 areas do not include any roadless areas. The roadless share of the other eight areas ranges from 61 percent to 100 percent. A total of 30,394 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 6,079 service days. Hiking/mountaineering accounted for 52 percent of average annual use. Road-based activities were the second most popular activity (26 percent), followed by remote-setting nature tours (10 percent) (Table 3.10-4). Viewed by use area, hiking/mountaineering service days were concentrated in two use areas, Port Althorp and Idaho Inlet, which together accounted for 81 percent of total service days. Port Althorp also accounted for more than one-third (39 percent) of the remote-setting nature tour visitor days. Road-based activities were concentrated in the Port Frederick and Freshwater Bay areas, which together accounted for 99 percent of total road-based service days.

Juneau Ranger District

The Juneau Ranger District includes 28 outfitter/guide use areas. Three of the 28 areas do not include any roadless areas. The roadless share of the

remaining 25 areas ranged from 67 percent to 100 percent. A total of 2,879,009 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 575,802 service days (Table 3.10-4). Visits to the Juneau Ranger District accounted for 91 percent of Forest-wide outfitter/guide service days over this period. Put another way, outfitter/guides using the Juneau Ranger District reported 10 times as many service days as the other nine districts (including Admiralty National Monument) combined. Visits to one use area, Juneau Icefield 4 – Mendenhall Glacier, accounted for 90 percent of reported service days, with the majority of these service days (79 percent) consisting of trips to the Forest Service's Mendenhall Glacier Visitor Center. Helicopter ski/tours accounted for 15 percent of total service days on the Juneau Ranger District and were mainly reported for the seven Juneau Icefield and three Skagway Icefield use areas, with Juneau Icefield 4 – Mendenhall Glacier accounting for almost half (48 percent) of the reported total.

Ketchikan-Misty Fiords Ranger District

The Ketchikan-Misty Fiords Ranger District includes 28 outfitter/guide use areas. Four of the 28 areas do not include any roadless areas, and two more had less than 50 roadless acres each. The roadless share of the remaining 22 areas ranged from 6 percent to 98 percent. A total of 86,997 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 17,339 service days. Flightseeing accounted for 36 percent of service days, followed by hiking/mountaineering (31 percent) (Table 3.10-4). More than 99 percent of flightseeing service days were reported in the Misty Core Lakes use area. This area does not include any roadless areas and would not be affected under any of the alternatives.

Hiking/mountaineering service days on the Ketchikan-Misty Fiords Ranger District were reported for a number of areas, with the largest use occurring in the Betton Island use area, which accounted for about 72 percent of service days in this category. Other important types of use included remote-setting nature tours (12 percent of service days) and wildlife viewing-developed sites (12 percent of service days) (Table 3.10-4). Almost all (98 percent) of the remote setting nature tour service days were reported in the Betton Island use area. Wildlife viewing-developed site service days were all reported for the Margaret Creek Wildlife Viewing Area, which is part of the Margaret Bay outfitter/guide use area.

Petersburg Ranger District

The Petersburg Ranger District includes 20 outfitter/guide use areas, one of which does not include any roadless acres. The roadless share of the remaining 19 areas ranges from 2 percent to 99 percent. A total of 41,328 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 8,266 service days. Hiking/mountaineering was the most popular outfitter/guide activity (63 percent of service days), followed by camping (18 percent) (Table 3.10-4). Hiking/mountaineering service days were reported for a number of use areas, with relatively large numbers reported for the Thomas Bay/Point Vandeput (30 percent) and Petersburg Creek/Duncan Salt Chuck (25 percent) use areas. Camping service days were reported in almost all of the outfitter/guide use areas on the Petersburg Ranger District.

Sitka Ranger District

The Sitka Ranger District includes 13 outfitter/guide use areas and parts of two others, Tenakee Inlet and West Yakobi Island, which are also partially in

the Hoonah Ranger District. Two of the 15 areas include less than 10 roadless acres, with the roadless share of the other 13 areas ranging from 70 percent to 99 percent. A total of 67,156 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 13,431 service days. Hiking/mountaineering accounted for 43 percent of reported service days, followed by road-based activities (15 percent), and remote-setting nature tours (14 percent) (Table 3.10-4). Two outfitter/guide use areas, the Sitka Area and Kelp Bay use areas, together accounted for more than three-quarters of reported visitor days. Hiking/mountaineering and remote-setting nature tour service days were concentrated in these use areas, with the Sitka Area also accounting for most of the road-based activity service days.

Thorne Bay Ranger District

Outfitter/guide data are compiled for the Thorne Bay Ranger District as a whole. Approximately 40 percent of the 0.9 million acres that comprise this area are roadless. A total of 6,196 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 1,239 service days. Hiking/mountaineering, camping, and fishing were the most popular outfitter/guide activities in this area, accounting for 28 percent, 26 percent, and 23 percent of total service days, respectively (Table 3.10-4).

Wrangell Ranger District

The Wrangell Ranger District includes 13 outfitter/guide use areas. Two of the 13 areas had no roadless acres, with the roadless share of the other 11 areas ranging from 40 percent to 99 percent. A total of 11,730 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 2,346 service days. Camping was the most popular outfitter/guide activity, accounting for 42 percent of total service days, followed by wildlife viewing-developed sites (29 percent) and remote-setting nature tours (12 percent) (Table 3.10-4). Camping service days were reported for most of the use areas. Wildlife viewing-developed site service days were all reported for the Anan Creek wildlife viewing area, which is part of the Anan Creek outfitter/guide use area. Remote-setting nature tour service days were reported for a number of use areas, with the Stikine-LeConte Wilderness use area accounting for 71 percent of the total.

Yakutat Ranger District

The Yakutat Ranger District includes 16 outfitter/guide use areas, with roadless shares ranging from 1 percent to 99 percent. A total of 14,157 outfitter/guide service days were reported from 2013 to 2017, for an annual average of 2,831 service days. Fishing was the most popular outfitter/guide activity accounting for 90 percent of service days (Table 3.10-4). Fishing visitor days were reported for a number of use areas, with the Situk River use area accounting for 71 percent of the total.

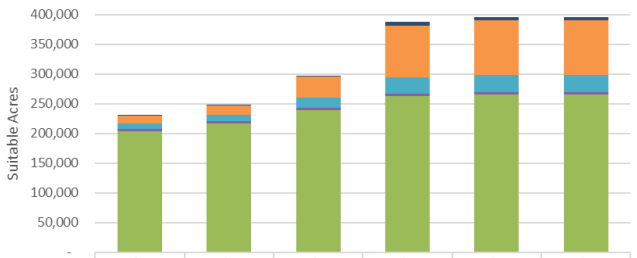
Environmental Consequences

Supply of Recreation Opportunities

Recreation Opportunity Spectrum

Figure 3.10-1 shows total old-growth suitable acres by ROS setting and alternative. Total old-growth suitable acres would increase relative to Alternative 1 under all five action alternatives, with increases ranging from about 18,000 acres (8 percent) (Alternative 2) to 167,000 acres (72 percent) (Alternatives 5 and 6). The total number of suitable acres would increase for all ROS settings. The largest increase for Alternatives 4 to 6 would occur in the SPNM setting. Large absolute increases would also occur in RM, but RM as a share of total acres decreases as total acres increase, dropping from almost 90 percent under Alternative 1 to 67 to 68 percent under Alternatives 4 to 6 (Figure 3.10-1).

Figure 3.10-1
Old-Growth Suitable Acres by ROS Setting and Alternative



	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
P	175	649	1,818	5,654	5,818	5,818
SPNM	12,929	15,862	35,165	87,199	91,349	91,349
SPM	8,841	10,057	16,812	27,327	29,696	29,696
RN	3,779	3,802	3,850	3,928	4,029	4,029
RM	204,041	217,293	239,826	263,491	265,375	265,375

Note:
[1] Urban (U) and Rural (R) ROS settings are not shown because they each make up a very small share of suitable acres under all six alternatives, less than 10 acres and between 100 and 200 acres, respectively.

Young-growth acres suitable for harvest would remain relatively constant across all alternatives. Suitable young-growth acres would range from 334,000 acres for Alternative 1 to 354,000 acres for Alternative 5. More than 90 percent of young-growth suitable for harvest is in the RM setting under all six alternatives.

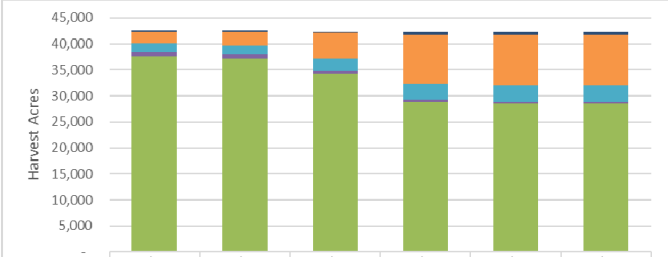
Although the alternatives would vary in terms of the amount and location of acres suitable for timber harvest, the total volumes expected to be harvested would be the same under each alternative. An estimated 42,500 acres of old growth would be harvested over 100 years.[1] The following analysis assumes that the estimated total number of acres harvested would be the same for

[1] These estimates of total old growth (42,500 acres) and young growth (284,000 acres) that would be harvested over 100 years were developed as part of the 2016 Forest Plan EIS modeling for the selected alternative, which is the current Forest Plan (Alternative 1 in this EIS).

each alternative and that harvest would be evenly distributed across the available suitable acres. RM as a share of the estimated total would decrease relative to Alternative 1 under all alternatives, dropping from almost 90 percent under Alternative 1 to 67-68 percent under Alternatives 4 to 5 (Figure 3.10-2). Much of this decrease would be made up by an increase in SPNM acres. SPNM as a share of the estimated total would range from about 6 percent under Alternatives 1 and 2 to 22-23 percent under Alternatives 4 to 6 (Figure 3.10-2).

Using the same assumptions for young growth, an estimated 284,000 acres of young growth would be harvested over 100 years under all alternatives.[2] Harvest would largely be concentrated in RM settings under all six alternatives, with RM accounting for 93 to 96 percent of total harvest acres by alternative.

Figure 3.10-2
Old-Growth Acres Expected to be Harvested After 100 Years by ROS Setting and Alternative



	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
P	32	111	260	619	623	623
SPNM	2,389	2,719	5,020	9,552	9,788	9,788
SPM	1,634	1,724	2,400	2,993	3,182	3,182
RN	698	652	550	430	432	432
RM	37,704	37,252	34,234	28,864	28,435	28,435

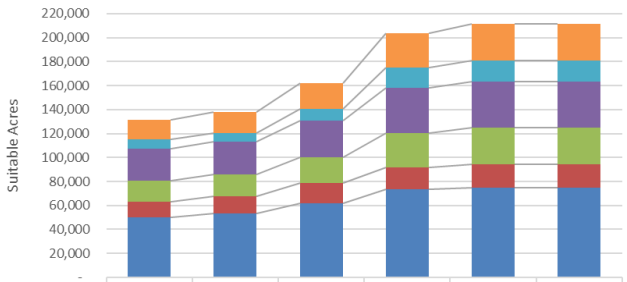
Recreation Places

Figure 3.10-3 shows total old-growth suitable acres by recreation place and alternative. Total old-growth suitable acres in recreation places would increase relative to Alternative 1 under all five action alternatives. The total number of suitable old-growth acres would increase for all recreation place categories. The largest absolute increases would occur in home range recreation places, with net increases of approximately 25,000 suitable old-growth acres under Alternatives 5 and 6. Home range recreation places are those inventoried recreation places within an approximate 20-mile radius of one or more communities. Large increases would also occur under Alternatives 5 and 6 in recreation places important for marine use, hunting, and tourism, with net gains of about 12,000 to 14,000 suitable old-growth acres (Figure 3.10-3).

[2] See previous footnote.

Total young-growth acres suitable for harvest would remain relatively constant across all alternatives, with the largest increase anticipated for home range recreation places under Alternative 5, a net gain of almost 4,000 acres.

Figure 3.10-3
Old-Growth Suitable Acres by Recreation Place Category and Alternative



	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Tourism	16,439	16,997	21,503	29,103	30,754	30,754
Fishing	7,838	7,730	9,877	16,439	17,088	17,088
Hunting	26,417	27,029	30,914	37,906	38,703	38,703
Marine	17,740	18,179	21,019	28,672	30,308	30,308
Facilities	13,119	14,309	17,079	18,322	19,570	19,570
Home Range	49,961	53,424	61,807	73,412	74,970	74,970

Note:
[1] Recreation place categories are not mutually exclusive. A recreation place can be rated as important in more than one category.

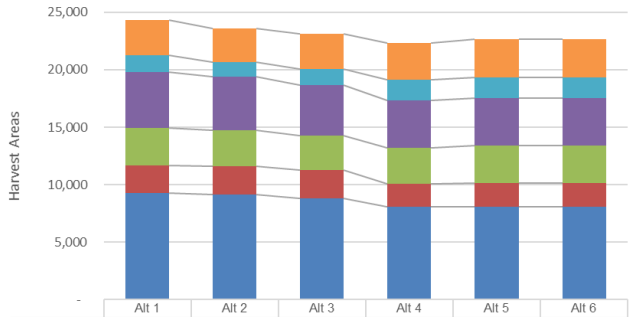
As discussed with respect to ROS settings, although the alternatives would vary in terms of the amount and location of acres suitable for timber harvest, the total volumes expected to be harvested would be the same under each alternative. The following analysis assumes that the estimated total number of acres harvested over 100 years would be the same for each alternative and that harvest would be evenly distributed across available suitable acres, including those that coincide with important recreation places. Based on these assumptions, the acres of old-growth acres harvested within four of the recreation place categories (home range, facilities, marine, and hunting) would mostly decrease relative to Alternative 1 because old-growth acres in these recreation places would make up a smaller share of total Forest-wide suitable old-growth acres (Figure 3.10-4). Old-growth acres harvested in recreation places important for fishing and tourism would be expected to increase relative to Alternative 1.

Using the same assumptions for young-growth, total acres harvested in important recreation place over 100 years would be similar across all alternatives, decreasing by 1 to 3 percent relative to Alternative 1.

Overall, the total share of recreation place acres that would be harvested over 100 years would be small under all alternatives. Viewed as a share of total recreation place acres in each category, estimated old-growth and young growth harvest would range from about 2 percent (facilities and tourism) to 4 percent (home range and fishing) of total acres, with harvest in the other two

categories (marine and hunting) equivalent to about 3 percent of total acres. Total acres by category are shown in Table 3.10-3.

Figure 3.10-4
Old-Growth Acres Expected to be Harvested After 100 Years by Recreation Place Category and Alternative



	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Tourism	3,038	2,914	3,069	3,188	3,295	3,295
Fishing	1,448	1,325	1,410	1,801	1,831	1,831
Hunting	4,881	4,634	4,413	4,152	4,147	4,147
Marine	3,278	3,117	3,000	3,141	3,247	3,247
Facilities	2,424	2,453	2,438	2,007	2,097	2,097
Home Range	9,232	9,159	8,823	8,042	8,033	8,033

Note:
[1] Recreation place categories are not mutually exclusive. A recreation place can be rated as important in more than one category.

Commercial Outfitter/Guide Use

Land management activities that affect the natural appearance of the landscape have the potential to affect outfitter/guide operations that provide commercial recreation opportunities on the Forest. Impacts to existing outfitter/guide use are likely to be greatest where changes in roadless protections allow development in remote areas that are used for outfitter/guide activities dependent on high scenic integrity and undisturbed landscapes. Changes in roadless area protections could also affect outfitter/guide use in other adjacent or nearby areas as outfitter/guides displaced from one location seek other places to take clients. Some use areas are currently at capacity, which could serve to exacerbate potential displacement effects. Long-term changes in roadless area management could affect the Forest's ability to meet future outfitter/guide demand, especially for operators seeking more remote areas. In the short term, commercial recreation operators could be displaced by logging operations in the nearby vicinity, with the presence of logging equipment and related noise affecting the quality of the recreation experience.

The following analysis assesses potential impacts to the 143 outfitter/guide use areas that the Forest Service uses to manage outfitter/guide use using three primary measures by alternative: 1) change in acres managed as roadless; 2) change in acres in development LUDs; and 3) change in suitable old-growth acres available for harvest.

Changes in Roadless Area Acres

The change in acres managed as roadless provides a broad overview of the changes in the current management situation by outfitter/guide use area.

Changes in roadless acres are presented by outfitter/guide use area and alternative in Table C-1 in Appendix C.

Under Alternative 3, roadless protection would be removed from “roaded roadless” and “logical extension” areas, as discussed in Chapter 2. Alternative 3 would also remove protection from the 826,000 LUD II acres that are currently within an IRA. LUD II acres dropped from roadless designation would still retain their congressionally-designated protections, which require that these areas be managed in a roadless state to retain their wildland character. Therefore, decreases shown for Alternative 3 tend to overstate the amount of acres that would no longer be protected.

Two sets of estimates are provided for Alternative 4. Alaska Roadless Areas (AKRAs) would be assigned to three roadless categories under this alternative: LUD II Priority, Roadless Priority, and Timber Priority. The Timber Priority category would except timber harvest and road construction from roadless protection. The first set of estimates (4a) shows the net change in acres classified as roadless; the second set (4b) also subtracts the acres that would be managed as Timber Priority because road construction would be allowed in these areas.

Changes in Development LUDs

Not all acres dropped from roadless management would be available for development. LUD II acres dropped from roadless designation under Alternative 3, for example, would, as noted above, still retain their congressionally-designated protections, which require that these areas be managed in a roadless state to retain their wildland character. Other areas dropped from roadless protection would be assigned to non-development LUDs, such as Old-growth Habitat and Remote and Semi-remote Recreation, which do not allow old-growth timber harvest. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative.

Development LUDs for the purposes of this analysis are Timber Production, Modified Landscape, and Scenic Viewshed. These three LUDs all allow timber production, with Timber Production generally considered an intensive development LUD and Modified Landscape and Scenic Viewshed considered moderate development LUDs. Approximately 6.7 percent (1,176,000 acres) of the Forest is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 34,600 acres (Alternative 2) to 2.1 million acres (Alternatives 5 and 6). Changes in development LUDs are presented by outfitter/guide use area and alternative in Table C-2 in Appendix C.

Changes in Suitable Timber

Not all lands allocated to development LUDs are available for timber management. As described in Appendix A to the 2016 Forest Plan (USDA Forest Service 2016a), old-growth forest located within Phases 2 and 3 of the Tongass Timber Sale Program Adaptive Management Strategy or within the Tongass 77 (T77) Watersheds and The Nature Conservancy (TNC)/Audubon conservation priority areas is identified as not suitable for timber production. As a result, not all increases in development LUD acres would provide additional opportunities for timber harvest. Changes in suitable old-growth and young-growth acres available for harvest are, therefore, used as a relative measure of timber opportunity to differentiate between alternatives (see Tables C-3 and C-4 in Appendix C, respectively). Forest-wide, approximately

230,000 acres are presently considered suitable old-growth available for harvest. This total would increase under all the action alternatives, with gains ranging from about 18,000 acres (Alternative 2) to 157,900-166,600 acres (Alternatives 4 to 6). Approximately 334,000 acres are considered suitable for young-growth harvest, with estimated increases ranging from about 10,300 acres (Alternative 2) to 19,900 acres (Alternative 5).

When viewing changes in suitable timber available for harvest, it is important to note that suitable acres in this context serve as a relative measure of timber resources that would be potentially available under the current Forest Plan by alternative. They do not represent estimates of how much harvest would occur under each alternative. Actual harvest locations would depend on the timber sales that are carried out during plan implementation. Elsewhere in this EIS, including the preceding ROS and recreation place analyses, harvest projections that assume an even Forest-wide distribution of harvest across suitable acres are used to assess potential impacts. The assessment presented here differs in that it is concerned with identifying change in potential timber opportunity, rather than the potential Forest-wide distribution of harvest, and, therefore, focuses on changes in suitable acres.

Effects on Selected Outfitter/Guide Use Areas

The following analysis uses changes in suitable old-growth acres in conjunction with information on existing outfitter/guide use to help focus on potentially affected areas. Not all of the outfitter/guide use areas were used over the past 5 years; a number do not include any roadless acres; others include roadless acres, but none are suitable for old-growth harvest; and others would see little change in suitable old-growth acres by alternative. The remaining areas are those where potential conflicts between existing outfitter/guide use and future management could occur. An initial review based on these factors reduced the number of potentially affected outfitter/guide use areas from 143 to 24. Further review reduced this total to 15, with areas with limited use and small changes in suitable old-growth acres dropped from further consideration. The remaining 15 areas are identified in Table 3.10-5, which also identifies the total number of acres in each area and the share presently in IRAs and provides a summary of reported service days for 2013 to 2017. Eight of the 15 identified outfitter/guide use areas are located on the north part of the Forest, in the Juneau, Sitka, and Hoonah Ranger Districts. The remaining seven areas include the entire Craig and Thorne Bay Ranger Districts, and outfitter/guide use areas on the Petersburg (four areas) and Ketchikan-Misty Fiords (one area) Ranger Districts.

Table 3.10-5
Total Area, Percent Roadless, and Reported Service Days for Selected Outfitter/Guide Use Area

Outfitter/Guide Use Area	Total Acres	Percent in IRA	Reported Service Days						
			2013	2014	2015	2016	2017	Grand Total	Annual Average
01-03 EAST CHILKATS	361,545	67%	446	454	179	146	246	1,471	294
04-03 SITKA AREA	345,862	85%	5,213	4,733	6,005	5,614	6,597	28,162	5,632
04-04A RODMAN BAY	75,427	60%	250	428	385	347	508	1,918	384
04-04B KELP BAY	144,680	89%	4,048	4,427	5,316	5,343	5,494	24,628	4,926
04-11A PORT FREDERICK	112,512	77%	10	15	78	1,358	3,021	4,482	896
04-11B FRESHWATER BAY	160,078	61%	178	228	1,838	2,235	2,468	6,947	1,389
04-12 TENAKEE INLET	312,370	79%	95	89	108	230	407	929	186
04-13 PERIL STRAIT	232,130	72%	744	1,057	1,473	1,254	1,368	5,896	1,179
CRD 00-00NO AREA	925,876	77%	2,574	1,920	2,125	1,798	926	9,343	1,869
K19 NORTH REVILLA	70,401	83%	217	269	101	286	193	1,066	213
P01 MITKOF ISLAND	109,302	32%	1,179	1,106	1,105	681	568	4,639	928
P08 NORTH LINDENBERG PENINSULA	75,605	78%	200	227	482	224	255	1,388	278
P12B KUIU ISLAND ROAD	134,852	31%	167	91	174	156	108	696	139
P21 MUDDY RIVER AREA	63,357	68%	474	330	411	263	257	1,735	347
TBRD 00-00NO AREA	901,507	40%	1,872	1,495	953	1,006	870	6,196	1,239

The following sections assess potential impacts by alternative to existing outfitter/guide use in each of the 15 identified areas. This review found that in almost all of these areas existing outfitter/guide use occurs on or near shorelines and along Forest road systems where development has occurred in the past. Viewed in terms of increases in acres suitable for harvest, impacts under Alternatives 2 and 3 would be minimal in all areas, with increases in roadless acres and reductions in suitable acres occurring in some areas under these alternatives. Alternatives 4 to 6 would add similar numbers of suitable acres in all areas. In most cases, additions under Alternatives 4 to 6 would expand areas of existing suitable acres around an existing road system, for example, rather than open-up new areas for potential harvest. For old-growth this is at least partially due to the definition of suitable, which allows harvest only in Phase 1 of the Tongass Timber Sale Program Adaptive Management Strategy and excludes the T77 Watersheds and TNC/Audubon Conservation Priority Areas, as noted above. These exclusions result in roadless restrictions being removed in development LUDs, with no corresponding increase in suitable acres.

In most of the following outfitter/guide use areas, harvest that could already occur in these areas (under Alternative 1) has the potential to conflict with existing outfitter/guide use. By expanding the acres available for harvest, Alternatives 4 to 6 could directly add to these potential impacts by increasing the number and geographic extent of the acres affected. The addition of acres in these areas could also indirectly affect the potential for conflict by adding potential timber volume and improving the economics of a potential timber sale.

Peninsula, this use area is bordered to the west by Glacier Bay National Park and Lynn Canal to the east, with the Endicott River Wilderness located alongside the north part of the area. An existing logging road system is located at the southern end of the area.

Seven outfitter/guides reported use in this area from 2013 to 2017, two of which used the area regularly (4 out of 5 years). An annual average of 294 service days were reported over this period (Table 6). The majority of the use involved one operator conducting guided freshwater fishing trips. Fishing accounted for the majority (86 percent) of reported service days, followed by hiking/mountaineering (11 percent). Use was reported at 12 locations, with Teardrop Creek accounting for 36 percent of reported service days, followed by Couverden Creek (31 percent) and Mirror Creek (19 percent).

The East Chilkats use area includes about 16,700 acres of lands in development LUDs outside of roadless, with about 6,350 acres of suitable old-growth available for harvest and 3,800 acres of suitable young-growth. Existing suitable old-growth acres are concentrated around the existing logging road system at Point Couverden on the south end of the peninsula. Suitable young-growth is also located along this road system and along the shorelines near Excursion Inlet on the west side, and near St James Bay and Sullivan Island to the east.

Table 3.10-6

Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the East Chilkats Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	242,377	-1,975	-1,975	-1,975	-242,377	-49,984
Development LUDs – Not Roadless[2]	16,662	1,880	1,880	1,880	49,885	49,885
Suitable Old Growth	6,355	256	256	3,420	4,341	4,341
Suitable Young Growth	3,791	688	688	688	1,091	1,055

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the East Chilkats use area would decrease under the action alternatives, with decreases ranging from about 2,000 acres (Alternatives 2, 3, and 4) to about 242,400 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 50,000 acres (Table 3.10-6). Increases in the number of acres in development LUDs without roadless protection would range from 1,880 acres (Alternatives 2 to 4) to 49,885 acres (Alternatives 5 and 6). Increases in suitable old-growth would range from less than 300 acres (Alternatives 2 and 3) to about 4,300 acres (Alternatives 5 and 6). Suitable young-growth acres would increase from about 700 acres (Alternatives 2 to 4) to 1,100 acres (Alternatives 5 and 6) (Table 3.10-6).

Suitable old-growth and young-growth acres would be added in and around the existing road system under all alternatives. Alternatives 5 and 6 would add more suitable old growth along the Excursion Inlet shoreline north of the past harvest area. Young-growth acres would also be added along the shoreline, north of William Henry Bay (all action alternatives) and south of Lynn Sisters

(Alternatives 5 and 6). Harvest near Lynn Sisters under Alternatives 5 and 6 could conflict with existing outfitter/guide use in that area. Fishing at Lynn Sisters accounted for about 10 percent of reported service days from 2013 to 2017.

04-03 Sitka Area

The Sitka Area outfitter/guide use area is located on the Sitka Ranger District and consists of 345,562 acres, 85 percent of which are located in IRAs (Table 3.10-5). This use area includes Sitka and northwest Baranof Island from north of Fish Bay to south of Three Entrance Bay, as well as Kruzof, Partofshikof, Halleck, Krestof, and Siginaka Islands. Much of the shoreline is protected and provides easy access to the bays, sounds, and straits located throughout the area.

Thirty-two outfitter/guides reported use in this area from 2013 to 2017, 11 of which used the area regularly (4 out of 5 years). An annual average of 5,632 service days were reported over this period, more than 40 percent of the total reported for all areas on the Sitka Ranger District. Hiking accounted for 39 percent of reported use, followed by road-based nature tours (32 percent) and remote-setting nature tours (12 percent). Use was reported in multiple locations, with relatively high use identified for the Mud Bay road system and Iris Meadows, which together accounted for 31 percent of reported service days, followed by the Mosquito Cove Trail, with 20 percent of service days. The Mud Bay road system and Iris Meadows are mainly used for road-based nature tours. The Mosquito Cove Trail is mainly used for hiking, with some road-based nature tour use also reported.

The Sitka Area includes 24,600 acres of lands in development LUDs outside of roadless, with 2,335 acres identified as suitable for old-growth harvest and 9,857 acres suitable for young-growth harvest (Table 7). Existing suitable old-growth acres are almost entirely located on Kruzof Island, primarily along the existing Mud Bay road system. Suitable young-growth acres are also located in this area, as well as along FR 7595 on the north part of Kruzof Island. Suitable young-growth acres are also available along existing Forest road systems near Fish Bay, St. John Baptist Bay, and along Nakwasina Sound.

Table 3.10-7
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Sitka Area Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	293,354	1,004	1,004	-617	-293,354	-59,090
Development LUDs – Not Roadless[2]	24,617	204	204	247	58,721	58,721
Suitable Old Growth	2,335	-16	-16	2,517	2,517	2,517
Suitable Young Growth	9,857	1	1	1	28	1

Note:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

Changes in roadless area acres in the Sitka Area would be minimal under Alternatives 2 to 4, with Alternatives 2 and 3 adding about 1,000 acres to roadless protection. Alternative 4 would drop about 600 acres from roadless, with this total increasing to 25,900 acres (9 percent of the roadless area), if

acres assigned to the AKRA Timber Priority management category are included with those dropped. Alternative 5 would remove roadless designation from all lands in existing IRAs, approximately 293,000 acres. Alternative 6 would drop roadless protection for about 59,000 acres (Table 3.10-7).

Alternatives 2 to 4 would have very little effect on development potential, as measured by acres in development LUDs without roadless protection, with each alternative adding from 200 to 250 acres, about 1 percent of the existing total. Alternatives 5 and 6, on the other hand, would increase existing development LUD acres without roadless protection more than three-fold, with a net increase of 58,700 acres under each alternative. There would be essentially no change in suitable young-growth acres under any alternative, and a negligible decrease in suitable old-growth acres under Alternatives 2 and 3. Alternatives 4 to 6 would each add 2,500 suitable old-growth acres, mainly along the north side of the Mud Bay road system on Kruzof Island.

The Mud Bay road system is heavily used by outfitter/guides, mainly offering road-based nature tours. The existing old-growth suitable acres in this area are along this road system. The addition of 2,500 suitable old-growth acres under Alternatives 4 to 6 would extend the area available for harvest. Harvest of existing suitable old-growth and young-growth acres under all alternatives would conflict with outfitter/guide use in the area. The old-growth acres that would be added under Alternatives 4 to 6 could make harvest in this area more likely by expanding available volumes and improving economics; potentially exacerbating the level of impact if harvest were to occur in these areas.

04-04A Rodman Bay

The Rodman Bay outfitter/guide use area is located on the Sitka Ranger District and consists of 75,427 acres, 60 percent of which are located in IRAs (Table 3.10-5). This use area is located on the north end of Baranof Island extending from just west of Peschani Point to Point Moses, just east of the Lake Eva Trail. Shorelines are easily accessed in the area's bays: Rodman Bay, Appleton Cove, and Saook Bay.

Twenty outfitter/guides reported use in this area from 2013 to 2017, five of which used the area regularly (4 out of 5 years), with one outfitter/guide accounting for more than half (57 percent) of total reported use. An annual average of 384 service days were reported over this period (Table 3.10-5). Hiking accounted for almost half (46 percent) of reported use, followed by freshwater fishing (37 percent), and remote-setting nature tours (13 percent). Use was reported at eight locations around the area's three bays. Almost three-quarters (74 percent) of reported service days were for Saook Bay or Saook Bay Creek.

The Rodman Bay use area includes 24,400 acres of lands in development LUDs outside of roadless, with about 750 acres identified as suitable for old-growth harvest and 7,500 acres suitable for young-growth harvest (Table 3.10-8). Existing suitable young-growth acres are located along the existing road systems around Rodman Bay, Appleton Creek, and Saook Bay, along Rodman Creek, and extending northeast along the Duffield Peninsula toward Peschani Point. Existing suitable old-growth acres are located either side of the suitable young-growth along Forest Road 7587 on the Duffield Peninsula.

Table 3.10-8
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Rodman Bay Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	45,273	7,777	7,777	-159	-45,273	-34,269
Development LUDs – Not Roadless[2]	24,411	-6,317	-6,317	153	34,263	34,263
Suitable Old Growth	749	19	19	2,661	2,662	2,662
Suitable Young Growth	7,508	-30	-30	0	0	0

Note:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Rodman Bay use area would increase under Alternatives 2 and 3, with net gains of approximately 7,800 aces, about 10 percent of the total use area. The number of acres with roadless protection would decrease under Alternatives 4, 5, and 6. Alternative 5 would remove roadless designation from all lands, approximately 45,300 acres, and Alternative 6 would drop roadless protection for about 34,300 acres (Table 3.10-8).

Changes in the total number of acres in development LUDs without roadless protection would range from a decrease of about 6,300 acres under Alternatives 2 and 3 to an increase of about 34,300 acres for Alternatives 5 and 6. Increases in suitable old-growth acres available for harvest would range from a negligible increase under Alternatives 2 and 3 (about 20 acres) to about 2,700 acres (Alternatives 4 to 6) (Table 3.10-8). Suitable old-growth acres would be entirely added to the Duffield Peninsula, extending the existing narrow bands of suitable old-growth to the north and south. None of the action alternatives would add suitable young-growth acres.

Harvest of existing suitable young-growth acres under all alternatives would conflict with outfitter/guide use in the area. The suitable old-growth acres added on Duffield Peninsular under Alternatives 4 to 6 are located farther away from areas that receive relatively high levels of existing outfitter/guide use.

04-04B Kelp Bay

The Kelp Bay outfitter/guide use area is located on the Sitka Ranger District and consists of 144,680 acres, 89 percent of which are located in IRAs (Table 3.10-5). Located on the northern end of Baranof Island, this use area extends from Hanus Bay to south of Takatz Bay and includes Catherine Island and surrounding islands, as well as the islands in Kelp Bay. Easily accessible shorelines include Hanus Bay, Cosmos Cove, Kasnyku Bay, Takatz Bay, and Kelp Bay.

Almost 40 outfitter/guides reported use in this area from 2013 to 2017, 20 of which used the area regularly (4 out of 5 years). An annual average of 4,926 service days were reported over this period (Table 3.10-5). Hiking accounted for more than half (54 percent) of reported use, followed by remote-setting nature tours (17 percent) and hatchery tours (13 percent). Use was reported at 31 locations, with the Lake Eva Trail accounting for almost half (46 percent) of reported service days. Other popular locations were Hidden Falls Hatchery

(21 percent of total service days) and various locations around Kelp Bay (10 percent of service days).

Conflicts between guided groups (hunting, remote-setting nature tour, and freshwater fishing) have been reported during spring and fall hunting seasons at Hanus Bay and Kelp Bay. Concerns have also been expressed about small cruise ship activity in Kelp Bay and the impact of larger groups on the remote experience being sought by other operators in the area (USDA Forest Service 2017e).

The Kelp Bay use area includes 10,500 acres of lands in development LUDs outside of roadless, with about 2,500 acres identified as suitable for old-growth harvest and 3,500 acres suitable for young-growth harvest (Table 3.10-9). Existing suitable old-growth and young-growth acres are located on the north end of Catherine Island, around Hanus Bay, and either side of Portage Arm. Suitable young-growth acres are also along existing roads near Kelp Bay.

Table 3.10-9
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Kelp Bay Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	129,335	92	92	-83	-129,335	-22,229
Development LUDs - Not Roadless[2/]	10,500	129	129	142	22,288	22,288
Suitable Old Growth	2,530	26	26	3,875	3,875	3,875
Suitable Young Growth	3,535	0	0	1	6	1

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Kelp Bay use area would increase slightly under Alternatives 2 and 3 and decrease under the other action alternatives. Alternative 5 would remove roadless designation from all lands, approximately 129,300 acres, and Alternative 6 would drop roadless protection for about 22,200 acres (Table 3.10-9).

The total number of acres in development LUDs without roadless protection would range from very slight increases under Alternatives 2 and 3 (less than 150 acres) to about 22,300 acres (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from a negligible increase under Alternatives 2 and 3 (about 25 acres) to 3,875 acres (Alternatives 4 to 6). Suitable old-growth acres would be added next to the areas of existing suitable old-growth, extending further south on Catherine Island and northwest on Baranof Island toward Lake Eva. None of the action alternatives would add suitable young-growth. Harvest of existing suitable old-growth and young-growth acres under all alternatives would conflict with outfitter/guide use in the area. The old-growth acres that would be added under Alternatives 4 to 6 could potentially exacerbate these impacts if harvest were to occur in these areas.

04-11A Port Frederick
The Port Frederick outfitter/guide use area is located on the Hoonah Ranger District and consists of 112,500 acres, 77 percent of which are located in IRAs

(Table 3.10-5). This use area encompasses the north and northeast portions of Chichagof Island from Chicken Creek east to Port Frederick. The area also includes the city of Hoonah, Native Corporation lands, State properties, and several private inholdings. Access is via boat or float plane.

Fourteen outfitter/guides reported use in this area from 2013 to 2017, two of which used the area regularly (4 out of 5 years). An annual average of 896 service days were reported over this period. Use has, however, increased substantially over recent years, with reported service days increasing from 10 (2013) to 1,358 and 3,021 in 2016 and 2017, respectively (Table 3.10-5). Road-based nature tours accounted for almost two-thirds (62 percent) of reported use, followed by hiking (34 percent). Use was reported at 12 locations, with Burnt Point and the Neka Bay North Bight Large Group Area each accounting for more than one-third of reported service days, followed by Game Creek (20 percent).

The Port Frederick use area includes about 15,850 acres of lands in development LUDs outside of roadless, with about 2,000 acres of old-growth identified as suitable for harvest and 3,800 acres of young-growth suitable for harvest (Table 3.10-10). Existing suitable old-growth acres are mainly located east of Hoonah. Suitable young-growth acres are located south of Port Frederick and along the existing road system that follows the Neka River.

Table 3.10-10
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Port Frederick Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	86,804	2,491	2,333	-46	-86,804	-47,650
Development LUDs – Not Roadless[2]	15,851	-2,171	-2,076	37	47,641	47,641
Suitable Old Growth	1,999	15	69	3,269	3,369	3,369
Suitable Young Growth	3,800	-2	-2	0	115	5

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Port Frederick use area would increase by more than 2,000 acres under Alternatives 2 and 3 and decrease under the other action alternatives. Alternative 5 would remove roadless designation from all lands, approximately 86,800 acres, and Alternative 6 would drop roadless protection for about 47,650 acres (Table 3.10-10).

The total number of acres in development LUDs without roadless protection would drop by more than 2,000 acres under Alternatives 2 and 3 and increase by about 47,650 acres under Alternatives 5 and 6. Increases in suitable old-growth acres available for harvest would range from a negligible increase under Alternatives 2 and 3 (less than 70 acres) to about 3,300 acres (Alternative 4) and 3,400 acres (Alternatives 5 and 6). Suitable old-growth acres would be added south and east of Hoonah in areas that do not presently receive high outfitter/guide use. Changes in suitable young-growth acres available for harvest range from a negligible decrease to an increase of 115 acres (Table 3.10-10).

04-11 B Freshwater Bay

The Freshwater Bay outfitter/guide use area is located on the Hoonah Ranger District and consists of about 160,000 acres, 61 percent of which are located in IRAs (Table 3.10-5). This use area encompasses the north and northeast portion of Chichagof Island from Whitestone Harbor east to Freshwater Bay. Access is via float plane, boat, or the Hoonah forest road system.

Fifteen outfitter/guides reported use in this area from 2013 to 2017, three of which used the area regularly (4 out of 5 years). An annual average of about 1,389 service days were reported over this period. Use has, however, increased over recent years, with reported service days increasing from 178 (2013) to 2,235 and 2,468 in 2016 and 2017, respectively (Table 3.10-5). Road-based nature tours accounted for more than three-quarters (78 percent) of reported use, followed by hiking (9 percent) and freshwater fishing (8 percent). Use was reported at 14 locations, with Upper Game Creek accounting for almost half (45 percent) of reported service days, followed by Kennel Creek (23 percent) and Freshwater Bay (13 percent).

The Freshwater Bay use area includes about 47,200 acres of lands in development LUDs with no roadless protection, with about 16,600 acres of suitable old-growth available for harvest and 12,400 acres of suitable young-growth (Table 3.10-11). Existing suitable old-growth and young-growth acres are located along the existing road systems in the area with almost half (46 percent) of the non-roadless portion of the area considered suitable and available for harvest.

The number of roadless acres in the Freshwater Bay use area would decrease under all of the action alternatives with drops ranging from about 1,200 acres (Alternative 2) to 97,253 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 49,150 acres, with a similar reduction under Alternative 4 (48,400 acres), if acres assigned to the AKRA Timber Priority management category are included with those dropped.

Table 3.10-11
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Freshwater Bay Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	97,253	-1,170	-10,968	-1,331	-97,253	-49,151
Development LUDs – Not Roadless[2]	47,178	1,298	10,401	1,298	49,118	49,118
Suitable Old Growth	16,587	341	3,480	12,073	12,236	12,236
Suitable Young Growth	12,374	178	203	303	1,204	350

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The total number of acres in development LUDs outside of roadless would increase under all alternatives with gains ranging from about 1,300 acres (Alternative 2) to 49,200 (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from about 350 acres (Alternative 2) to more than 12,000 acres (Alternatives 4 to 6). Suitable young-growth acres available for harvest would increase under all alternatives, with

the largest increase (about 1,200 acres) under Alternative 5 (Table 3.10-11). Suitable old-growth acres would be added throughout the area under Alternatives 4 to 6. Harvest of existing suitable old-growth and young-growth acres under all of the alternatives would conflict with outfitter/guide use in the area. The old-growth acres that would be added under Alternatives 4 to 6 could potentially exacerbate these impacts if harvest were to occur in these areas.

04-12 Tenakee Inlet

The Tenakee Inlet outfitter/guide use area is located on the Sitka and Hoonah Ranger Districts and consists of 312,370 acres, 79 percent of which are located in IRAs (Table 3.10-5). This use area encompasses the central and eastern portions of Chichagof Island that surround Tenakee Inlet, as well as the lands adjacent to Chatham Strait from the mouth of Tenakee Inlet south to Florence Bay.

Sixteen outfitter/guides reported use in this area from 2013 to 2017, with none using the area more than 3 out of 5 years. Reported use has increased in recent years, jumping from 95 service days in 2013 to 407 in 2017, for a 5-year annual average of 186 service days (Table 3.10-5). Hiking accounted for almost half (47 percent) of reported use, followed by brown bear hunting (33 percent) and remote-setting nature tours (10 percent). Use was reported at more than 20 locations, with much of the use reported at the bays on the south side of Tenakee Inlet. Seal Bay received the most use (29 percent of total service days), followed by Corner Bay (20 percent) and Basket Bay (10 percent).

The Tenakee Inlet use area includes almost 48,000 acres of lands in development LUDs outside of roadless, with about 13,400 acres identified as suitable for old-growth harvest and 10,100 acres suitable for young-growth harvest (Table 3.10-12). Existing suitable old-growth and young-growth acres are located along the existing road systems that are excluded from the Chichagof IRA (IRA 311).

Table 3.10-12
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Tenakee Inlet Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	246,547	7,224	-50,608	-10,478	-246,547	-103,908
Development LUDs – Not Roadless[2]	47,757	-4,632	6,274	8,191	103,837	103,837
Suitable Old Growth	13,380	359	3,595	11,656	11,656	11,656
Suitable Young Growth	10,145	89	89	89	143	140

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in Tenakee Inlet would increase under Alternative 2, with a net gain of approximately 7,200 aces, about 2 percent of the total use area. The number of acres with roadless protection would decrease under the other action alternatives. Alternative 5 would remove roadless designation from all lands, approximately 246,500 acres and Alternative 6 would drop roadless protection for about 104,000 acres.

The total number of acres in development LUDs without roadless protection would decrease by about 4,600 acres under Alternative 2. Increases in development LUDs outside or roadless for the other alternatives would range from about 6,300 acres (Alternative 3) to almost 104,000 acres (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from less than 400 acres (Alternative 2) to about 11,700 acres (Alternatives 4 to 6). Suitable old-growth acres would mainly be added to areas in and around existing roads, extending the areas of existing suitable old-growth available for harvesting. The action alternatives would each add less than 150 acres of suitable young-growth.

Suitable old-growth acres would be added in the vicinity of Basket Bay and Corner Bay, both of which receive relatively high levels of reported outfitter/guide use. Suitable old-growth acres would also be added south of Crab Bay, another area with reported outfitter/guide use, under Alternatives 4 to 6. These additions would extend existing areas of suitable acres that are presently available for harvest. Harvest of these areas under all of the alternatives, including Alternative 1, would have the potential to conflict with existing outfitter/guide use, but particularly under Alternatives 4 to 6, which would increase suitable old-growth acres by 87 percent.

04-13 Peril Strait

The Peril Strait outfitter/guide use area is located on the Sitka Ranger District and consists of 232,130 acres, 72 percent of which are located in IRAs (Table 5). This use area encompasses the southern end of Chichagof Island surrounding Hoonah Sound and Peril Strait, from near Sergius Point to Point Hayes. Access to the shoreline along Hoonah Sound and Peril Strait is dictated by weather conditions and tidal flow.

Twenty-one outfitter/guides reported use in this area from 2013 to 2017, eight of which used the area regularly (4 out of 5 years). An annual average of 1,179 service days were reported over this period (Table 3.10-5). Hiking accounted for more than half (58 percent) of reported use, followed by freshwater fishing (15 percent), brown bear hunting (9 percent), and road-based nature tours (9 percent). Use was reported at more than 30 locations, with about one-third of service days reported at Sitkoh Bay, Sitkoh Creek, and Sitkoh Lake on the south end of Chichagof Island. Relatively high use was also reported for Eammon Island (18 percent of total service days), Deep Bay, Sergius Narrows (11 percent), and the False Island Road System (10 percent).

The Peril Strait use area includes 49,700 acres of lands in development LUDs outside of roadless, with about 3,000 acres identified as suitable for old-growth harvest and 9,000 acres suitable for young-growth harvest (Table 3.10-13). Existing suitable old-growth and young-growth acres are mainly located along the existing road systems at the south end of Chichagof Island, and further northwest around two existing roads on the north shore of Peril Strait.

Table 3.10-13
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Peril Strait Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	167,544	25,959	-63,632	5,119	-167,544	-52,108
Development LUDs – Not Roadless[2]	49,702	-17,629	-17,616	465	52,108	52,108
Suitable Old Growth	2,998	-35	-35	1,534	2,536	2,536
Suitable Young Growth	9,063	85	85	112	188	129

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Peril Strait use area would increase under Alternative 2, with a net gain of approximately 26,000 aces, about 11 percent of the total use area. The number of acres with roadless protection would decrease under the other action alternatives. Alternative 5 would remove roadless designation from all lands, approximately 167,500 acres, and Alternative 6 would drop roadless protection for about 52,100 acres (Table 3.10-13).

The total number of acres in development LUDs without roadless protection would decrease by almost 17,600 acres under Alternatives 2 and 3. Increases in development LUDs outside of roadless for the other alternatives would range from less than 500 acres (Alternative 4) to about 52,000 acres (Alternatives 5 and 6). Changes in suitable old-growth acres available for harvest would range from a very small drop (Alternatives 2 and 3) to increases of about 2,500 acres (Alternatives 5 and 6). Suitable old-growth acres would mainly be added in areas in and around existing roads, extending the areas of existing suitable old-growth available for harvesting. The action alternatives would each add less than 200 acres of suitable young-growth.

Suitable old-growth acres would be added south of Sitkoh Lake, on the north side of the False Island road system, and around the existing roads further northwest on the north shore of Peril Strait under Alternatives 4 to 6. These additions would extend existing areas of suitable acres that are presently available for harvest. Harvest of these areas under Alternatives 4 to 6 would have the potential to conflict with existing outfitter/guide use.

CRD 00 Craig Ranger District

The CRD 00 outfitter/guide use area, which consists of the entire Craig Ranger District, encompasses about 926,000 acres, 77 percent of which are located in IRAs (Table 3.10-5). The Craig Ranger District is located on the southern half of Prince of Wales Island, the largest island in Southeast Alaska. Prince of Wales Island has the most extensive road system in Southeast Alaska, ranging from paved scenic byways to logging roads that require four-wheel drive. These roads provide access to numerous areas with opportunities to fish, hike, camp, hunt, boat, and view wildlife.

Twenty-one outfitter/guides reported use in this area from 2013 to 2017, five of which used the area regularly (4 out of 5 years). An annual average of 1,869 service days were reported over this period. Use in this area was

noticeably lower in 2017 than in previous years, with just 926 reported service days, about half the annual average (Table 5). Wildlife viewing accounted for 85 percent of reported service days, followed by hunting (7 percent). Use was reported at 75 locations, with the Dog Salmon fish pass wildlife viewing site and Polk Inlet accounting for 39 percent and 17 percent of service days, respectively. Reported use at Dog Salmon fish pass was mainly from 2014 to 2016; use at Polk Inlet was mainly reported in 2013.

The Craig Ranger District includes about 72,900 acres of lands in development LUDs outside of roadless, with about 14,000 acres of suitable old-growth available for harvest and 17,000 acres of suitable young-growth (Table 14). Existing suitable acres are located along the road systems throughout the non-roadless parts of the area, including areas near Dog Salmon fish pass and Polk Inlet. The Craig Ranger District use area includes Congressionally designated LUD II areas, as well the South Prince of Wales Wilderness.

Table 3.10-14
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Craig Ranger District Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	715,371	-1,872	-153,736	-28,584	-715,371	-269,571
Development LUDs-Not Roadless[2/]	72,885	15,026	35,795	32,873	249,980	249,980
Suitable Old Growth	13,959	4,366	8,259	14,383	16,266	16,266
Suitable Young Growth	17,069	2,569	3,574	3,892	4,199	4,074

Note:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Craig Ranger District would decrease under all of the action alternatives with drops ranging from about 1,900 acres (Alternative 2) to about 715,400 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 270,000 acres (Table 3.10-14).

The total number of acres in development LUDs outside of roadless would increase under all alternatives with gains ranging from about 15,000 acres (Alternative 2) to 250,000 acres (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from about 4,400 acres (Alternative 2) to about 14,300 to 16,300 acres, which would more than double the amount available under Alternatives 4 to 6. Increases in suitable young-growth acres would range from about 2,600 acres (Alternative 2) to about 4,200 acres (Alternatives 5 and 6) (Table 3.10-14). Suitable acres would mainly be added in the north central part of the area, near the communities of Craig, Klawock, and Hollis in the Twelvemile and Soda Bay IRAs (IRAs 534 and 505), with smaller concentrations on the south part of Sumez Island and east of Cholmondeley Sound. These additions would expand the areas presently available for harvest in the vicinity of Dog Salmon fish pass and Polk Inlet. Harvest of suitable acres in the vicinity of these areas under all alternatives would have the potential to conflict with existing outfitter/guide use.

K19 North Revilla

The North Revilla outfitter/guide use area is located on the Ketchikan-Misty Fiords Ranger District and consists of 70,400 acres, 83 percent of which are located in IRAs (Table 3.10-5). The North Revilla area encompasses the northern, non-wilderness portion of Revillagigedo Island, including Hassler Island and Black Island.

Eight outfitter/guides reported use in this area from 2013 to 2017, five of which used the area regularly (4 out of 5 years). An annual average of 213 service days were reported over this period (Table 3.10-5). Hiking accounted for most (82 percent) of reported use, followed by fishing (17 percent). Use was reported for three locations. Hiking use was reported at Klu Bay and the Orchard Lake Trail, with fishing reported at Orchard Lake.

The North Revilla use area includes about 9,400 acres of lands in development LUDs outside of roadless, with 2,200 acres identified as suitable for old-growth harvest and 2,300 acres suitable for young-growth harvest (Table 3.10-15). Existing suitable old-growth and young-growth acres occupy much of the non-roadless portions of this use area, including Hassler Island, along the south shoreline, and around Orchard Lake.

Table 3.10-15
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the North Revilla Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	58,474	-275	-275	-277	-58,474	-13,234
Development LUDs – Not Roadless[2]	9,384	245	245	245	13,203	13,203
Suitable Old Growth	2,181	78	78	2,384	2,655	2,655
Suitable Young Growth	2,278	5	5	133	154	144

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

Changes in roadless area acres in North Revilla would be minimal under Alternatives 2 to 4, with roadless protection dropped from less than 300 acres. This total increases to 9,500 for Alternative 4, if acres assigned to the AKRA Timber Priority management category are included with those dropped. Alternative 5 would remove roadless designation from all lands in existing IRAs, approximately 58,500 acres, with Alternative 6 dropping roadless protection for about 13,200 acres (Table 3.10-15).

Alternatives 2 and 3 would have very little effect on development potential, as measured by acres in development LUDs outside of roadless, with each alternative adding about 250 acres, about 3 percent of the existing total. Alternatives 5 and 6, on the other hand, would more than double existing development LUD acres without roadless protection, with a net increase of 13,200 acres under each alternative. Changes in suitable old-growth acres available for harvest would range from less than 100 acres (Alternatives 2 and 3) to an increase of about 2,400 to 2,700 acres under Alternatives 4 to 6, more than double the suitable old-growth acres under Alternative 1. Suitable old-growth acres would mainly be added on Black Island and north of the existing suitable acres on Revillagigedo Island. The action alternatives would

each add less than 200 acres of suitable young growth. Harvest of existing suitable old-growth and young-growth acres under all of the alternatives would conflict with outfitter/guide use in this area. The old-growth acres that would be added under Alternatives 4 to 6 could potentially exacerbate these impacts if harvest to occur in these areas.

P1 Mitkof Island

The Mitkof Island outfitter/guide use area is located on the Petersburg Ranger District and consists of 109,302 acres, 32 percent of which are located in IRAs (Table 3.10-5). This use area encompasses all of Mitkof Island and includes the city of Petersburg.

Fifteen outfitter/guides reported use in this area from 2013 to 2017, five of which used the area regularly (4 out of 5 years). An annual average of about 928 service days were reported over this period (Table 3.10-5). Hiking accounted for more than half (59 percent) of reported service days, followed by camping (9 percent) and remote-setting nature tours (15 percent). Use was reported at 11 locations, with the Ideal Cove Trail accounting for 71 percent of reported service days, followed by Point Alexander (13 percent).

The Mitkof Island use area includes about 57,000 acres of lands in development LUDs outside of roadless (slightly more than half the total area), with about 15,600 acres of suitable old-growth available for harvest and 9,800 acres of suitable young-growth (Table 3.10-16). Existing suitable old-growth and young-growth acres are located along the existing road systems through the center of the island, as well as along the roads that wrap around the south side of the Sumner Mountains.

Table 3.10-16
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Mitkof Island Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	34,625	-28	-3,994	-125	-34,625	-22,154
Development LUDs – Not Roadless[2]	56,934	96	4,061	96	22,124	22,124
Suitable Old Growth	15,557	2	1,426	3,384	3,542	3,542
Suitable Young Growth	9,761	3	4	20	52	25

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Mitkof Island use area would decrease under all of the action alternatives with drops ranging from less than 30 acres (Alternative 2) to about 34,600 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 22,150 acres (Table 3.10-16).

The total number of acres in development LUDs outside of roadless would increase under all alternatives with gains ranging from less than 100 acres (Alternative 2) to 22,100 (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from about 1,400 acres (Alternative 3) to about 3,400 acres (Alternative 4) and 3,550 acres (Alternatives 5 and 6). Suitable old-growth acres would be added in three

main locations under Alternatives 4 to 6, none of which would likely conflict with areas receiving relative high levels of existing outfitter/guide use. Increases in suitable young-growth acres would be 50 acres or less under all of the action alternatives.

P08 North Lindenberg Peninsula

The North Lindenberg Peninsula outfitter/guide use area is located on the Petersburg Ranger District and consists of 75,600 acres, 78 percent of which are located in IRAs (Table 3.10-5). Located on the north end of Kupreanof Island, this use area is bordered to the north and east by Frederick Sound and includes Portage Bay.

Twelve outfitter/guides reported use in this area from 2013 to 2017, three of which used the area regularly (4 out of 5 years). An annual average of 278 service days were reported over this period (Table 3.10-5). Camping accounted for more than three-quarters (76 percent) of reported service days, followed by remote-setting nature tours (9 percent). Use was reported at 11 locations, with locations around Portage Bay accounting for 46 percent of reported service days, followed by Five Mile Creek (29 percent).

The North Lindenberg Peninsula use area includes about 13,800 acres of lands in development LUDs outside of roadless, with about 4,700 acres of suitable old-growth available for harvest and 3,700 acres of suitable young-growth (Table 3.10-17). Existing suitable old-growth and young-growth acres are located along the existing roads on the east side of Portage Bay.

The number of roadless acres in the North Lindenberg Peninsula use area would decrease under all of the action alternatives with drops ranging from 10,500 acres (Alternative 2) to about 58,700 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 48,600 acres (Table 3.10-17).

Table 3.10-17
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the North Lindenberg Peninsula Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	58,697	-10,504	-27,975	-20,635	-58,697	-48,631
Development LUDs – Not Roadless[2]	13,772	10,080	24,215	16,867	48,200	48,200
Suitable Old Growth	4,666	3,227	6,708	8,764	8,856	8,856
Suitable Young Growth	3,685	742	755	756	815	804

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The total number of acres in development LUDs without roadless protection would increase under all alternatives with gains ranging from about 10,100 acres (Alternative 2) to 48,200 (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from about 3,200 acres (Alternative 2) to about 8,800 to 8,850 acres (Alternatives 4 to 6) (Table 3.10-17). Old-growth acres would be added throughout the area under Alternatives 4 to 6. Increases in suitable young growth acres would range from about 750 to 800 acres under all of the action alternatives. Harvest of existing suitable

old-growth and young-growth acres under all alternatives would conflict with outfitter/guide use in the area. The old-growth acres that would be added under Alternatives 4 to 6 could potentially exacerbate these impacts if harvest were to occur in these areas.

P12B Kuiu Island Road System

The Kuiu Island Road System outfitter/guide use area is located on the Petersburg Ranger District and consists of 134,850 acres, 31 percent of which are located in IRAs (Table 3.10-5). The Kuiu Island Road System area is located on the north end of Kuiu Island. The area includes the mainline and spur roads on Kuiu Island. Roads extend to Saginaw Bay, Security Bay, Rowan Bay, Bay of Pillars, Port Camden, and Three Mile Arm.

Nine outfitter/guides reported use in this area from 2013 to 2017, five of which used the area regularly (4 out of 5 years). An annual average of about 139 service days were reported over this period (Table 3.10-5). Hunting, mainly for black bear, and camping each accounted for about one-third (33 percent and 32 percent, respectively) of reported service days, followed by freshwater fishing (26 percent). Use was reported at 13 locations, with Kadake Creek and Port Camden each accounting for slightly more than one-quarter (26 percent) of reported service days, with various locations along the road system making up 24 percent.

The Kuiu Island Road System use area includes about 77,200 acres of lands in development LUDs outside of roadless, with about 14,700 acres of suitable old-growth available for harvest and 19,600 acres of suitable young-growth (Table 3.10-18). Existing suitable old-growth acres are located in the center of the area and north of Rowan Bay. Existing young-growth acres are distributed along the existing road system throughout the area.

Table 3.10-18
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Kuiu Island Road System Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	41,215	3,380	-3,632	-107	-41,215	-30,442
Development LUDs – Not Roadless[2]	77,174	-3,159	3,849	107	30,442	30,442
Suitable Old Growth	14,741	-1,281	1,148	4,247	4,248	4,248
Suitable Young Growth	19,585	0	0	25	49	34

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Kuiu Island Road System use area would increase under Alternative 2 (3,400 acres) and decrease under the other action alternatives, with drops ranging up to about 41,200 acres under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 30,400 acres (Table 3.10-18).

The total number of acres in development LUDs outside of roadless would decrease under Alternative 2, by about 3,200 acres. Increases in development LUD acres outside of roadless under the other action

alternatives would range up to about 30,450 acres (Alternatives 5 and 6). Total suitable old-growth acres would decrease under Alternative 2, dropping by about 1,300 acres. Increases under the other action alternatives would range from 1,150 acres (Alternative 3) to 4,250 acres (Alternatives 2 to 4). Increases in suitable young-growth would be about 50 acres or less under all alternatives. Suitable old-growth acres would mainly be added in the north central and southwest parts of this area. Harvest of existing suitable old-growth and young-growth acres under all alternatives would conflict with existing outfitter/guide use in this use area.

P21 Muddy River Area

The Muddy River Area outfitter/guide use area is located on the Petersburg Ranger District and consists of 63,357 acres, 68 percent of which are located in IRAs (Table 5). The Muddy River Area is located on the mainland east of Frederick Sound. The area includes the Thomas Bay road system, Patterson River, Muddy River, Point Agassiz, and a portion of Thomas Bay.

Eight outfitter/guides reported use in this area from 2013 to 2017, three of which used the area regularly (4 out of 5 years). An annual average of 347 service days were reported over this period (Table 5). Hiking accounted for more than three quarters (78 percent) of reported use, followed by camping (9 percent). Use was reported for seven locations, with relatively high use identified for Patterson River (62 percent), followed by Ruth Island, Thomas Bay (23 percent). Service days reported for Patterson River were mainly hiking, with some mountain goat hunting use also reported.

The Muddy Bay Area includes 16,664 acres of lands in development LUDs outside of roadless, with about 2,900 acres identified as suitable for old-growth harvest and 4,200 acres suitable for young-growth harvest (Table 3.10-19). Existing suitable old-growth and young-growth acres are located along the existing road system and extend south along the Muddy River and Crystal Creek drainages reflecting past harvest in the area. Suitable old-growth acres are also located on Point Agassiz Peninsula and Deer Island.

Table 3.10-19
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Muddy River Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	42,959	4,591	-3,103	-5	-42,959	-28,700
Development LUDs – Not Roadless[2]	16,664	-3,343	4,333	5	28,700	28,700
Suitable Old Growth	2,891	-738	2,397	6,026	6,771	6,771
Suitable Young Growth	4,218	0	0	0	13	0

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

Changes in roadless area acres in the Muddy River Area would range from a net gain of about 4,600 acres under Alternative 2 to a net reduction of almost 43,000 acres under Alternative 5, which would remove roadless protection from all lands. Alternative 2 would also reduce the number of acres in development LUDs outside of roadless. Increases under the other alternatives would range up to 28,700 acres (Alternatives 5 and 6). There would be no

change in suitable young-growth acres by alternative. Changes in suitable old-growth acres available for harvest would range from a net decrease (Alternative 2) to an increase of almost 6,800 acres (Alternatives 5 and 6). Alternative 4 would result in the addition of 6,026 acres (Table 3.10-19). Suitable old-growth acres would mainly be added in the south portion of the area. Harvest of existing suitable old-growth and young-growth acres under all alternatives would conflict with outfitter/guide use in this area. The old-growth acres that would be added under Alternatives 4 to 6 could potentially exacerbate these impacts if harvest were to occur in these areas.

TBRD 00 Thorne Bay Ranger District

The TBRD 00 outfitter/guide use area, which consists of the entire Thorne Bay Ranger District, encompasses about 902,000 acres, 40 percent of which are located in IRAs (Table 3.10-5). The Thorne Bay Ranger District is located on the northern half of Prince of Wales Island. The largest island in Southeast Alaska, Prince of Wales Island has an extensive road system that provides access to numerous areas with opportunities to fish, hike, camp, hunt, boat, and view wildlife. The Thorne Bay Ranger District is known for its cave systems and karst topography.

Twenty-seven outfitter/guides reported use in this area from 2013 to 2017, 11 of which used the area regularly (4 out of 5 years). An annual average of 1,239 service days were reported over this period. Use in this area was lower in 2017 than in previous years, with about 870 reported service days, slightly more than two-thirds of the annual average (Table 3.10-5). Freshwater fishing accounted for 43 percent of reported service days, followed by sightseeing (20 percent), and camping (13 percent) and remote-setting nature tours (13 percent). Use was reported at 65 locations, with the El Capitan Cave interpretative site accounting for 39 percent, followed by locations along Staney Creek (9 percent) and Thorne River (8 percent).

The Thorne Bay Ranger District includes about 328,000 acres of lands in development LUDs outside of roadless, with about 62,400 acres of suitable old-growth available for harvest and 127,000 acres of suitable young-growth (Table 3.10-20). Existing suitable acres are located along the road systems throughout the non-roadless parts of the area. The Thorne Bay Ranger District use area includes Congressionally designated LUD II areas, as well the Coronation Island, Warren Island, and Karta River Wildernesses.

Table 3.10-20
Change in Roadless Area, Development LUDs without Roadless Protection, and Suitable Timber by Alternative for the Thorne Bay Ranger District Outfitter/Guide Use Area

	Total Acres	Change from Alternative 1 (acres)				
Management Type	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Roadless Area[1, 2]	356,596	10,601	-177,576	-31,434	-356,596	-130,321
Development LUDs – Not Roadless[2]	327,916	4,355	54,025	30,566	125,863	125,863
Suitable Old Growth	62,406	1,866	13,676	20,254	21,217	21,217
Suitable Young Growth	127,019	1,054	1,109	1,320	1,536	1,322

Notes:
[1] Changes in roadless area acres for Alternative 3 include LUD II acres, which would be dropped from roadless classification, but would still be managed in a roadless condition.
[2] Roadless acres managed as AKRA Timber Priority under Alternative 4 are included in the roadless area total and excluded from the development LUD total, which has the effect of understating the changes in these categories.

The number of roadless acres in the Thorne Bay Ranger District would increase by 10,600 acres under Alternative 1 and decrease under all the other action alternatives, with 357,000 acres dropped under Alternative 5, which would remove roadless designation from all lands. Alternative 6 would drop roadless protection for about 130,300 acres (Table 3.10-20).

The total number of acres in development LUDs outside of roadless would increase under all alternatives with gains ranging from about 4,400 acres (Alternative 2) to 126,000 acres (Alternatives 5 and 6). Increases in suitable old-growth acres available for harvest would range from about 1,900 acres (Alternative 2) to about 20,300 acres (Alternative 4) and 21,200 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from about 1,100 to 1,300 acres across all the action alternatives (Table 3.10-20). Suitable old-growth acres would be added throughout the area, with larger additions near Klawock in the Kogish IRA (IRA 509) and Karta IRA (IRA 510), with relatively large gains in the northwest part of the area in the El Capitan IRA (IRA 517). These additions are not expected to conflict with outfitter/guide use at the most visited locations in this use area.

Scenery

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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, including the communities of Southeast Alaska, the Alaska Marine Highway ferry route, cruise ship routes, existing road systems, popular small boat routes and anchorages, developed recreation sites and facilities, and hiking trails. Tourist-related flight seeing via small aircraft is increasing in popularity and provides aerial views of the forest landscape.

The Forest Service developed a Visual Management System (VMS) in 1974 to integrate aesthetic considerations into large-scale resource management decisions. Due to advances in technology, as well as the increased demand for high-quality scenery, the Scenery Management System (SMS) was released in 1996. The SMS integrates the increased understanding of ecosystem processes and cultural landscapes in identifying the effects of various management practices on scenic resources. The SMS was used in this analysis to inventory existing scenic resources, provide measurable scenic quality management objectives for each portion of the landscape, and estimate the landscape's sensitivity based on the visibility from priority travelways and use areas.

In order to apply the SMS to the Forest, a viewshed analysis of the entire Tongass National Forest was completed using the Tongass Geographic Information System (GIS) and is described in the Scenery section of the 2016 Forest Plan FEIS (USDA Forest Service 2016b). This viewshed analysis was completed separately for each Ranger District and was based on the viewsheds of selected points along Visual Priority Routes and Use Areas. The analysis included identification of distance zones, which were subsequently overlaid with the Land Use Designations (LUDs) to generate the Scenic Integrity Objectives (SIOs) (refer to the Forest-wide standards and guidelines in the Tongass Land and Resource Management Plan for details on how SIOs were determined for each LUD).

Existing Scenic Integrity

The existing scenic resources of the Tongass encompass everything from vast tracts unmodified by human activity to extensive areas of heavily modified landscapes. Existing Scenic Integrity (ESI) ratings are used by the Forest Service to analyze the degree of intactness of the landscape character. These ratings are used to categorize the degree of alteration visible in the landscape on a continuum from a natural setting to a heavily altered landscape. The ratings apply to the broad landscape affected, not just the acres altered. As described

below, ESI ratings range over six levels of integrity, from Very High to Unacceptably Low.

- **Very High**—Landscapes where the valued landscape character is intact with only minute deviations, if any. The existing landscape character and sense of place is expressed at the highest possible level.
- **High**—Landscapes where the valued landscape character appears intact. Deviations may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
- **Moderate**—Landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- **Low**—Landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but compatible or complimentary to the character within.
- **Very Low**—Landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed.
- **Unacceptably Low**—Landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character.

Table 3.16-1 in the Forest Plan FEIS (USDA Forest Service 2016b) displays the percent of acres of each ESI for the Tongass. 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 inventoried Visual Priority Routes and Use Areas with a concern level of 1 or 2, the travelways and use areas with the highest number of users. Seldom seen areas are all the rest of the Forest. The ESI for wilderness is also included in this table. Approximately 88 percent of the Tongass is rated as a Very High ESI, which is a visually unaltered condition. About 10 percent of the land is rated as Low, Very Low, or Unacceptably Low, which indicates noticeable development activity. The remainder of the Forest is rated as High or Moderate. Some of the wilderness acres have a High or lower rating. This is mostly due to the landscape effect of developments adjacent to wilderness and past development activities within wildernesses.

Under the Forest Plan, all land has a designated LUD, which guides the types and intensity of development actions. The LUDs designate the SIOs for each area, which define the degree to which the natural landscape can be altered, and provide guidelines for timber harvest, road building, and other activities to ensure they are conducted in a way that allows the scenic objectives to be achieved. A LUD may have different SIOs depending on the distance zone (foreground, middleground, background) in which the development activity is to take place. SIOs are classified using the same terms outlined above for ESI: Very High,

High, Moderate, Low, and Very Low. The Unacceptably Low rating is only used to inventory existing conditions and cannot be used as a management objective.

- The current adopted SIOs for all land within the Tongass are displayed in Table 3.11-1. This table separates the percent of acres of each SIO into five categories: foreground, middleground, background, seldom seen, and other (municipal watersheds and non-wilderness national monuments where the SIO is determined on a project-by-project basis). The Very High SIO is typically assigned to wilderness; however, it is not used for Tongass wilderness because of the potential alterations allowed under the Alaska National Interest Lands Conservation Act (ANILCA). In reality, the vast majority of wilderness acreage will be managed through the specific wilderness plans with a Very High SIO. Thus, over 60 percent of the Tongass is to be managed at the High or Very High Scenic Integrity level.

- 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. These facts result in a strong indirect connection between scenic resource values and the economy of Southeast Alaska. For example, Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruise ship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The visitors 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. A report published by the Alaska Department of Community and Economic Development shows that the largest number of visitors (1.96 million) for 2013-2014 was 5,000 more than the last record set in 2007-2008. This increase also represents a 6 percent increase over 2012-2013.

Table 3.11-1
Adopted Scenic Integrity Objectives for the Tongass (percent)

	Scenic Integrity Objective					
Category	**High**	**Moderate**	**Low**	**Very Low**	**Other[1]**	**Total**
Foreground	7.6	3.6	1.4	0.0	0.2	12.9
Middleground	18.3	7.2	2.4	6.0	0.3	34.3
Background	0.8	0.4	0.0	0.1	0.0	1.4
Seldom seen	34.4	8.7	0.0	7.5	0.8	51.5
Unmapped	0.0	0.0	0.0	0.0	0.0	0.0
Total	**61.2**	**20.0**	**3.9**	**13.7**	**1.3**	**100.0**

[1] Includes land in the Municipal Watershed and Non-wilderness National Monument LUDs. SIOs in these LUDs are to be determined on a project-by-project basis. Generally, the High SIO will be met.

Source: USDA Forest Service, GIS. Numbers are not exact and may not sum correctly due to rounding.

Lands adjacent to the Alaska Marine Highway, cruise ship routes, flight-seeing routes, high-use recreation areas, and other marine and land-based travel routes will be seen by more people, more frequently, and for greater duration.

Environmental Consequences

The Tongass has adopted specific management objectives for scenic resources (i.e., SIOs) for each LUD in the Forest. The adopted SIOs indicate the desired or

acceptable level of human-induced alteration to the valued landscape character. No changes in the SIOs or related Scenery standards and guidelines are proposed under any alternative. Harvest of old growth would follow the SIOs of the 2016 Forest Plan for all alternatives. However, the Forest Plan relaxes the SIOs for young-growth harvest in order to increase the availability of young growth, especially in the first few decades. In other words, all alternatives have reduced SIOs in viewsheds where young growth is to be harvested. As a result, the current SIO designated for the LUD in which young-growth harvest takes place is not likely to be met in many cases.

Adopted SIOs can be thought of as an indicator of long-term cumulative effects. SIOs are adopted to provide a threshold for the amount of modification to the landscape during land-altering activities; therefore, land may have an adopted SIO of Low, but currently meet the High SIO.

The potential effects to the scenic resource are primarily described in the following two ways:

1. A display of acres of each SIO adopted for suitable young growth, along with LUD, for each alternative.
2. A display of the effects of each alternative on a selected group of key viewsheds throughout the Tongass.

Indirect and Cumulative Forest-wide Effects

The Forest Plan relaxes the SIOs for young-growth harvest to Very Low, no matter what the SIO is currently, in all development LUDs. However, young-growth harvest is also allowed in the Old-Growth Habitat LUD and there is no change in the SIO for this LUD (it would remain High). All alternatives would follow these same SIO definitions for young-growth harvest. Table 3.11-2 displays the acres of suitable young growth in each SIO that would result from the six alternatives.

Table 3.11-2

Scenery Integrity Objectives for Suitable Young Growth by LUD and Alternative (percent)

	Alternative					
SIO/LUD	**1**	**2**	**3**	**4**	**5**	**6**
Very Low/Timber Production	60%	61%	61%	61%	60%	61%
Very Low/Modified Landscape	23%	23%	23%	22%	22%	22%
Very Low/Scenic Viewshed	6%	6%	6%	6%	6%	6%
High/Old-Growth Habitat	11%	11%	11%	11%	12%	11%
Total Young-Growth Suitable Acres	**334,054**	**344,342**	**345,851**	**348,641**	**353,961**	**350,660**

[1] Consists of unmapped areas.
Note: Numbers are based on GIS estimates and are not exact due to rounding.

Overall old-growth and young-growth harvest would be similar under all alternatives. However, the distribution of harvest acres would vary based on the locations of suitable forest land. As shown in Table 3.11-2, the vast majority of young-growth harvest areas would have Very Low SIOs in all alternatives, which could result in negative effects on scenery. The only variation from Very Low SIOs would occur for young-growth harvest in Old-Growth Habitat LUDs. These harvest areas would have High SIOs. All alternatives would have similar percentages of High SIOs.

Effects on Selected Viewsheds

To help focus the visual effects on more familiar areas, the alternatives were analyzed by selected large viewsheds in the Tongass. These 23 viewsheds were selected for their popularity and intensity of public use and travel and are the same as those analyzed in the EIS associated with the 1997 Forest Plan (USDA Forest Service 1997a) and in the EISs associated with the 2008 and 2016 Forest Plan Amendments (USDA Forest Service 2008b, 2016b). They technically represent a series of viewsheds along a travelway and take in entire Value Comparison Units (VCUs). Table 3.11-3 compares suitable and projected harvest acres for young-growth and old-growth timber under the six alternatives for each of the viewsheds. The table also includes the total acres of each viewshed and the percent of each viewshed consisting of non-National Forest System (NFS) lands. Acres that are seldom seen or unseen from any viewpoint along the travelway are excluded from the viewshed, which are displayed in Figure 3.11-1.

While the previous section of this effects analysis summarized overall effects by alternative, this section is intended to be a viewshed-specific assessment of effects. As such, it takes into account past harvest and represents a cumulative assessment of scenery effects Listed below are some summary points that can be observed from the viewshed-specific assessment:

- Three of the 23 viewsheds (Hyder/Salmon River Highway, Stephens Passage, and Mendenhall Glacier) include less than 500 acres of suitable young growth in all alternatives.
- Six of the 23 viewsheds (Hyder/Salmon River Highway, Mendenhall Glacier, Stephens Passage, Ernest Sound, Lynn Canal, and Salmon Bay Lake) include less than 150 acres of suitable old growth in all alternatives.
- In most viewsheds, the highest effects on scenery would be associated with Alternatives 5 and 6, followed in order by Alternatives 4, 3, 2, and 1.
- Viewsheds with the highest potential for negative effects from young-growth harvest include Chatham Strait, Duncan Canal, Frederick Sound, Lynn Canal, and Stikine Strait, based on both the percent increase and the increase in acreage of young growth suitable and projected harvest relative to Alternative 1.
- Viewsheds with the highest potential for negative effects from old-growth harvest include Duncan Canal, Eastern Passage, Frederick Sound, Stikine Strait, Tenakee Inlet to Tenakee Springs, and Zimovia Strait, based on both the percent increase and the increase in acreage of old growth suitable and projected harvest relative to Alternative 1.

Behm Canal (West)

All alternatives would have similar acres of suitable young growth in the Behm Canal West viewshed. Suitable old-growth acres would be similar for Alternatives 1, 2, and 3 and would be 12 to 15 percent higher for Alternatives 4, 5, and 6. However, projected harvest in this viewshed would decrease for both young growth and old growth for the alternatives that include greater acreages of suitable lands. This is because harvest levels would remain the same under all alternatives, so alternatives with greater acreages of suitable lands would experience a lower harvest rate on a per acre basis.

Figure 3.11-1
Map of Selected General Viewsheds

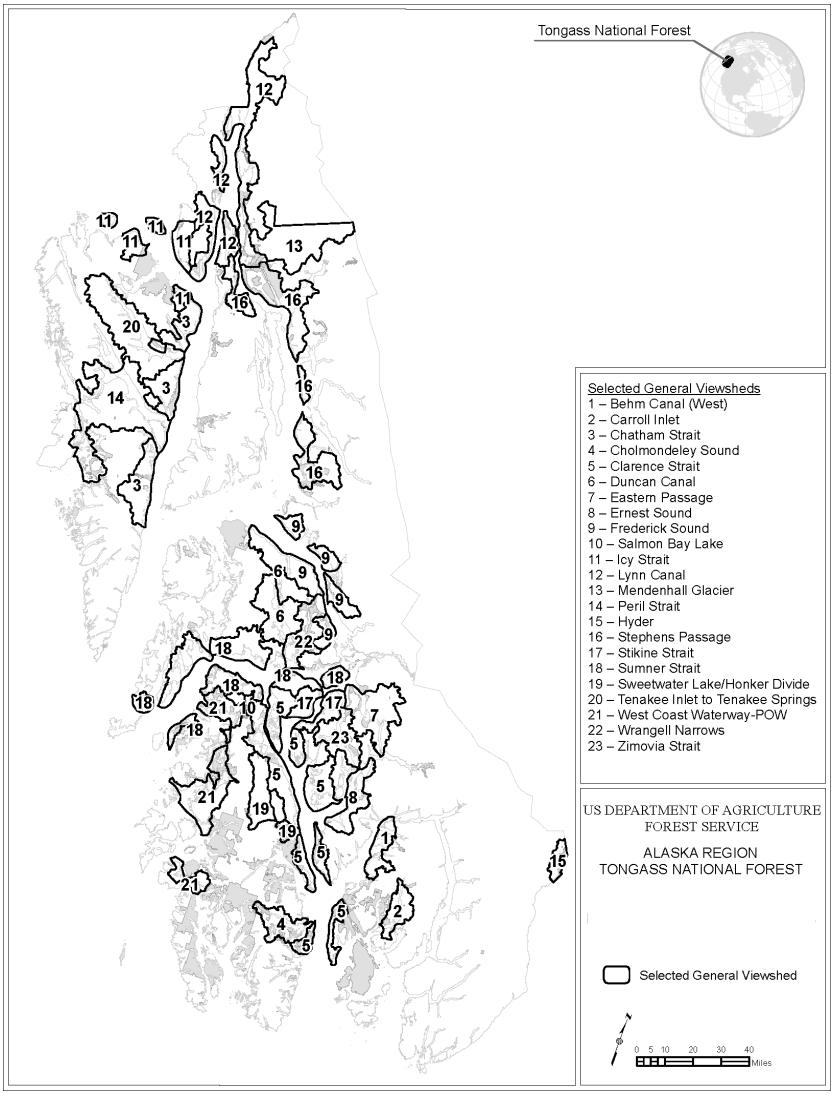

Table 3.11-3
Suitable/Projected Harvest (in acres) for Young Growth and Old Growth in Selected General Viewsheds [1,2]

Viewshed and Category	Alternative 1	2	3	4	5	6
Behm Canal (West)						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	803	803	803	803	846	803
Very Low SIO-Foreground/Middleground	8,114	8,114	8,114	8,115	8,127	8,127
Suitable OG Acres – All SIOs and Dist. Zones	8,223	8,226	8,405	9,205	9,420	9,420
Projected YG Harvest Acres in Seen Area over 100 Years	7,585	7,358	7,326	7,268	7,203	7,236
Projected OG Harvest Acres in Seen Area over 100 Years	1,520	1,410	1,200	1,008	1,009	1,009
Total Acres in Viewshed (2% is Non-NFS)	**48,957**	**48,957**	**48,957**	**48,957**	**48,957**	**48,957**
Carroll Inlet						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	86	86	86	86	91	86
Very Low SIO-Foreground/Middleground	7,026	7,312	7,312	7,312	7,312	7,312
Suitable OG Acres – All SIOs and Dist. Zones	6,342	7,135	8,163	9,756	9,756	9,756
Projected YG Harvest Acres in Seen Area over 100 Years	6,049	6,105	6,078	6,030	5,943	5,995
Projected OG Harvest Acres in Seen Area over 100 Years	1,172	1,223	1,165	1,069	1,045	1,045
Total Acres in Viewshed (6% is Non-NFS)	**52,422**	**52,422**	**52,422**	**52,422**	**52,422**	**52,422**
Chatham Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	2,326	2,326	2,326	2,326	2,898	2,326
Very Low SIO-Foreground/Middleground	4,850	4,850	4,927	4,990	4,993	4,993
Suitable OG Acres – All SIOs and Dist. Zones	8,136	8,174	10,447	12,451	12,516	12,516
Projected YG Harvest Acres in Seen Area over 100 Years	6,104	5,921	5,959	5,963	6,334	5,931
Projected OG Harvest Acres in Seen Area over 100 Years	1,503	1,401	1,491	1,364	1,341	1,341
Total Acres in Viewshed (4% is Non-NFS)	**107,411**	**107,411**	**107,411**	**107,411**	**107,411**	**107,411**
Cholmondeley Sound						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	91	91	91	91	96	91
Very Low SIO-Foreground/Middleground	711	727	727	727	728	728
Suitable OG Acres – All SIOs and Dist. Zones	1,203	1,206	1,364	1,889	2,533	2,533
Projected YG Harvest Acres in Seen Area over 100 Years	682	674	672	666	662	664
Projected OG Harvest Acres in Seen Area over 100 Years	222	207	195	207	271	271
Total Acres in Viewshed (27% is Non-NFS)	**36,156**	**36,156**	**36,156**	**36,156**	**36,156**	**36,156**
Clarence Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	1,182	1,175	1,181	1,187	1,290	1,195
Very Low SIO-Foreground/Middleground	17,271	17,386	17,575	17,767	17,948	17,948
Suitable OG Acres – All SIOs and Dist. Zones	9,969	10,590	11,555	13,772	13,773	13,773
Projected YG Harvest Acres in Seen Area over 100 Years	15,696	15,317	15,410	15,448	15,443	15,512
Projected OG Harvest Acres in Seen Area over 100 Years	1,842	1,815	1,649	1,509	1,476	1,476
Total Acres in Viewshed (12% is Non-NFS)	**200,381**	**200,381**	**200,381**	**200,381**	**200,381**	**200,381**

Table 3.11-3 (continued)
Suitable/Projected Harvest (in acres) for Young Growth and Old Growth in Selected General Viewsheds [1,2]

Viewshed and Category	Alternative 1	2	3	4	5	6
Duncan Canal						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	351	351	351	351	362	351
Very Low SIO-Foreground/Middleground	1,919	2,448	2,451	2,451	2,480	2,480
Suitable OG Acres – All SIOs and Dist. Zones	1,619	2,782	4,316	4,416	4,416	4,416
Projected YG Harvest Acres in Seen Area over 100 Years	1,931	2,310	2,302	2,284	2,281	2,294
Projected OG Harvest Acres in Seen Area over 100 Years	299	477	616	484	473	473
Total Acres in Viewshed (0% is Non-NFS)	**69,641**	**69,641**	**69,641**	**69,641**	**69,641**	**69,641**
Eastern Passage						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	342	342	342	342	468	342
Very Low SIO-Foreground/Middleground	2,344	2,428	2,428	2,428	2,465	2,465
Suitable OG Acres – All SIOs and Dist. Zones	4,251	4,680	7,248	8,361	8,361	8,361
Projected YG Harvest Acres in Seen Area over 100 Years	2,285	2,286	2,276	2,258	2,355	2,275
Projected OG Harvest Acres in Seen Area over 100 Years	786	802	1,035	916	896	896
Total Acres in Viewshed (10% is Non-NFS)	**135,673**	**135,673**	**135,673**	**135,673**	**135,673**	**135,673**
Ernest Sound						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	31	31	31	31	53	31
Very Low SIO-Foreground/Middleground	464	464	464	464	464	464
Suitable OG Acres – All SIOs and Dist. Zones	0	0	0	0	0	0
Projected YG Harvest Acres in Seen Area over 100 Years	421	408	407	403	415	401
Projected OG Harvest Acres in Seen Area over 100 Years	0	0	0	0	0	0
Total Acres in Viewshed (8% is Non-NFS)	**36,131**	**36,131**	**36,131**	**36,131**	**36,131**	**36,131**
Frederick Sound						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	526	590	596	596	635	590
Very Low SIO-Foreground/Middleground	7,424	8,183	8,208	8,208	8,229	8,229
Suitable OG Acres – All SIOs and Dist. Zones	9,085	11,647	15,727	20,056	20,601	20,601
Projected YG Harvest Acres in Seen Area over 100 Years	6,763	7,239	7,233	7,176	7,116	7,147
Projected OG Harvest Acres in Seen Area over 100 Years	1,679	1,997	2,245	2,197	2,207	2,207
Total Acres in Viewshed (2% is Non-NFS)	**163,068**	**163,068**	**163,068**	**163,068**	**163,068**	**163,068**
Salmon Bay Lake						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	256	256	256	256	256	256
Very Low SIO-Foreground/Middleground	1,103	1,103	1,103	1,103	1,103	1,103
Suitable OG Acres – All SIOs and Dist. Zones	12	12	12	12	12	12
Projected YG Harvest Acres in Seen Area over 100 Years	1,155	1,121	1,116	1,107	1,090	1,101
Projected OG Harvest Acres in Seen Area over 100 Years	2	2	2	1	1	1
Total Acres in Viewshed (0% is Non-NFS)	**8,422**	**8,422**	**8,422**	**8,422**	**8,422**	**8,422**

Table 3.11-3 (continued)
Suitable/Projected Harvest (in acres) for Young Growth and Old Growth in Selected General Viewsheds [1,2]

Viewshed and Category	Alternative 1	2	3	4	5	6
Icy Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	16	16	16	16	132	16
Very Low SIO-Foreground/Middleground	2,421	2,442	2,442	2,442	2,564	2,564
Suitable OG Acres – All SIOs and Dist. Zones	8,060	8,238	8,424	10,514	11,179	11,179
Projected YG Harvest Acres in Seen Area over 100 Years	2,073	2,028	2,020	2,003	2,164	2,090
Projected OG Harvest Acres in Seen Area over 100 Years	1,489	1,412	1,202	1,152	1,198	1,198
Total Acres in Viewshed (6% is Non-NFS)	**71,116**	**71,116**	**71,116**	**71,116**	**71,116**	**71,116**
Lynn Canal						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	1	1	1	1	83	25
Very Low SIO-Foreground/Middleground	42	646	646	696	928	928
Suitable OG Acres – All SIOs and Dist. Zones	91	91	91	98	106	106
Projected YG Harvest Acres in Seen Area over 100 Years	36	534	531	568	812	772
Projected OG Harvest Acres in Seen Area over 100 Years	17	16	13	11	11	11
Total Acres in Viewshed (18% is Non-NFS)	**234,261**	**234,261**	**234,261**	**234,261**	**234,261**	**234,261**
Mendenhall Glacier						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	0	0	0	0	0	0
Very Low SIO-Foreground/Middleground	0	0	0	0	0	0
Suitable OG Acres – All SIOs and Dist. Zones	0	0	0	0	0	0
Projected YG Harvest Acres in Seen Area over 100 Years	0	0	0	0	0	0
Projected OG Harvest Acres in Seen Area over 100 Years	0	0	0	0	0	0
Total Acres in Viewshed (3% is Non-NFS)	**55,266**	**55,266**	**55,266**	**55,266**	**55,266**	**55,266**
Peril Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	1,804	1,804	1,804	1,804	1,868	1,804
Very Low SIO-Foreground/Middleground	6,518	6,478	6,478	6,518	6,521	6,521
Suitable OG Acres – All SIOs and Dist. Zones	3,437	3,407	3,407	5,330	6,270	6,270
Projected YG Harvest Acres in Seen Area over 100 Years	7,079	6,834	6,805	6,783	6,735	6,746
Projected OG Harvest Acres in Seen Area over 100 Years	635	584	486	584	672	672
Total Acres in Viewshed (7% is Non-NFS)	**189.194**	**189.194**	**189.194**	**189.194**	**189.194**	**189.194**
Hyder						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	0	0	0	0	0	0
Very Low SIO-Foreground/Middleground	186	186	186	186	207	207
Suitable OG Acres – All SIOs and Dist. Zones	21	21	21	21	21	21
Projected YG Harvest Acres in Seen Area over 100 Years	158	154	153	152	166	168
Projected OG Harvest Acres in Seen Area over 100 Years	4	4	3	2	2	2
Total Acres in Viewshed (3% is Non-NFS)	**23,278**	**23,278**	**23,278**	**23,278**	**23,278**	**23,278**

Table 3.11-3 (continued)
Suitable/Projected Harvest (in acres) for Young Growth and Old Growth in Selected General Viewsheds [1,2]

Viewshed and Category	Alternative 1	2	3	4	5	6
Stephens Passage						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	0	0	0	0	156	0
Very Low SIO-Foreground/Middleground	159	165	165	186	258	258
Suitable OG Acres – All SIOs and Dist. Zones	47	47	47	50	50	50
Projected YG Harvest Acres in Seen Area over 100 Years	135	136	136	152	332	209
Projected OG Harvest Acres in Seen Area over 100 Years	9	8	7	5	5	5
Total Acres in Viewshed (34% is Non-NFS)	**258,970**	**258,970**	**258,970**	**258,970**	**258,970**	**258,970**
Stikine Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	352	361	369	369	512	362
Very Low SIO-Foreground/Middleground	3,231	3,802	3,874	3,927	4,029	4,029
Suitable OG Acres – All SIOs and Dist. Zones	2,025	2,301	2,318	4,136	5,281	5,281
Projected YG Harvest Acres in Seen Area over 100 Years	3,048	3,435	3,485	3,501	3,646	3,558
Projected OG Harvest Acres in Seen Area over 100 Years	374	394	331	453	566	566
Total Acres in Viewshed (0% is Non-NFS)	**60,654**	**60,654**	**60,654**	**60,654**	**60,654**	**60,654**
Sumner Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	898	898	898	898	936	898
Very Low SIO-Foreground/Middleground	20,232	20,231	20,257	20,284	20,302	20,302
Suitable OG Acres – All SIOs and Dist. Zones	13,339	13,430	13,600	16,170	16,175	16,175
Projected YG Harvest Acres in Seen Area over 100 Years	17,973	17,436	17,381	17,263	17,049	17,179
Projected OG Harvest Acres in Seen Area over 100 Years	2,465	2,302	1,941	1,771	1,733	1,733
Total Acres in Viewshed (5% is Non-NFS)	**151,274**	**151,274**	**151,274**	**151,274**	**151,274**	**151,274**
Sweetwater Lake/Honker Divide						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	2,586	2,586	2,586	2,586	2,586	2,586
Very Low SIO-Foreground/Middleground	6.911	6,972	6,974	6,974	6,974	6,974
Suitable OG Acres – All SIOs and Dist. Zones	467	467	467	467	467	467
Projected YG Harvest Acres in Seen Area over 100 Years	8,077	7,887	7,854	7,791	7,674	7,674
Projected OG Harvest Acres in Seen Area over 100 Years	86	80	67	51	50	50
Total Acres in Viewshed (10% is Non-NFS)	**107,354**	**107,354**	**107,354**	**107,354**	**107,354**	**107,354**
Tenakee Inlet to Tenakee Springs						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	1,147	1,147	1,147	1,147	1,149	1,149
Very Low SIO-Foreground/Middleground	2,600	2,602	2,602	2,602	2,641	2,641
Suitable OG Acres – All SIOs and Dist. Zones	4,801	5,246	6,380	9,629	9,629	9,629
Projected YG Harvest Acres in Seen Area over 100 Years	3,187	3,093	3,080	3,055	3,042	3,042
Projected OG Harvest Acres in Seen Area over 100 Years	887	899	911	1,055	1,032	1,032
Total Acres in Viewshed (1% is Non-NFS)	**152,342**	**152,342**	**152,342**	**152,342**	**152,342**	**152,342**

Table 3.11-3 (continued)
Suitable/Projected Harvest (in acres) for Young Growth and Old Growth in Selected General Viewsheds [1,2]

Viewshed and Category	Alternative 1	2	3	4	5	6
West Coast Waterway-POW						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	2,009	2,020	2,020	2,024	2,057	2,057
Very Low SIO-Foreground/Middleground	10,779	10,822	10,868	10,881	10,885	10,885
Suitable OG Acres – All SIOs and Dist. Zones	5,482	5,389	6,197	6,880	6,880	6,880
Projected YG Harvest Acres in Seen Area over 100 Years	10,878	10,596	10,588	10,517	10,389	10,389
Projected OG Harvest Acres in Seen Area over 100 Years	1,013	924	885	754	737	737
Total Acres in Viewshed (17% is Non-NFS)	**139,547**	**139,547**	**139,547**	**139,547**	**139,547**	**139,547**
Wrangell Narrows						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	514	561	561	561	587	587
Very Low SIO-Foreground/Middleground	2,260	2,397	2,397	2,397	2,432	2,432
Suitable OG Acres – All SIOs and Dist. Zones	5,904	6,493	6,596	8,438	8,872	8,872
Projected YG Harvest Acres in Seen Area over 100 Years	2,360	2,441	2,430	2,411	2,423	2,423
Projected OG Harvest Acres in Seen Area over 100 Years	1,091	1,113	942	924	951	951
Total Acres in Viewshed (36% is Non-NFS)	**87,438**	**87,438**	**87,438**	**87,438**	**87,438**	**87,438**
Zimovia Strait						
Suitable YG Acres by SIO & Dist. Zone						
High SIO-Foreground/Middleground	663	666	666	666	730	730
Very Low SIO-Foreground/Middleground	2,807	3,155	3,181	3,195	3,198	3,198
Suitable OG Acres – All SIOs and Dist. Zones	4,450	5,501	7,052	8,128	8,128	8,128
Projected YG Harvest Acres in Seen Area over 100 Years	2,952	3,153	3,160	3,146	3,154	3,154
Projected OG Harvest Acres in Seen Area over 100 Years	822	943	1,007	890	871	871
Total Acres in Viewshed (14% is Non-NFS)	**82,695**	**82,695**	**82,695**	**82,695**	**82,695**	**82,695**

[1] SIO terms are defined in the *Affected Environment* portion of this section.
[2] The numbers in this table are approximate acres seen from a Visual Priority Travel Route and Use Area.

In some areas, particularly on the Revilla Island side of the west Canal, existing harvest is likely near the level allowed by the adopted SIOs. Additional harvest may need to be deferred in some areas in the coming decade. A high portion of the existing harvest acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed, but a 200-foot shoreline buffer would be maintained, which would help conceal the opening created by clearcuts. Therefore, all alternatives could have localized higher effects during the first few decades.

Carroll Inlet
Suitable acres of young growth in Carroll Inlet would increase by about 4 percent for all action alternatives relative to Alternative 1. Suitable acres of old growth would increase by 12 and 29 percent under Alternatives 2 and 3, respectively, relative to Alternative 1, and by 54 percent under Alternatives 4, 5, and 6. Again, however, projected harvest levels would decrease or increase slightly under each of the action alternatives because the constant harvest levels dictated by the Forest Plan would be spread over larger acreages of suitable forest lands.

Carroll Inlet has experienced relatively heavy past harvest and existing harvest is likely near the level allowed by the adopted SIOs in some areas. Additional harvest may need to be deferred in localized areas in the coming decade depending on the SIO. A high portion of young-growth acres are scattered along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed, but a 200-foot shoreline buffer would be maintained, which would help conceal the opening created by clearcuts. Therefore, all alternatives could have localized moderate effects during the first few decades.

Chatham Strait (West side)

Suitable young-growth acres in this viewshed would be similar under Alternatives 1 and 2, increase by about 2 or 3 percent under Alternatives 3, 4, and 6, and increase by about 10 percent under Alternative 5. Suitable old-growth acres would also be similar under Alternatives 1 and 2, would increase by 28 percent under Alternative 3, and would increase by about 54 percent under Alternatives 4, 5, and 6. Again however, young-growth and old-growth projected harvest under the action alternatives would be the same or less than under Alternative 1, with the exception of young-growth harvest under Alternative 5, which would increase by about 4 percent.

Chatham Strait has experienced relatively high past harvest but much of it is in seldom seen areas. Further, the number of young-growth acres of harvestable age within the next decade is very limited (USDA Forest Service 2016b, Table 3.16-5). Therefore, all of the alternatives are expected to have low effects during the first few decades.

Cholmondeley Sound

In this viewshed, suitable young-growth acres would be similar under all alternatives, varying by less than 3 percent. Using Alternative 1 as the baseline, suitable old-growth acres, however, would increase by 13 and 57 percent under Alternatives 3 and 4, respectively, and by 111 percent under Alternatives 5 and 6. Suitable old-growth acres would be almost identical under Alternatives 1 and 2. Projected old-growth harvest would be less than the Alternative 1 level for all alternatives except Alternatives 5 and 6, which would be 22 percent higher than Alternative 1.

Cholmondeley Sound has experienced limited past harvest on NFS lands, but high past harvest on non-NFS lands. About 27 percent of the viewshed consists of non-NFS lands. The number of young-growth acres of harvestable age within the next decade is very limited (USDA Forest Service 2016b, Table 3.16-5) and the projected harvest of old growth is on the order of 200 to 300 acres over the next 100 years. Therefore, with the possible exception of Alternatives 5 and 6, all of the alternatives are expected to have relatively low effects during the first few decades. However, additional harvest may need to be deferred in localized areas near non-NFS land, especially where harvest includes openings in the beach fringe.

Clarence Strait

Clarence Strait is a large viewshed (over 200,000 acres), extending along both sides of the strait, from its northern end south to Gravina Island. The viewshed includes portions of the South Etolin Wilderness Area, which would have an SIO of High under all alternatives; however, a Very High SIO would likely be achieved.

Relative to Alternative 1, the suitable young-growth acres would vary by 4 percent (Alternatives 5 or 6) or less and suitable old-growth acres would increase by up to 38 percent (under Alternatives 4, 5, and 6). However, because of the constant overall harvest level under all alternatives, projected harvest acreage would be at Alternative 1 levels or less for both young growth and old growth.

Clarence Strait has experienced considerable past harvest, but much of it is not readily visible from the Strait, so much of the viewshed appears relatively pristine. However, the number of young-growth acres of harvestable age within the next decade is considerable (USDA Forest Service 2016b, Table 3.16-5). A number of these acres are scattered along the beach fringe, especially along Prince of Wales and adjacent islands. Therefore, all alternatives could have localized moderate effects during the first few decades.

Duncan Canal

In the Duncan Canal viewshed, suitable young-growth acres would increase from 23 to 25 percent and the projected harvest would increase from 18 to 20 percent under all action alternatives. However, suitable old-growth acres would increase from 72 to 173 percent and projected harvest would increase from 58 to 106 percent under the action alternatives.

Duncan Canal has experienced considerable past harvest on the east side of the Canal, but much of it is not readily visible from the Strait. However, the number of young-growth acres of harvestable age within the next decade exceeds 100 acres (USDA Forest Service 2016b, Table 3.16-5). A number of these acres are scattered along the beach fringe in all alternatives. Therefore, all alternatives could have local effects along the travelway during the first few decades.

Eastern Passage

Suitable young-growth acres for each alternative vary by only 9 percent, with the highest acreage in Alternatives 5 and 6. The increase in suitable old-growth acres relative to Alternative 1 would range up to 97 percent in Alternatives 4, 5, and 6. Projected young-growth harvest would vary by 3 percent or less under the alternatives but projected old-growth harvest would range up to 32 percent more acres than under Alternative 1.

Eastern Passage has experienced considerable past harvest on the Wrangell Island side, but much of it is not readily visible from the Passage. A few older young-growth acres are scattered along the beach fringe in all alternatives. Therefore, all alternatives could have local effects along the travelway during the first few decades.

Ernest Sound

Both suitable and projected harvest acres in the Ernest Sound viewshed for young growth and old growth do not vary significantly among the alternatives. There are no suitable old-growth acres under any alternative.

Ernest Sound has experienced considerable past harvest on Deer Island and along the beach to the north. A considerable number of young-growth acres of harvestable age during the next decade occur within the viewshed (USDA Forest Service 2016b, Table 3.16-5) and most of these acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed, and a 200-foot shoreline buffer would mitigate opening size. Therefore, all alternatives could have localized effects during the first few decades.

Frederick Sound
In the Frederick Sound viewshed, suitable young-growth acres would increase from 10 to 11 percent and the projected harvest would increase from 5 to 7 percent under all action alternatives. However, suitable old-growth acres would increase more substantially under all alternatives ranging from 28 percent under Alternative 2 to 121 to 127 percent under Alternatives 4, 5, and 6. Projected harvest would increase from 19 percent under Alternative 2 to 31 to 34 percent under all other action alternatives.

Frederick Sound is a large viewshed (163,000 acres) along Kupreanof Island and the mainland. Frederick Sound has experienced considerable past harvest in local areas on Kupreanof Island and along the mainland. It includes a substantial acreage of young-growth of harvestable age within the next decade (USDA Forest Service 2016b, Table 3.16-5). Some of these acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed, and a 200-foot shoreline buffer would mitigate opening size. Therefore, all alternatives could have localized moderate effects during the first few decades.

Salmon Bay Lake
In the Salmon Bay Lake Viewshed, suitable acres of young growth and old growth would remain the same as Alternative 1 acres under all alternatives. Projected harvest would remain the same as Alternative 1 or be slightly lower. Harvest of old growth would be 2 acres or less.

None of the alternatives would have any young-growth acres that would be of harvestable age within the next decade (USDA Forest Service 2016b, Table 3.16-5). Therefore, none of the alternatives are expected to have more than minor effects on scenery in the next few decades.

Icy Strait
Icy Strait would experience limited effects due partly to the Wilderness LUDs on Pleasant and Lemesurier Islands and the LUD II at Point Adolphus. Wilderness areas would have an SIO of High under all alternatives, but would likely achieve an SIO of Very High.

Suitable young growth and projected harvest acres would be similar under Alternatives 1, 2, 3, and 4 varying by up to 1 percent for suitable acres and up to 3 percent for projected harvest acres. Under Alternatives 5 and 6, suitable young growth would increase by 6 to 11 percent. For suitable old-growth acreage, Alternatives 1, 2, and 3 would vary by up to 5 percent, while these acres would increase by 30 to 39 percent under Alternatives 4, 5, and 6. Projected old-growth harvest, however, would be lower under all action alternatives because of the fact that overall harvest would be constant under all alternatives.

No young-growth acres of harvestable age within the next decade occur in the viewshed (USDA Forest Service 2016b, Table 3.16-5). Therefore, minor effects are expected to occur under any alternatives during the first few decades.

Lynn Canal
Scenic effects within the Lynn Canal Viewshed would be very limited under Alternative 1 because of minor suitable acreages of young growth and old growth. In addition, very minor differences would result under all alternatives for old growth suitable and projected harvest acreages. In contrast, young-growth suitable and projected harvest acreages would increase considerably for all action alternatives, especially for Alternatives 5 and 6. However, projected

young-growth harvest over 100 years would be less than 900 acres for all alternatives, or less than 0.4 percent of this large viewshed (234,000 acres).

Mendenhall Glacier
No effects would occur in the Mendenhall Glacier Viewshed under any of the alternatives. No suitable young growth or old growth occurs within the viewshed.

Peril Strait/Neva-Olga Strait/Sitka
This viewshed is a large one (189,000 acres) that begins near Sitka and wraps around the northern end of Chichagof Island and the southern end of Baranof Island. Young growth suitable acres would vary insignificantly under all alternatives, and projected harvest acres for young growth under all action alternatives would be less than under Alternative 1. Suitable old-growth acres would be relatively constant for Alternatives 1, 2, and 3, but would increase by 55 to 82 percent under Alternatives 4, 5, and 6. Projected old-growth harvest acres would be less than Alternative 1 for Alternatives 2, 3, and 4, but would be 6 percent higher under Alternatives 5 and 6.

The Peril Strait complex has experienced considerable past harvest in local areas, mostly on Chichagof, Kruzof, and adjacent small islands. The number of young-growth acres of harvestable age within the next decade is substantial for all alternatives (USDA Forest Service 2016b, Table 3.16-5). Many of these acres are along the beach fringe in all alternatives. Clearcutting or patch cutting, with up to 10-acre openings, are allowed in the beach fringe, along with a 200-foot shoreline buffer, which would mitigate opening size. Therefore, all alternatives could have local moderate effects during the first few decades.

Hyder/Salmon River
Only minor amounts of suitable young-growth and old-growth acres occur in this viewshed under all of the alternatives. Therefore, little to no impacts related to scenic quality are expected to occur.

Stephens Passage
Stephens Passage is a large viewshed (259,000 acres) running between Admiralty Island and the mainland. It excludes the majority of the wilderness portion of the Admiralty National Monument.

Young growth suitable acres are relatively minor under all alternatives and old growth suitable acres are insignificant. Only Alternatives 5 and 6 have a projected young-growth harvest over 200 acres. Although many of the young-growth acres are older stands in the beach fringe, they are scattered throughout the large viewshed.

Stikine Strait
This viewshed covers the corridors between Etolin, Zarembo, and Woronkofski Islands. Suitable young growth would increase under the action alternatives by 16 to 18 percent for Alternatives 2 and 3 and by 20 to 27 percent for Alternatives 4, 5, and 6. Projected young-growth harvest would also increase under all action alternatives ranging from 13 percent for Alternative 2 to 20 percent for Alternative 5. Suitable old growth would be 14 percent higher under Alternatives 2 and 3, but 104 to 161 percent higher under Alternatives 4, 5, and 6. Projected old-growth harvest would be similar under Alternatives 1, 2, and 3, ranging from 5 percent higher to 11 percent lower than Alternative 1, but would be 21 percent higher under Alternative 4 and 51 percent higher under Alternatives 5 and 6.

The Stikine Strait Viewshed has experienced considerable past harvest in most areas within the viewshed. The number of young-growth acres of harvestable age within the next decade are relatively low, but many of these acres are along the beach fringe.

Sumner Strait
The Sumner Strait Viewshed is a large viewshed (152,000 acres) along northern Prince of Wales, Kosciusko, Kuiu, Kupreanof, Zarembo, and other islands. It includes portions of the Kuiu Wilderness and the Mt. Calder/Mt. Holbrook and Salmon Bay LUD II areas. These areas would have an SIO of High but would likely achieve an SIO of Very High.

Suitable young-growth acres in this viewshed are essentially the same under all alternatives. Suitable old-growth acres are also similar for Alternatives 1, 2, and 3, but increase by 21 percent for Alternatives 4, 5, and 6. Projected old-growth and young-growth harvest, however, would decrease for the action alternatives because all alternatives would have the same overall harvest level. The number of young-growth acres of harvestable age within the next decade is relatively high (USDA Forest Service 2016b, Table 3.16-5), and many of these acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10 acre openings, are allowed in addition to a 200-foot shoreline buffer, which would mitigate opening size. Therefore, all alternatives could have relatively high effects along the shoreline during the first few decades.

Sweetwater Lake/Honker Divide
Suitable young-growth and old-growth acres are essentially the same under all alternatives in this viewshed. Therefore, there would be essentially no difference among the alternatives.

The Sweetwater Lake/Honker Divide Viewshed has experienced relatively heavy past harvest in some portions. Additional harvest may need to be deferred in localized areas in the coming decade.

Tenakee Inlet to Tenakee Springs
This is a large viewshed (152,000 acres), which contains the Trap Bay and Kadashan LUD II areas, which have an SIO of High under all alternatives. The viewshed also contains land designated as Research Natural Area and Wild River LUDs, which also have a High SIO under all alternatives.

Suitable young-growth acres are essentially the same under all alternatives in this viewshed. Therefore, there would be essentially no difference among the alternatives in terms of young growth. Old-growth suitable acres, however, would increase by 9 to 33 percent under Alternatives 2 and 3 and by 101 percent under Alternatives 4, 5, and 6. Similarly, projected harvest would increase by up to 3 percent for Alternatives 2 and 3 and by 16 to 19 percent for Alternatives 4, 5, and 6.

The Tenakee Inlet to Tenakee Springs Viewshed has experienced considerable past harvest in many areas within the viewshed. The number of young-growth acres of harvestable age within the next decade is considerable (USDA Forest Service 2016b, Table 3.16-5). Many of these acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed in addition to a 200-foot shoreline buffer, which would mitigate opening size. Therefore, all of the alternatives could have relatively high localized effects during the first few decades.

West Coast Waterway/Prince of Wales
This large viewshed (141,000 acres) contains the Mt. Calder/Mt. Holbrook LUD II area, which would have an SIO of High under all alternatives. Suitable young-growth acres and projected harvest acres would vary by only 1 and 4 percent, respectively, under all alternatives. Suitable old-growth acres would generally increase and range up to 26 percent (Alternatives 4, 5, and 6) higher under the action alternatives relative to Alternative 1. However, projected old-growth harvest in the viewshed would decline under the action alternatives relative to Alternative 1, because of the fact that all alternatives would have the same overall harvest level and the action alternatives would spread that harvest over a larger suitable area.

The West Coast Waterway/Prince of Wales Viewshed has experienced relatively heavy past harvest in many areas within the viewshed. The number of young-growth acres of harvestable age within the next decade is relatively high (USDA Forest Service 2016b, Table 3.16-5). Many of these acres are along the beach fringe in all alternatives. Clearcutting and patch cutting, with up to 10-acre openings, are allowed along with a 200-foot shoreline buffer, which would mitigate opening size. Therefore, the alternatives could have relatively high localized effects during the first few decades.

Wrangell Narrows
Suitable young-growth acres would be 7 to 9 percent higher for the action alternatives relative to Alternative 1, and projected harvest acres would be 3 percent higher under the action alternatives. Suitable old-growth acres would generally increase and range up to 50 percent (Alternatives 5 and 6) higher under the action alternatives relative to Alternative 1. However, projected old-growth harvest acres in the viewshed would range from 2 percent higher to 15 percent lower under the action alternatives relative to Alternative 1, because all alternatives would have the same overall harvest level and the action alternatives would spread that harvest over a larger suitable area.

The Wrangell Narrows Viewshed has experienced relatively high past harvest in many areas within the viewshed and includes 36 percent non-NFS lands. However, the number of young-growth acres of harvestable age within the next decade is relatively low. Most of these acres are along the beach fringe and, therefore, all of the alternatives could have localized effects during the first few decades.

Zimovia Strait
The Zimovia Strait Viewshed runs between Etolin and Wrangell Islands. Suitable young-growth acres would be 10 to 13 percent higher for the action alternatives relative to Alternative 1 and projected young-growth harvest acres would be 7 percent higher under all action alternatives. Suitable old-growth acres would generally increase and range from 24 percent (Alternative 2) up to 83 percent (Alternatives 4, 5, and 6) higher under the action alternatives relative to Alternative 1. Projected old-growth harvest acres in the viewshed would also increase ranging from 6 to 23 percent higher under the action alternatives relative to Alternative 1.

The Zimovia Strait Viewshed has experienced relatively high past harvest in some areas within the viewshed. There are a considerable number of young-growth acres of harvestable age over the next decade within the viewshed (USDA Forest Service 2016b, Table 3.16-5). Most of these acres are along the beach fringe in all alternatives and, therefore, all alternatives could have localized effects during the first few decades.

Non-Timber Actions

A range of other developments may occur within areas removed from roadless designation or in areas where roadless designations have been modified, as occurs under the action alternatives. These other developments include mining related actions, renewable energy development, transmission lines, state highway development, and others. Essentially all of these developments are allowed under Alternative 1 so changes in their likelihood are expected to be minor.

Effects from these projects on scenery would heavily depend on site-specific plans. In general, project activities that would impact scenery could include mine development and expansion; new access road construction; forest clearing and ground disturbance; dam, powerhouse, and penstock construction; transmission line construction; and others. There is a wide range of types and sizes for these disturbances and facilities and the eventual impacts to scenery will depend on the location and design features. All potential impacts to scenery resources would be addressed during the permitting and licensing of the projects, and would include National Environmental Policy Act assessment.

The impacts to scenery associated with the action alternatives are expected to be similar to those associated with Alternative 1, as these alternatives would make only minor changes to regulations that affect the potential for their development. Impacts associated with Alternative 1 are expected to be slightly lower because of the development of slightly fewer projects over the long term; however, the Alternative 1 standards and guidelines for scenery related to these other projects are similar to the plan components of the action alternatives. Although on a site-specific basis differences would occur, on a Forest-wide basis the scenery effects associated with all of the alternatives would show little differences because of the small number of projects likely to be developed.

Cumulative Effects

This section considers the incremental effects of the alternatives when added to other past, present, and reasonably foreseeable actions. The effects of past and present actions on scenery are included in the Affected Environment portion of this section, which discusses the level of scenic quality on the Tongass. Past actions include past timber harvest and road building, as well as the development of facilities and mines, which have resulted in reduced ESIs in many areas. Present actions include the impacts of current management policies on scenery; these have resulted in modifications to SIOs.

Reasonably foreseeable actions on NFS lands include the projected levels of future timber harvest and other developments that are used in the preceding analysis to assess the potential impacts of the alternatives on the scenic quality. Other reasonably foreseeable actions include regional transportation development as defined by the State Transportation Plan and the Forest Service Alaska Region Long-Range Transportation Plan, as well as road paving on Prince of Wales Island, the closing of roads, and construction of the Angoon Airport. In addition, the expansion of cities like Juneau, Ketchikan, and Sitka, recreational cabin development, land auctions by the State, and land exchanges could include additional road construction, timber harvest, and facility construction.

It is not possible at this time to predict exactly which roads, energy projects, or other projects would be developed or their likely impact on future scenic integrity. Human settlement expansion is expected to occur around the region's larger cities with residential expansion also expected as a result of state land auctions. These developments would likely result in increased impacts on scenery. Mining activities are expected to expand at existing sites, including Greens Creek on

Admiralty Island and Kensington Gold Mine north of Juneau, as well as possible future sites, including the Bokan Mountain and Niblack sites on the southern end of Prince of Wales Island. Mining projects are for the most part expected to have a negative local effect on scenery. Overall, the cumulative effects of past, present, and future actions on scenery are expected to be negative, but are not expected to be substantially different than the effects associated with the actions addressed under direct and indirect effects.

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Subsistence

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Affected Environment

Subsistence hunting, fishing, trapping, and gathering activities are a major part of life for many Southeast Alaska residents. Some individuals participate in subsistence activities to supplement personal income and provide needed food. Nearly all rural Alaska communities depend on subsistence resources to meet some portion of their nutritional needs (Fall 2016). 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 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. Because of 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.

Native and non-Native communities both have high subsistence participation rates and rely heavily on wild foods, with approximately 79 percent of rural households in Southeast Alaska using wild game and 95 percent using fish (Fall 2016). The opportunity to participate in subsistence activities reinforces a variety of cultural and related values in both Native and non-Native communities. For example, the distribution of harvested fish and wildlife contributes to the cohesion of kinship groups and community stability through the sharing of resources. Subsistence resources provide the foundation for Native culture, forming the basis for different clans and potlatch ceremonies, as well as reinforcing 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 move to or remain in Southeast Alaska (USDA Forest Service 1997a).

The Legal Context for Subsistence Use

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." The provisions in ANILCA established a harvest priority for rural residents in an attempt to protect subsistence resource harvest. Under ANILCA, in times of resource scarcity or when demand exceeds biologically sound harvest levels, subsistence harvests have priority over other consumptive use of resources. In practice, this meant that commercial, sport, or other harvests were to be curtailed by state or federal fish and wildlife management authorities before subsistence harvests were limited. The Alaska legislature subsequently passed a regulation to comply with ANILCA, but in 1989, the Alaska Supreme Court ruled in *McDowell v. State of Alaska* that a harvest priority for rural residents conflicted with the state constitution, which guarantees all Alaskans equal access to the state's natural resources. This ruling took the state out of compliance with ANILCA, and the federal government has managed subsistence resources on federal lands in Alaska since 1990. As a result, federal subsistence harvests of fish and wildlife on the Tongass National Forest are presently managed by the Forest Service (Schroeder and Mazza 2005).

ANILCA requires the analysis of the potential effects on subsistence uses of all actions on federal lands in Alaska. This analysis typically focuses on those food-related resources most likely to be affected by habitat degradation associated with land management activities. Three factors related to subsistence uses are specifically identified by ANILCA: 1) resource distribution and abundance, 2) access to resources, and 3) competition for the use of resources. These factors are discussed in general terms in the following paragraphs.

Abundance and Distribution

Southeast Alaska subsistence resources include terrestrial wildlife (including deer, moose, mountain goat, black and brown bear, furbearers, and small game), waterfowl (including ducks, geese, and seabirds), marine mammals (harbor seal), salmon, other finfish, marine invertebrates, plants, and firewood. The abundance and distribution of these resources on the Tongass is described in the 1997 Forest Plan FEIS (USDA Forest Service 1997a), as well as in other sections of this EIS.

Access

Road building, a byproduct of timber harvesting and, to a much lesser extent, mining, is an important agent of change in Southeast Alaska. New road networks often provide greater access to previously unconnected areas 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

connected by road are now more easily reached by local residents and other nearby communities. Road systems tend to bring more people into an area and also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest.

Southeast Alaska comprises isolated islands unconnected by road systems; however, with the transportation means available (floatplanes, ferry systems, automobiles, and boats), Southeast Alaska residents are very mobile in their subsistence resource use activities. Wrangell, the fifth-largest community in Southeast Alaska, for example, 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 1990).

Competition

The Tongass National Forest, with nearly 17 million acres of largely undeveloped land, includes extensive subsistence resources. These resources are not, however, distributed or used evenly across the Forest. Where the resources are confined to island groups or river systems and 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 that resides in the area. Where resources are abundant and access is readily available to local and other communities of Southeast Alaska, competition for resources may exist.

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 because of easier, more cost-effective access, the new area then tends to be used. When communities with road access to abundant resources are connected to a ferry 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 Alaska. 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 a result of timber harvest activities, has created relatively large areas that are easily accessed from local communities. Access provided by ferry systems and small commuter planes to Chichagof and Prince of Wales Islands allows relatively easy access from off-island communities. Access to the Yakutat Forelands has been made easier because of commercial jet service and ferry service to the community of Yakutat.

Subsistence Users

Under ANILCA, 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. Following the Alaska Supreme Court's 1989 ruling in *McDowell v. State of Alaska*, all Alaska residents qualify as subsistence users on state lands with federal lands continuing to be managed under ANILCA.

In 2017, Southeast Alaska had an estimated population of 72,915, with the majority (about 91 percent) living in established communities (either incorporated cities or Census Designated Places [CDP]) (Alaska Department of Labor [DOL] 2018). Almost two-thirds (63 percent) of the area's population lived in the city and borough of Juneau (44 percent) or Ketchikan Gateway Borough (19 percent), the only two communities considered as urban areas for subsistence purposes. An additional

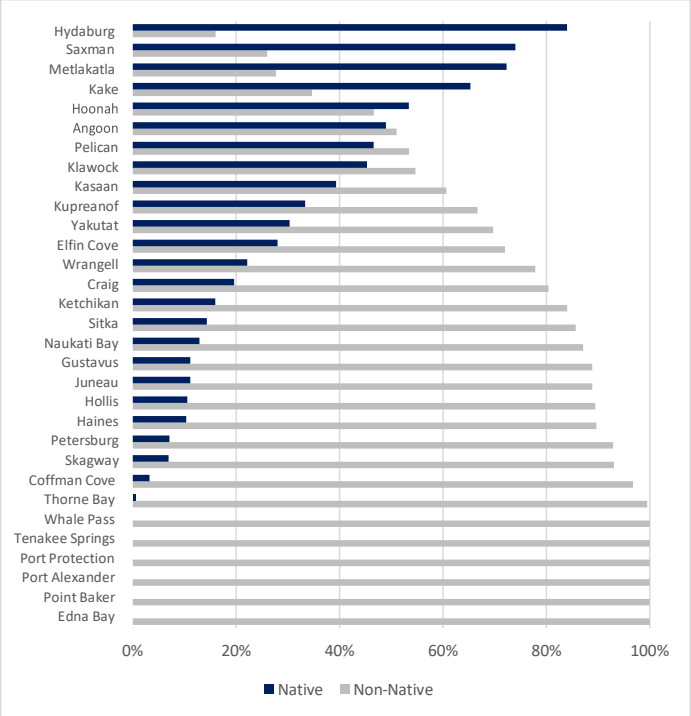
22 percent of the area's population resided in the communities of Sitka, Petersburg, Wrangell, and Haines. The remaining share of the population living in established communities lived in communities ranging in size from Excursion Inlet with 11 people to Metlakatla with 1,422 people (Alaska DOL 2018).

A relatively small number of Southeast Alaska residents live at remote isolated locations. These include people living at home sites throughout Southeast Alaska, at summer fishing sites along the outer coast, tree thinners camped near areas where they have Forest Service contracts, trappers, and people living on floathouses and 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.

Alaska Natives made up an estimated 17 percent of the region's population in 2017 (including Juneau and Ketchikan), and an estimated 24 percent for rural communities (excluding Juneau and Ketchikan) (Figure 3.12-1). These rural communities include places that are predominately Native, such as Hydaburg, Saxman, Metlakatla, and Kake where Alaska Natives make up an estimated 84 percent, 74 percent, 72 percent, and 65 percent of the population, respectively; other communities that are predominately non-Native, like Edna Bay, Point Baker, and Whale Pass; and places with more mixed ethnicity where Alaska Natives range from about one-third to two-thirds of the population (Figure 3.12-1).

The Bureau of Indian Affairs identifies 17 localized Indian tribes in the region, including the Metlakatla of the Annette Island Reserve. At the time of contact, tribes occupied seasonal camps and temporary villages throughout traditional territories. In the late 1800s, the individual tribes of the region coalesced at what had been their winter villages. The area's extant tribes live within their earlier territories and use a similar set of subsistence resources and in this way maintain long standing ties to place. For Native people, this tie to place and the harvest and use of traditional foods are key elements in fostering Native cultural identity (Alaska Native Heritage Center 2014).

Native/Non-Native Components of Southeast Communities



Note:
[1] Estimates are annual totals developed as part of the 2013-2017 American Community Survey 5-Year Estimates.
Source: U.S. Census Bureau 2018a

Economy

Subsistence use of fish and wildlife has been and 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 that were 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 Alaska rural communities is limited and intermittent, and 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

Figure 3.12-1

within the region. Subsistence harvests are not geared toward market sale or commercial 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 (Wolfe 2004).

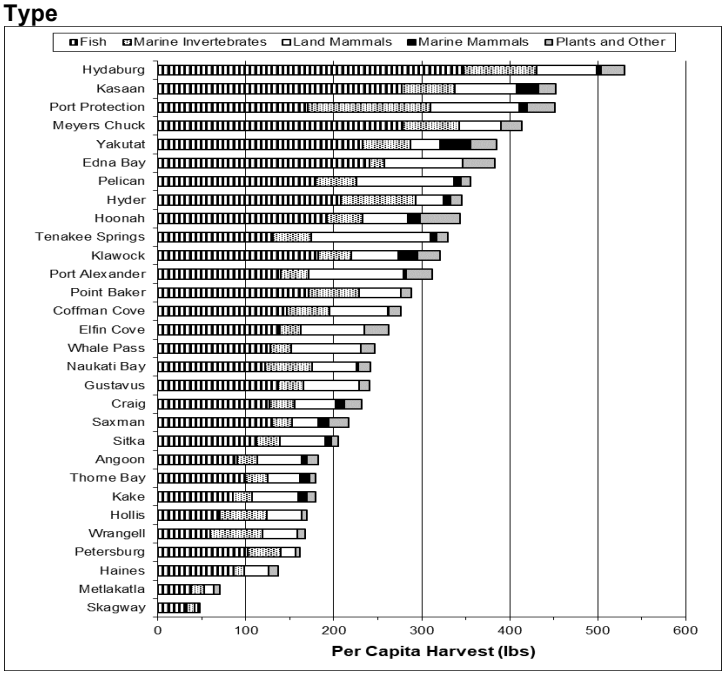
Subsistence research conducted in Southeast Alaska over the past two decades has included detailed community studies, use area mapping, household surveys, and studies of specific subsistence harvests. During the 1980s, the Forest Service supported research that examined the impacts of timber harvests in the Tongass National Forest on subsistence resources in the area. The Tongass Resource Use Cooperative Survey (TRUCS) was completed in 1988. Data from TRUCS are summarized in the 1997 Tongass Land Management Plan Revision FEIS (USDA Forest Service 1997a).

From 1987 to 2001, interviews were conducted with 1,064 households in 24 Southeast Alaska communities as part of the Tongass Land and Resource Management Plan (Forest Plan) subsistence administrative studies. This fieldwork was conducted cooperatively with the Forest Service, Alaska Department of Fish and Game (ADF&G), and the area's tribes and communities all participating. Summary data from this and past community harvest assessments were compiled from the ADF&G Subsistence Community Profile Database (www.state.ak.us) and harvest levels are presented by community and species in Figure 3.12-2. The data presented in this figure are the most recent available in the ADF&G database. The year these data were collected does, however, vary by community, and the data summarized should be considered a general overview of harvest patterns rather than an exact representation of current harvest activities.

The findings of this research are summarized in an unpublished paper by Schroeder and Mazza (2005) who identify a number of key subsistence characteristics that are evident in these data and generally consistent with the following past findings:

- Wild foods account for a large share of the diet for residents of the studied communities, ranging from 48 pounds per capita for Skagway in 1987 to over 500 pounds per capita for Hydaburg in 2012 (Figure 3.12-2). The average American diet includes about 225 pounds of meat, fish, and poultry on a per capita basis. In more than half of the identified communities, wild foods came close to, or exceeded, this national average (Figure 3.12-2). Although residents of subsistence communities purchase food, most could meet their entire protein need from wild sources.

Figure 3.12-2
Per Capita Subsistence Harvest by Community and Resource Type



Note:
The year these data were collected varies by community, as follows:
1987: Elfin Cove, Gustavus, Hyder, Metlakatla, Meyers Chuck, Pelican, Port Alexander, Skagway, and Tenakee Springs
1996: Kake, Point Baker, Port Protection, and Sitka
1997: Craig, Hydaburg, and Klawock
1998: Coffman Cove, Edna Bay, Hollis, Kasaan, Naukati Bay, and Thorne Bay
1999: Saxman
2000: Petersburg, Wrangell, and Yakutat
2012: Angoon, Haines, Hoonah, Hydaburg, and Whale Pass
Source: ADF&G 2006, 2014

Commented [U20]: Is this the most recent data available from AKDF&G?

- Marine resources, including fish, mammals, and plants, comprise the majority of subsistence harvests in all communities when measured by food weight. Marine resources account for more than half of total per capita harvest in all Southeast Alaska communities, ranging from 55 percent in Tenakee Springs to 88 percent in Skagway (Figure 3.12-2). As a result, management activities that restrict access for subsistence harvest of land mammals have had a relatively small effect on overall subsistence harvest by weight.

- More recent subsistence harvest levels in the main Native communities and the larger non-Native communities appear very similar to harvest levels estimated in the late 1980s or before. Harvest levels identified in the recent assessments conducted in Angoon, Hoonah, Hydaburg, Kake, Petersburg,

Wrangell, and Yakutat, for example, are very similar to those identified in earlier studies. In a few communities, such as Coffman Cove, Kasaan, Klawock, and Port Protection, there are larger differences in harvest levels over time. However, these differences seem to be more influenced by special events or small community sizes than by patterned changes in subsistence harvests.

- Subsistence harvest levels vary considerably from community to community. Recent research and other data suggest that intercommunity variability may not be fully explained by ethnicity, income, community size, or access to resources. Other factors, such as community demographic composition, cultural traditions and orientations, and community history, may have a larger influence on harvest levels than more easily analyzed standard socioeconomic variables.
- Subsistence harvesters use a wide variety of species, but use tends to be concentrated on a relatively small number of species. In Yakutat, for example, individual subsistence harvesters use as many as 65 of the 150 different species that are harvested in the community, but 84 percent of overall community harvest (in food weight) involves just 10 species. That said, the contribution of a particular species to the total subsistence harvest generally appears to vary from year to year, although the overall total harvest in food weight may remain nearly constant.
- A small number of high harvesting households account for a disproportionate share of the total community harvest and tend to harvest more fish and wildlife than their family members can consume. The surplus is distributed to other subsistence users through a kinship network and through barter and trade. These networks are also used to distribute specialty subsistence products such as herring roe and hooligan oil, which are produced in large quantities in only a few communities. In Yakutat, for example, just 25 percent of subsistence households account for about 75 percent of total community subsistence harvest (in terms of food weight), with the lowest harvesting 50 percent of households taking just 8 percent of the total community harvest.

Subsistence Use Areas

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 accessible 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 advent of motorized boats and the development of road systems associated with timber harvest activities have had a substantial influence on subsistence gathering activity in Southeast Alaska. Today, all communities use motorized boats and many are tied to nearby lands by road systems.

The distribution of subsistence harvest activity is described in further detail in the 1997 Tongass Land Management Plan Revision FEIS, with traditional household deer hunting areas mapped in Appendix H. These areas were identified based on the 1987 TRUCS (Kruse and Muth 1990). 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 tends to be concentrated in close proximity to individual communities and along beaches.

Each of the communities in Southeast Alaska has a distinct home range where concentrated use occurs, with a wide range of use typically occurring on a less concentrated scale outside the normal home range. More than half (54 percent) of all households surveyed in rural Southeast Alaska in 1987 traveled a minimum

of 11 miles by boat to reach the one reliable deer hunting area that they chose to describe in TRUCS (Kruse and Muth 1990). An additional 18 percent of all households also used boats to reach their reliable deer hunting area, but traveled shorter distances (10 miles or less). Only 15 percent of all households used cars or trucks to travel to their most reliable areas. Thirteen percent used 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 (USDA Forest Service 1997a). Appendix H in the 1997 Tongass Land Management Plan Revision FEIS also displays, by community, the individual Wildlife Analysis Areas (WAAs) where approximately 75 percent of the average annual deer harvest occurred.

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.

Commented [U21]: This rule making will result in significant impacts to subsistence use of deer.

Many of the fish and wildlife resource values of Southeast Alaska watersheds, based on the Value Comparison Unit (VCU) classification of the Tongass, are summarized in the 1998 Tongass Fish and Wildlife Resource Assessment (ADF&G 1998). This report shows the relative value of areas for black bear, brown bear, deer, sport fishing, salmon production, and subsistence use. This resource assessment also included a ranking of the VCUs that have the highest community use values.

Environmental Consequences

The analysis of the likely effects of the EIS alternatives on subsistence resources and uses is presented in two parts. Effects on subsistence resources and uses important to each rural community are discussed individually by community in Appendix D. This section provides a Forest-wide evaluation that assesses the three factors related to subsistence uses identified by ANILCA: 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* from the Key Issue 3 discussion) where abundance and distribution are of concern.

Section 810 of ANILCA requires the Forest Service, in determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of NFS 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.

It should be noted that the term "significant" as used in this context does not have the same definition as used in the implementing regulations for the National Environmental Policy Act (NEPA). See 40 Code of Federal Regulations (CFR) Section 1508.27 for definitions of "significant" in a NEPA context.

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 compiled as part of TRUCS, 61 percent of subsistence resources (by weight) are fish or marine invertebrates, 21 percent are deer, 4 percent are other land mammals, and another 3 percent are marine mammals. More recent community data compiled by ADF&G (2014) indicate that fish and marine invertebrates still comprise the majority of subsistence harvest per capita (in pounds). As shown in Figure 3.12-2, the share of total subsistence harvest that consists of fish and marine invertebrates ranges from 55 percent in Tenakee Springs to 88 percent in Skagway.

The subsistence analysis conducted for the 1997 Forest Plan Revision FEIS found that the primary subsistence resource likely to be significantly affected by the alternatives was Sitka black-tailed deer. Some effects to fish habitat may also result from land management activities, but the magnitude of the effects could not be calculated. Alternatives with more roads and timber production within riparian management areas and/or beach and estuary fringe were found to generally have the highest potential for adverse effects to fish and wildlife resources in the Tongass.

As a result of their association with old-growth forest habitat, which is the main terrestrial habitat type affected by the alternatives, deer are considered the "indicator" for potential subsistence resource consequences concerning the abundance and distribution of the resources. The community-based subsistence discussions presented in Appendix D largely focus on deer, which is, in most cases, by far the largest terrestrial component of subsistence food resources.

Both the 1997 Forest Plan Revision FEIS and 2008 Forest Plan Amendment FEIS concluded 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 of the 1997 and 2008 alternatives could, therefore, be accompanied by a significant possibility of a significant restriction on the abundance and/or distribution of subsistence uses of deer. This possibility was largely due to the continuation of reduced habitat capabilities resulting from past habitat alterations, which is why it applied to all alternatives.

The 2016 Forest Plan EIS found that the possibility of a significant restriction, resulting from a change in abundance or distribution, would be less than the possibility under the 1997 Forest Plan or 2008 Forest Plan for all of the alternatives considered in that EIS because of the lower anticipated rates of timber harvest. Further, although the harvest of old growth is likely to have negative effects on deer habitat, the vast majority of the harvest proposed under

the 2016 Forest Plan EIS alternatives represented the harvest of young-growth stands that are currently in the stem exclusion stage of plant succession. Harvesting these stands would convert them to the stand initiation stage or open them up to provide more light to forage, which is generally of much higher value to deer. As a result, the harvest under all of the 2016 Forest Plan EIS alternatives would have both adverse and beneficial effects on deer habitat, depending on the stand.

The alternatives evaluated in this EIS would all harvest approximately the same amounts of young-growth and old-growth acres and, therefore, the risk of a significant restriction would be the same under all of the alternatives. In the short term, the effects of past harvest would override the effects of new harvest during the next 10 years. In the long term, future harvesting of old growth would drop substantially following the young-growth transition under all of the alternatives, reducing the risk of a significant restriction when viewed in the context of past Forest Plan harvest projections. Total maximum old-growth harvest over 100 years would be approximately 42,000 acres under all of the alternatives.

Commented [U22]: This statement is arbitery and inconsistent with the information disclosed in table 2-8 on page 2-25

Access

Subsistence users typically hunt and fish in traditional areas surrounding their communities. Many of the communities in Southeast Alaska are compact, centralized places surrounded by undeveloped land with limited infrastructure. Most subsistence food production is supported by a central or core use area surrounding a community. Traditional household deer hunting areas are identified for 32 communities in Southeast Alaska in Appendix H to the 1997 Forest Plan EIS. Access to and use of surrounding areas for subsistence activities may be guided by local customary rules, as well as federal and state regulation and economic considerations, with traditional use areas for different communities often overlapping at their margins. Customary rules guiding subsistence harvest may be related to local histories and social customs of clans and communities (Wolfe 2004).

This EIS is programmatic, meaning that it establishes direction and allowable activities for broad land areas, rather than schedule specific activities in specific locations. This makes it difficult to evaluate the effects of the alternatives on particular groups of subsistence users or resources. The following discussion addresses potential impacts at the programmatic or forest scale and assesses relative potential impacts in terms of overall proposed road construction and timber management activities.

Viewed at this scale, none of the alternatives would directly limit the use of public lands for the purposes of subsistence gathering activities. Traditional access methods would remain available under all the alternatives for present and foreseeable future activities. Access methods differ by Game Management Unit (GMU). Those subsistence users who use a boat as their primary method of access may have temporary and localized disruptions where young-growth harvest occurs in the beach fringe.

Data on documented deer harvest by transportation type are available at the GMU level. Data from the 2013 Deer Management Report are presented by transportation type and GMU in Table 3.12-1. GMU 4, the ABC Islands (Admiralty, Baranof, and Chicagof Islands), accounted for slightly more than half (52 percent) of reported deer harvested in Southeast Alaska in 2013 (5,434 deer), with GMU 2, Prince of Wales Island, accounting for more than a third (36 percent) (3,702 deer). Hunters accessing hunting areas by boat accounted for 63 percent of total deer harvest in 2013. Hunters accessing the area by highway

vehicle accounted for 53 percent of total deer harvest. The relative share of harvest by transportation type varies by GMU, with boat access, for example, accounting for 84 percent of harvest in GMU 1B, but just 27 percent in GMUs 1C and 2. Highway vehicle was the most frequently used method of access in GMU 2, Prince of Wales Island, accounting for almost two-thirds (65 percent) of deer harvest in 2013 (Table 3.12-1). This relatively high share reflects the more densely roaded nature of Prince of Wales Island and may be considered generally indicative of the effects of timber harvest and associated road building in areas connected to communities and the marine highway system.

Table 3.12-1
Deer Harvest by Game Management Unit and Transportation Type, 2013

			Percent of Deer Harvested by Transportation Type[3]					
GMU Number[1]	Area[2]	Deer Harvested	Airplane	Boat	3- or 4-Wheeler	Highway Vehicle	Foot	Unknown
1A	Ketchikan[4]	265	NA	NA	NA	NA	NA	NA
1B	Petersburg[5]	89	1	84	4	1	6	4
1C	Juneau	413	0	27	0	47	21	5
2[5]	Prince of Wales Island	3,702	3	27	NA	65	2	3
3	Central Islands	474	2	38	8	42	3	7
4	ABC Islands[6]	5,434	8	73	0	9	3	7
	Total[7]	**10,377**	**556**	**5,333**	**41**	**3,289**	**343**	**549**
	Percent of Total	100	5	53	0	33	3	5

Notes:
NA = not available; na = not applicable; ABC Islands = Admiralty, Baranof, and Chichagof Islands
[1] Game Management Units (GMUs) are a geographic unit of measurement established and used by ADF&G.
[2] Harvest estimates are reported totals only and do not include estimates of unreported and illegal harvest.
[3] These data were compiled as part of ADF&G's mandatory hunt report cards issued in conjunction with deer harvest tickets. Hunters report transportation method for traveling to their hunting areas. Numbers may not sum to 100 percent due to rounding.
[4] Airplane data are not available for this GMU.
[5] The foot category for this GMU includes 1 percent of hunters that used a horse/dog team to access their hunting area.
[6] In GMU 2, 3- or 4- Wheelers were accounted for in the Highway Vehicle category.
[7] Total deer harvested by transportation type exclude Unit 1A, where transportation information is not available.
Source: ADF&G 2015

New road construction is likely to result in the development of new use patterns around some communities, but these changes are not likely to lead to a significant possibility of a significant restriction of subsistence access to the resources. New use patterns may, however, favor some subsistence groups and disadvantage others. Subsistence access may be via a number of different transportation types and often involves more than one form of transportation. Subsistence users may, for example, access an area via boat followed by road (and on-foot) or via boat and on-foot, with types of access varying by location and user. Some hunters may access specific areas using more than one form of transportation, but others may favor one form of transportation over another, say highway vehicle over foot.

While there would be some new road access under all alternatives in the long run, nearly all new roads constructed under the alternatives would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They may, however, be available for access by other methods and would, as a result, have the potential to affect existing subsistence patterns. The action alternatives would increase the acres available for timber harvest, but harvest levels are expected to remain the same across all alternatives. As a result, the amount of new or reconstructed road miles would be similar across the alternatives, but would be lowest under Alternatives 1 and 2 and highest under Alternatives 4, 5, and 6. Alternative 3

would likely result in more roads than Alternatives 1 and 2, and fewer than Alternatives 4 to 6.

Some subsistence users have a preference for unroaded areas. Viewed at a programmatic level, Alternatives 1 and 2 would likely have the lowest impact on subsistence users who prefer unroaded areas because timber harvest would be limited to areas outside existing IRAs under Alternative 1 and areas outside and roaded roadless under Alternative 2. These alternatives would, therefore, tend to increase road density in already roaded areas rather than provide new access to presently undeveloped areas.

Another potential access impact relates to the effects of clearcut harvesting on the landscape. Subsistence hunters have varying opinions on the effects of clearcut harvest on hunting success. Some hunters say that timber harvest clearcuts are productive for some years after harvest, while others prefer not to use clearcuts. Hunters interviewed on Prince of Wales Island, for example, reported that the best hunting in clearcut areas begins approximately 2 years after an area is logged, with hunt quality typically starting to decline 9 years after the area was cut (Brinkman 2006). Concern has been expressed by hunters that clearcuts in the process of regrowth become impassable to hunters after a period of time (Galginaitus 2004). Young-growth harvest would likely improve hunting in many previously harvested areas.

In addition to long-term access effects, timber management activities may also have short-term, temporary displacement effects for subsistence users because it is standard practice to close logging roads to outside traffic when logging is taking place. Subsistence users who use existing roads for access would be preempted from using those roads for the duration of logging activity in the affected area. These types of effects would, however, be short term and temporary, and would not be likely to lead to a significant possibility of a significant restriction of subsistence access to the resources. In addition, as previously noted, most or all new roads would be closed following harvest.

Competition

Almost two-thirds (63 percent) of the population in Southeast Alaska in 2014 resided in Juneau (44 percent) or Ketchikan (19 percent) and is, therefore, considered non-rural from a subsistence perspective (Alaska DOL 2018). Residents in the remaining communities are considered rural. Competition for the more abundant wildlife and fisheries resources near rural communities is affected by a number of factors, including fish and game regulations, the mobility of community residents, the Forest-wide distribution of game species, decreases in resource populations as a result of habitat reductions and/or over-harvest, and types of community access, such as roads, ferries, and commercial air services.

The following assumptions were made for the purposes of evaluating potential impacts to competition:

- New road construction adjacent to communities with ferry access will result in increased competition from outside communities.
- New road construction adjacent to existing road systems where interties between communities exist will result in increased competition from surrounding communities associated with the interconnected roads.
- 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.

- The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Given these assumptions, the 1997 Forest Plan Revision FEIS concluded that implementation of Alternative 11 (the Selected Alternative) would result in a significant possibility of a significant restriction of subsistence use of deer by increasing competition for some subsistence resources by non-rural, as well as rural residents. This was judged most likely to occur on Chichagof, Baranof, and/or Prince of Wales Islands, where competition for deer and some other land mammals was identified as heavy, and habitat capability had already been reduced as a result of timber harvest.

The significant possibility of a significant restriction, resulting from a change in competition, would still exist but be less than the possibility under Alternative 11 (the Selected Alternative) of the 1997 Forest Plan Revision FEIS for all of the alternatives considered in this EIS because of the much lower anticipated rates of timber harvest and road construction.

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, and old-growth forest wildlife habitat capability on Native corporation lands (especially that for deer) has declined. This decline has occurred primarily on North Chichagof, Kupreanof, Admiralty (localized), and Prince of Wales Islands, as well as in some mainland areas. 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 National Forest. Timber harvest has historically been accompanied by road building, log transfer facility development, and reductions in old-growth forest habitat.
3. **Effects of Present Activities**. Implementation of the 2016 Forest Plan established an annual average projected timber sale quantity (PTSQ) of 46 million board feet (MMBF) prior to the young-growth transition, with annual old-growth harvest stabilized at 5 MMBF following the transition to support small operators and specialty products. Under this plan, an estimated total of 24,000 acres of old-growth habitat would be converted to young-growth habitat after 25 years, with a total of 42,500 old-growth acres converted after 100 years. These estimates are assumed to remain the same under all of the alternatives considered in this EIS, with similar miles of road construction and reconstruction anticipated under each alternative, as discussed in the *Direct and Indirect Effects* section, above. Two mining operations, the Greens Creek Mine on Admiralty Island and Kensington Mine north of Juneau, are currently operating.
4. **Effects of Reasonably Foreseeable Future Activities**. Timber harvest activities have typically been accompanied by new access and often increased use of subsistence resources by rural and non-rural residents. The effects of timber harvest on deer habitat capability would be reduced over time as harvest areas transition from old growth to young growth under all alternatives.

Counting all lands in Southeast Alaska, an estimated 86 percent of the original old growth remains today. After 100 years of implementing any of the alternatives, it is estimated that the percentage of the original old growth remaining would be 82 percent, due to combined harvest on NFS and non-NFS lands, assuming maximum rates of harvest. Although the percentage reduction would not be high overall, areas of concentrated harvest could have higher effects on subsistence. Areas of concentrated harvest are described in the *Biodiversity* section, which quantifies the estimated effects of cumulative future harvest on the amount of old growth by biogeographic province for all of Southeast Alaska (see Tables 3.9-16, 3.9-17, and 3.9-18 in Appendix B of this EIS).

Timber harvest of Native corporation lands is anticipated to continue at a relatively low but constant level over the next decade. New land conveyances under Public Law 113-291 could result in some previously unharvested areas being logged. Actual mineral development is difficult to predict, but effects to subsistence resources would be highly localized where it does occur. Appendix A provides a full list of all the projects considered in the cumulative effects analysis.

ANILCA Determination

An ANILCA Section 810 evaluation and determination is not required for the Alaska Roadless Rulemaking because it is programmatic level decision and not a determination whether to "withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of National Forest land. This EIS is part of the Roadless Rulemaking process and, therefore, does not require an ANILCA Section 810 evaluation and determination. However, public hearings on subsistence issues for the proposed Forest Plan Amendment will be held in communities throughout Southeast Alaska between the Draft and Final versions of this EIS.

Commented [U23]: We strongly disagree. The Forest Service's conclusion is arbitrary.

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Environmental Justice

Affected Environment **3-257**
Environmental Consequences **3-259**

Affected Environment

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participating in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin.

Commented [U24]: This is another reason why OVK should be granted co-management authority under any alternative affecting lands within Kake's Community Use Area.

Race and ethnicity are shown by borough in Table 3.13-1. These data show that 63 percent of the population of Southeast Alaska identified as White in the 2010 census. American Indian and Alaska Native was the largest minority group, accounting for 15 percent of the total Southeast Alaska population. Table 3.13-1 indicates that there are relatively large proportions of Alaska Natives in Prince of Wales-Hyder, Hoonah-Angoon, and Yakutat. The populations of Haines, Juneau, Petersburg, and Skagway in contrast, have relatively low proportions of Alaska Natives, below the Southeast Alaska average of 15 percent.

Alaska Native populations are identified as a percentage of total population by community in Table D-1 in Appendix D. This information is presented graphically in Figure 3.12-1 (in the *Subsistence* section). These data indicate that 16 of Southeast Alaska's 32 communities have Alaska Native populations that comprise a larger share of total population than the regional average. Alaska natives comprised a particularly large share of total population in Hydaburg (84 percent), Saxman (74 percent), Metlakatla (72 percent), Kake (65 percent), and Hoonah (53 percent), all considered traditional Native communities.

Table 3.13-1
Race/Ethnicity by Borough/Census Area[1]

Geographic Area	Total Population	Percent of Total Population				
		White[2]	American Indian and Alaska Native[2]	Hispanic or Latino	Other Race[2,3]	Two or More Races[2]
Haines Borough	2,537	79	7	3	4	7
Hoonah-Angoon CA	2,146	44	37	5	6	8
Juneau City and Borough	32,434	65	11	6	9	8
Ketchikan Gateway Borough	13,745	64	14	5	9	9
Petersburg Borough	3,275	67	7	11	8	7
Prince of Wales-Hyder CA	6,473	45	40	4	2	9
Sitka City and Borough	8,810	62	13	6	8	10
Skagway Municipality	1,038	79	5	7	5	5
Wrangell City and Borough	2,475	64	21	3	3	9
Yakutat City and Borough	682	44	28	6	8	15
Southeast Alaska	**73,615**	**63**	**15**	**6**	**8**	**9**
Alaska	738,565	62	14	7	10	7

CA = Census Area
[1] Estimates are annual totals developed as part of the 2013-2017 American Community Survey 5-Year Estimates.
[2] Non-Hispanic only. The Federal Government considers race and Hispanic/Latino origin (ethnicity) to be two separate and distinct concepts. People identifying as Hispanic or Latino origin may be of any race. In this table people identifying as Hispanic or Latino are included in the Other Race category only.
[3] The "Other Race" category presented here includes census respondents identified as Black or African American, Asian, Native Hawaiian and Other Pacific Islander, or Some Other Race.
Source: U.S. Census Bureau 2018a

Median household income and the percent of households below the poverty line are presented by borough in Table 3.13-2. Statewide, the estimated share of the population below the poverty line was 9.2 percent in 2017. Median household income was approximately $76,100. Juneau is the only borough in the region with median household income above the state median. Median household income as a share of the state median in the other boroughs ranged from 68 percent in Prince of Wales-Hyder to 93 percent in Haines, Sitka, and Skagway (Table 3.13-2). The share of the population below the poverty level in 2017 ranged from 5.6 percent in Skagway to 16.0 percent in Prince of Wales-Hyder compared to the statewide average of 9.2 percent (Table 3.13-2).

The percent of households below the poverty line and the median household income are identified by community in Table D-1 in Appendix D. The U.S. Census identified 16 communities in Southeast Alaska with 10 percent or more of their population below the poverty line. All but three of the communities identified in Table D-1 where data are available had median household incomes below the state average.

Table 3.13-2
Income and Poverty by Borough/Census Area[1]

Geographic Area	Median Household Income: 2017 Dollars	Median Household Income: Percent of State Median	Population Below the Poverty Level
Haines Borough	70,640	93%	8.4%
Hoonah-Angoon CA	57,900	76%	11.1%
Juneau City and Borough	90,749	119%	7.4%
Ketchikan Gateway Borough	67,321	88%	10.6%
Petersburg Borough	63,490	83%	7.8%
Prince of Wales-Hyder CA	52,114	68%	16.0%
Sitka City and Borough	70,765	93%	9.2%
Skagway Municipality	70,673	93%	5.6%
Wrangell City and Borough	56,094	74%	11.7%
Yakutat City and Borough	64,583	85%	6.2%
Alaska	**76,114**	**100%**	**10.2%**

CA = Census Area
[1] Estimates are annual totals developed as part of the 2013-2017 American Community Survey 5-Year Estimates.
Source: U.S. Census Bureau 2018b, 2018c

Environmental Consequences

The potential effects of the alternatives on the economic and social environment of Southeast Alaska are discussed in the *Key Issue 2* section of this document. The principal regional effects would be those associated with changes in the timber industry and recreation and tourism. There could also be potential effects upon subsistence use and heritage resources that have particular significance for Alaska Native populations.

The effects of the alternatives on communities are discussed by community in Appendix D. Changes in roadless management and acres are estimated for each community use area. Impacts to subsistence are discussed in the *Subsistence* section. Overall effects on heritage resources are expected to be low under all the alternatives because of the protection offered by Forest-wide standards and guidelines. Further, the potential effects of the alternatives upon heritage resources are expected to be the lower than under the 2008 Forest Plan because of the lower allowable amount of potential timber harvest.

Commented [U25]: As noted in appendix D the Kake community use area map is woefully inadequate. See attached map, which expands the 454,186 acre community use area to over 2.3 million acres.

Commented [U26]: We object to this conclusion, comparatively, the proposed rulemaking will adversely affect only 1% of Juneau's use area, 6 % of Ketchikan's use area, and 15% of Petersburg as compared to 18% of Kake' use area (please note this figure is understated because Figure D-13 fails to accurately describe Kake's community use area.

Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

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Issues Dismissed from Detailed Analysis

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Dismissed issues are concerns raised by the public or interdisciplinary team (IDT) that are outside the scope of this analysis, not relevant to this project, or would have no or negligible effects. Although changes in management direction would influence the nature of future projects, the timing, location, and details of future projects are currently unknown. This proposal does not make site-specific decisions or authorize any ground disturbing activities. Therefore, site-specific impacts of projects are not considered in this environmental impact statement (EIS) and only broad environmental issues commensurate with program-level, landscape-scale decision making are considered. Impacts of future projects would need to be assessed on a project by project basis as they are proposed.

Dismissed issues are not addressed beyond the rationale provided below:

Geology and Geologic Features

None of the roadless area management alternatives propose alteration of geologic processes or features. Although road construction and/or timber harvest could potentially increase within some roadless areas, impacts to geology or geologic features would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to geology and geologic features from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines. While this is also true for karst and cave resources, effects to these resources are discussed in the body of Chapter 3 due to their sensitivity to harvest and development.

Soil Characteristics and Composition

None of the roadless area management alternatives propose alterations to soil characteristics or composition. Although road construction and/or timber harvest could potentially increase within some roadless areas, none of the alternatives predict a projected timber sale quantity (PTSQ) greater than the amount disclosed in the 2016 Forest Plan Amendment EIS (46 million board feet [MMBF] per year). Impacts to soil characteristics and composition would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to soil characteristics and composition from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

A preliminary review of effects to soils was conducted, looking at the acres of suitable land on soils with a mass movement index (MMI) of 3. The Forest Plan removes very high hazard class MMI 4 from suitability because of the risk of irreversible damage to the resource. MMI 3 soils are considered high hazard, but less so than MMI 4 soils and can be harvested on. As expected, acres of suitable MMI 3 soils increase with each of the Alaska Roadless Rule alternatives, ranging from an increase of 6 percent for Alternative 2, 18 percent for Alternative 3, and 36 to 38 percent for Alternatives 4 through 6. However, because none of the alternatives predict an increase in the PTSQ, this does not correlate to an increase in harvest on MMI 3 soils. As with other soil characteristics, site-specific conditions would be evaluated at the project-scale. Similarly, harvest and road building on steep slopes, and associated risk of landslides, would be based on site-specific proposals. From a broad programmatic standpoint, the associated risk of harvest and road building on high risk soils and steep slopes from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

Water Quantity and Quality

None of the roadless area management alternatives propose specific actions that would alter water quantity or quality. Although road construction and/or timber harvest could potentially increase within some roadless areas, impacts to water quantity or quality would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to water quantity or quality from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

Air Quality

None of the roadless area management alternatives propose specific actions that would alter air quality. Although road construction and/or timber harvest could potentially increase within some roadless areas, none of the alternatives predict a PTSQ greater than the amount disclosed in the 2016 Forest Plan Amendment EIS (46 MMBF per year). Impacts to air quality would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to air quantity from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

General Vegetation

None of the roadless area management alternatives propose specific actions that would alter general vegetation. Although road construction and/or timber harvest could potentially increase within some roadless areas, none of the alternatives predict a PTSQ greater than the amount disclosed in the 2016 Forest Plan Amendment EIS (46 MMBF per year). Impacts to general vegetation would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to general vegetation from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

General Wildlife Species/Habitat

None of the roadless area management alternatives propose specific actions that would alter general wildlife habitat. Although road construction and/or timber harvest could potentially increase within some roadless areas, none of the alternatives predict a PTSQ greater than the amount disclosed in the 2016 Forest Plan Amendment EIS (46 MMBF per year). Impacts to general wildlife habitats would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to general wildlife habitat from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

General Aquatics Species/Habitat

None of the roadless area management alternatives propose specific actions that would alter general aquatic species. Although road construction and/or timber harvest could potentially increase within some roadless areas, impacts to general aquatic species would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the impacts to general aquatic species and habitat from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

Essential Fish Habitat

The Magnuson–Stevens Fishery Conservation and Management Act mandates that agencies initiate consultation with the National Marine Fisheries Service (NMFS) for any activities that could affect essential fish habitat (EFH). This consultation is completed for site-specific projects with ground-disturbing activity. The application of Forest-wide standards and guidelines and best management practices (BMPs) developed to meet soil protection, water quality standards, and fish habitat protection will help protect EFH on the Tongass National Forest and adjacent estuarine and marine waters. Adoption of a Roadless Rule alternative does not specifically result in any actions that could affect EFH, and any action that would be taken following adoption of an Alaska Roadless Rule that could affect EFH would undergo such consultation.

Invasive Aquatic Species

Executive Order 13112 addresses the prevention of the introduction of invasive species and provides for their control and minimization of the economic, ecological, and human health impacts the invasive species causes. None of the roadless area management alternatives propose specific actions that would introduce invasive aquatic species. Although road construction and/or timber harvest could potentially increase within some roadless areas, impacts of invasive aquatic species would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses.

Wetlands

Executive Order 11990 requires protection of wetlands by mandating federal agencies to avoid, if possible and practicable, adverse impacts to wetlands. None of the roadless area management alternatives propose specific actions that would have adverse impacts to wetlands. Although road construction and/or timber harvest could potentially increase within some roadless areas, identification, assessment, and protection of wetlands would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, the protection of wetlands from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

A preliminary review of effects to wetlands was conducted. This analysis concluded that the amount of timber harvest on wetlands is expected to vary slightly among alternatives; about 5 percent for old growth and 8 percent for young growth based on the assumption that timber harvest would be distributed evenly across suitable acres. Miles of road under all alternatives would be minimized, as individual projects would avoid wetlands to the extent feasible, as required in the Forest-wide standards and guidelines. It is expected that new road miles would vary only slightly among alternatives but would be lowest with Alternatives 1 and 2 and highest with Alternatives 4, 5, and 6. Alternative 3 would be intermediate in terms of road miles built on wetlands.

Floodplains

Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. None of the roadless area management alternatives propose specific actions that would have short- or long-term adverse impacts to floodplains. Although road construction and/or timber harvest could potentially increase within some roadless areas, identification and assessment of short- and long-term effects would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses. From a broad programmatic standpoint, short- and long-term effects to floodplains from the proposed alternatives would be the same as disclosed in the 2016 Forest Plan Amendment EIS due to Forest Plan standards and guidelines.

National Historic Preservation Act

In carrying out the responsibilities under Section 106 of the National Historic Preservation Act (NHPA), the Forest Service consulted with the State of Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, Office of History and Archaeology, resulting in a letter (10/08/2018) from the State Historic Preservation Officer concurring with the Forest Service's determination that changes in management direction for inventoried roadless areas on the Tongass National Forest would not result in undertaking, as defined in 36 CFR 800.16(y). Although road construction and/or timber harvest could potentially increase within some roadless areas, impacts under the NHPA would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses.

Commented [U27]: The SHPO conclusion is arbitrary because neither the State or Forest Service has adequately consulted with OVK's Tribal Historic Preservation Officer. In addition, all the action alternatives adversely affect some sacred sites important to OVK.

Specific Location Impacts

Comments were received requesting detailed analysis of specific timber sales, road densities, and impacts to commercial special use permit areas. None of the roadless area management alternatives propose site-specific projects or actions. Specific location impacts would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses.

Changes in Timber Markets

Commenters stated that timber demand has decreased in the United States, causing Alaska timber to be shipped to overseas markets; as a result, the timber industry is no longer a driving economic force in Alaska. Pacific Northwest Research Station published new planning-cycle demand projections (Daniels et al. 2016) that identified three future scenarios representing alternative futures for Southeast Alaska's forest products industry – the transition to young-growth timber harvest, growing wood energy markets, and rebound in domestic housing market. The Forest Plan amendment use of a projected timber demand of an annual average of 46 MMBF of Tongass National Forest timber as the PTSQ was reasonable, conservative, and based on an evaluation of the best available information. The Forest Service has considered the current market situation and determined that no change to the PTSQ are needed at this time.

Changes to the 1872 Mining Law

Comments received suggested that reforming or changing the 1872 Mining Law, as amended, would address potential future environmental impacts. While the Mining Law is fundamentally a law for acquiring property rights, rather than an environmental law, presumably the comments were directed at eliminating the ability to establish property rights and increasing agency discretion to prevent mining. This is dismissed from consideration because making or amending law is an explicit function of Congress and not within the authority of the Secretary of Agriculture.

Irreversible or Irretrievable Commitment of Resources

Commented [U28]: Western red ceder and yellow ceder are Irretrievable Resources that we are very concerned about in kake community use areas. As these are the northern most old growth stands in all of tongass.

An irreversible[1] or irretrievable[2] commitment of resources will not be made by the rulemaking. None of the roadless area management alternatives propose specific actions that would causes irreversible or irretrievable commitments of resources. Although road construction and/or timber harvest could potentially increase within some roadless areas, commitment of resources would be based on site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses.

[1] A term used that describes the loss of future options. Applies primarily to the effects of use of nonrenewalable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.
[2] A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievable while an area is serving as a winter sport sites. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.

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Appendix A
Cumulative Effects

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Appendix A

Appendix A
Cumulative Effects

Introduction

Cumulative effects are defined in the Council on Environmental Quality (CEQ) regulations as "the impact on the environment which results from the incremental impact of the action 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 impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations [CFR] 1508.7). Cumulative actions are defined as "actions, which when viewed with other proposed actions, have cumulatively significant impacts and should therefore be discussed in the same impact statement" (40 CFR 1508.25). Cumulative effects are discussed in detail for each resource in the Environmental Impact Statement (EIS). This document discusses the projects considered and records which projects were considered for each resource.

For cumulative impacts to accrue, there must first be an impact from the action under review that can then be added to the impacts of other past, present, or reasonably foreseeable future actions that affect the same resource. The proposed Alaska Roadless Rule alternatives would affect management of roadless areas on the Tongass, as it relates to what and where harvests, tree cutting, and road building could occur under the Forest Plan. The Forest Plan in turn will guide the management the Forest.

For most resources, the analysis area for the Alaska Roadless Rule constitutes lands within the boundaries of the Tongass National Forest (approximately 17.9 million acres, including 1.2 million acres of non-National Forest System [NFS] lands). However, the effect to Roadless Areas is considered both locally, at the Forest-scale, and nationally. At the national scale, the affected environment for the Alaska Roadless Rule constitutes all NFS lands currently, or in the past, managed under the Roadless Rule. As noted in CEQ's guidance memorandum of June 24, 2005 (CEQ 2005), the effects of past actions can generally be captured by a description of the affected environment, which is detailed in the Chapter 3 of this EIS. Cumulative effects to Roadless Areas nationwide are presented in Chapter 3, *Key Issue 1 – Protection of Roadless Area Characteristics*.

The Forest Service and U.S. Department of Agriculture (USDA) have a number of ongoing or recently finalized rulemaking and policy efforts that alone or in combination with the Alaska Roadless rule might affect management of NFS lands and resources. As these rules and policies are finalized, the Agency can integrate or clarify certain provisions within each rule or policy to ensure consistency, clarity, and effectiveness with other ongoing initiatives. The relationships of these efforts to the proposed and alternative planning rules are discussed below.

Cumulative effects have been discussed throughout Chapter 3. The discussion of effects for many of the resources explores the effects of the alternatives in combination with other ongoing initiatives, strategies, policies, laws, etc.

Assumptions

Projects and actions included in the cumulative effects analysis were identified by reviewing past records, reviewing scoping comments, interviewing knowledgeable individuals, analyzing the existing condition of the project area using the Tongass and other geographic information system (GIS) layers, reviewing current plans, and, where necessary, making reasonable assumptions. An underlying assumption throughout this EIS is that none of the Alaska Roadless Rule alternatives propose or authorized specific actions on the ground. Although road construction and/or timber harvest could potentially increase within some roadless areas, none of the alternatives predict a projected timber sale quantity (PTSQ) greater than the amount disclosed in the 2016 Forest Plan Amendment EIS (46 million board feet [MMBF] per year). On-the-ground activities, which would result in both direct and indirect effects, would be based on

site-specific proposals, which are currently unknown, and would be addressed in subsequent project environmental analyses, including cumulative effects.

Timeframe for Analysis

The timeframe for this cumulative effects analysis encompasses past and future activities. Past activities include timber harvest and other activities that date back over 70 years, while future activities consider timber harvest up to 100 years in the future. Most other future activities can only be considered as reasonably foreseeable about 25 years or less into the future because of uncertainties beyond that point.

Relevant Past, Present, and Reasonably Foreseeable Actions

Rulemaking and Policy

Roadless Rules

In determining the cumulative effects, the Agency considered the current status of the various roadless rules:

- The Roadless Area Conservation Rule, issued in 2001 (36 CFR Part 294);
- The Idaho Roadless Rule, issued in 2008 (36 CFR Part 294 subpart C);
- The Colorado Roadless Rule, issued in (36 CFR Part 394 subpart D); and
- Utah petition for a Utah Roadless Rule

The Agency also considered current roadless area guidance, including Secretary's Memorandum 1042-157 (USDA 2012) and the Forest Service Chief's delegation of authority to approve exceptions to the 2001 Roadless Rule (USDA Forest Service 2018). The potential for combined effects of the alternatives in this programmatic EIS were considered with the anticipated effects of the Idaho Roadless Rule, the Colorado State Roadless Rule, and the Utah State rulemaking petition and preliminary alternatives. While it is possible that changes to roadless area conservation could happen at a national scale, by future congressional or executive action, these possibilities for change are too speculative and, therefore, are not analyzed.

The effects of the Idaho Roadless Rule, the Colorado State Roadless Rule, and the Utah State rulemaking petition would not overlap; together they would modify the Roadless Rule or remove roadless lands. See Chapter 3, *Key Issue 1 – Protection of Roadless Area Characteristics* for discussion.

Locatable and Leasable Minerals

In September 2018, the Forest Service published two separate Advance Notices of Proposed Rulemaking (ANPR) in the *Federal Register* as first steps to update the agency's regulations that address surface activities associated with exploration and development of locatable minerals, and to update regulations that address leasing and subsequent development of oil and gas resources. Revision of the regulations governing both locatable minerals and oil and gas resources will help achieve more efficient permitting processes, which in turn reduces regulatory burdens. This would have a positive effect on locatable and leasable mineral development. While development of locatable minerals within the Tongass would not be measurably affected by any of the Roadless Rule Alternatives, access to leasable minerals could be improved within roadless and timber priority Alaska Roadless Areas (AKRAs), which would be a cumulative positive effect on leasable mineral development.

2012 Planning Rule

The 2012 planning rule for land management planning for the National Forest System was published in the *Federal Register* (FR) on April 9, 2012 (77 FR 21162), and it became effective on May 9, 2012. It was developed through the most collaborative rulemaking effort in Agency history to ensure an adaptive land management planning process that is inclusive, efficient, collaborative and science-based to promote healthy, resilient, diverse and productive National Forests and Grasslands. In January 2015, the Forest Service published the final planning directives, the key set of agency guidance documents that direct

implementation of the 2012 planning rule. The 2016 Forest Plan Amendment was consistent with the new planning rule. Future Plan amendments or revisions would be consistent with the rule as well.

Subsistence Regulations for Tongass National Forest Submerged Lands

In May 2018, the Secretaries of the Departments of Agriculture and the Interior published the final rule for the Federal Subsistence Management Regulations for the Tongass National Forest Submerged Lands. This rule added submerged public lands within the Tongass National Forest to the subsistence regulations. Additional listings will be published as the Bureau of Land Management and the Forest Service continue their review of pre-statehood withdrawals. This rule would not affect the roadless areas, and none of the Alaska Roadless Rule alternatives would affect access or use of submerged lands for subsistence purposes.

USDA Strategic Plan 2018 – 2022

The USDA Strategic Plan for 2018–2022 (USDA 2018) includes a goal to ensure national forests and grasslands are managed to ensure productive and sustainable use. Objectives of this goal include contributing to the economic health of rural communities through use and access opportunities and ensuring lands and watersheds are sustainable, healthy, and productive.

The Forest Service's Strategic Plan for 2015-2020 (USDA Forest Service 2015) goals and objectives include sustaining the Nation's forests and grasslands by fostering resilient, adaptive ecosystems to mitigate climate change; mitigating wildfire risk; and delivering benefits to the public by providing abundant clean water, strengthening communities, and connecting people to the outdoors.

Tongass Young-growth Transition

On July 2, 2013, Secretary of Agriculture Thomas Vilsack issued Memorandum 1044-009, Addressing Sustainable Forestry in Southeast Alaska (USDA 2013). The memorandum directs management of the Tongass National Forest to expedite the transition away from old-growth timber harvesting and towards a forest products industry that uses predominantly second-growth – or young-growth – forests. Secretary Vilsack's memorandum also directs that the transition must be implemented in a manner that preserves a viable timber industry that provides jobs and opportunities for Southeast Alaska residents. USDA's goal is to effectuate this transition, over the next 10 to 15 years, so that at the end of this period the vast majority of timber sold by the Tongass will be young growth. The Forest Plan was amended in 2016 to effectuate this transition.

Each of the Alaska Roadless Rule action alternatives would help facilitate this transition by making more forest, including young growth, available for planning and offering timber sales under the 2016 Plan and increasing the Forest Service's flexibility in locating harvests. None of the alternatives would alter the PTSQ. It is expected that the each of the Alaska Roadless Rule alternatives would improve the agency's goal of transitioning away from old-growth harvesting towards a predominantly young-growth based industry.

Actions within the Boundaries of the Tongass National Forest

The 2016 Forest Plan Final EIS, Appendix C (USDA Forest Service 2016) provides a full and detailed list of all the projects considered in the cumulative effects analysis, which has not changed substantially to date. Such reasonably foreseeable activities include, but are not limited to, timber harvest, residential development, mining, recreation and tourism, and road construction. This section summarizes and updates the list of past, present, and future activities considered based on a review of published material and available information about the Tongass National Forest and adjoining lands on various agency websites and the scoping process. It also examines other past projects, but most importantly, by looking hard at current conditions, residual effects of past human actions and natural events are captured, regardless of which particular action or event contributed those effects. The CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." For these reasons, the primary

method of analyzing past actions is based on the cumulative change in environmental conditions to the present, as described in the affected environment sections of the EIS. To keep the cumulative effects analysis useful, manageable, and concentrated on the effects that are meaningful, greater effort is given to future activities that are more certain and geographically close to the affected lands with a focus on issues of greatest concern.

Table A-1 lists and describes the past, present, and reasonably foreseeable projects and activities that are considered for analysis of cumulative effects. Table A-2 identifies the primary areas with potential interactions among the identified projects and actions and the primary resource areas.

Table A-1
Regional Projects Considered in Cumulative Effects Analyses

Action or Activity	Location	Timing	Description
Past Actions			
Timber harvests and road construction	Throughout Southeast Alaska	1950s to present	Over 460,000 acres of forest have been harvested and 9,400 miles of road have been constructed on Forest as of 2016. Additionally, there have been over 450,000 acres of forest land harvested on non-National Forest System (NFS) lands within the Forest boundary. Harvests and road construction have been concentrated on Prince of Wales and adjacent islands with large portions on Wrangell, Mitkof, Kupreanof, Kuiu, Revillagiggedo, and Baranof Islands.
Land Adjustments	Throughout Southeast Alaska	Various	NFS lands have been conveyed to non-federal parties under the Native Allotment Act, Alaska Native Claims Settlement Act (ANCSA), Alaska National Interest Lands Conservation Act (ANILCA) and other authorities. In 2015, Sealaska Corporation received its final ANSCA entitlement and conveyance of 70,075 acres. Public Law 113-291 added 8 new Land Use Designation (LUD) II areas, containing 152,000 acres. Other land adjustments have occurred in the past and the Forest Service began acquiring lands at Cube Cove on Admiralty Island in 2016 and continues through the present.
Mining	Throughout Southeast Alaska	1800s to present	Historic mines include the Treadwell Mine and the Alaska Juneau Mine in Juneau; the Kensington and Jualin mines north of Juneau (recently reopened); the Ross-Adams uranium mine on Prince of Wales Island; the undeveloped Quartz Hill molybdenum deposit in the non-Wilderness Misty-Fjord National Monument; copper mines in the Ketchikan area; and many other deposits that were explored or developed throughout the Tongass. Mineral exploration and extraction have continued, at some level, since the first discoveries. More recently, the Greens Creek mine has been operating since the late 1980s, less three years during a shutdown in the 1990s, and the Kensington Mine reopened in 2010.
Energy	Throughout Southeast Alaska	1800s to present	There are about 20 existing hydropower projects on the Forest that with a total capacity of about 200 megawatts.
Recreation and Tourism	Throughout Southeast Alaska	1800s to present	Tourism has occurred in Southeast Alaska since the late 1800s. Over 1.2 million people visited Southeast Alaska in 2016. Tourism activities on the Forest include use hunting and fishing outfitters and guides, helicopter landings and tours, access of the Forest from lodges, and enjoying Forest Service visitor centers. Dispersed recreation has steadily increased in Southeast Alaska along with the growth of the tourism industry, the growth of communities, and the development of roads

Table A-1 (continued)
Regional Projects Considered in Cumulative Effects Analyses

Action or Activity	Location	Timing	Description
Community Development	Throughout Southeast Alaska	1800s to present	Settlement and community development in Southeast Alaska occurred primarily from the late 1800s to the present. Mining, fishing, and fish canneries were the primary early factors encouraging settlement, later followed by logging. Today there are 32 communities in Southeast Alaska. Eleven of these communities have less than 100 people ranging up to Juneau with over 33,000. The footprint of these communities ranges in size from a few acres to several thousand acres. Road development is associated with community development and is covered above under timber harvest activities.
Fish and Wildlife Habitat Enhancement and Regulatory Actions	Forest-Wide	1960s to present	A range of fish and wildlife habitat enhancement projects has occurred throughout Southeast Alaska. These projects were designed to improve forest, riparian, and stream habitats for fish and wildlife. They include extensive pre-commercial thinning, riparian thinning, snag creation, instream and riparian rehabilitation; placement of large woody debris in streams; improving fish passage; and decommissioning roads. The number of locations and number of projects will vary year to year based on funding and need.
Yellow cedar decline	Throughout Southeast Alaska	Past 50 years	Yellow-cedar decline and mortality has dramatically changed many of the forests of Southeast Alaska and this decline is believed to have been climate related. Aerial surveys have mapped approximately 585,000 acres of decline in a wide band from western Chichagof and Baranof Islands to the Ketchikan area (USDA Forest Service and ADNR 2015).
Fire	Throughout Southeast Alaska	Historical	Because of high precipitation levels, fire has not been a major factor in shaping the forests of Southeast Alaska. However, approximately 400 to 500 acres have burned annually on the Tongass.
Windthrow Events	Throughout Southeast Alaska	Historical	Small-scale windthrow events are very common throughout Southeast Alaska forests. These small events involve individual trees or small groups of trees. The open gaps in the canopy that result, allow young trees to colonize and fill the openings. Therefore, over time, complex, mixed-aged stands are produced.
Present and Reasonably Foreseeable Actions			
Timber harvests and road construction	Throughout Southeast Alaska	Present + 100 years	Harvests and road construction will continue under the Forest Plan and may vary year to year while transitioning from. The 2016 Forest Plan EIS predicted harvests of old- and young-growth over 42,000 and 284,000 acres, respectively, over the next 100 years with about 1,000 miles of new road. Harvests and road construction are expected to continue as described in the 2016 Forest Plan EIS and transition to a young-growth based industry over 15 years. Additional harvests and road construction are expected on other lands.

Table A-1 (continued)
Regional Projects Considered in Cumulative Effects Analyses

Action or Activity	Location	Timing	Description
Land Adjustments	Forest-wide	2018-2019	Public Law 115-31 authorized land exchange between the Alaska Mental Health Trust Authority and the Forest Service. The land exchange encompasses lands from nine remote Alaska communities and comprises approximately 18,000 non-federal acres and 21,000 federal acres. Timber harvests are prohibited on the lands received from the Alaska Mental Health Trust Authority but are expected to occur on the lands provided. On the Tongass National Forest, the State of Alaska has approximately 12,145 acres remaining of land entitlement under the Alaska Statehood Act (43 CFR 2627.1(a)). The Forest Service began purchasing lands at Cube Cove and continues through the present and into the near future. At almost 23,000 acres, it was the largest single in-holding in the Admiralty Island National Monument.
Mining	Throughout Southeast Alaska	Present and beyond	Mineral exploration and development are expected to continue on the Forest and adjacent lands. Both the Greens Creek Mine on Admiralty Island and the Kensington Mine north of Juneau are active mines and expected to continue for some years based on successful continued exploration. As a result of successful exploration, the Greens Creek Mine has periodically sought and been authorized to expand its tailings tailings—the material left after the minerals have been removed—storage facility, most recently in 2013. Active mines generate waste water, waste rock, air emissions, and tailings. Several other sites are being prospected and explored with the intent to develop new mines. Development of leasable minerals, including geothermal, could occur, but there are no current leasable mineral activities on the Tongass and they are unlikely soon.
Energy	Throughout Southeast Alaska	Present and beyond	Hydropower will continue to be an important source of energy on the in Southeast Alaska. New sites, such as Angoon Hydroelectric and Sweetheart Lake, are expected to be developed and decrease community reliance on diesel. Transmission lines will be constructed to deliver energy to communities.
Recreation and Tourism	Throughout Southeast Alaska	Present and beyond	Recreation and tourism are expected to continue and increase in the future.
General – Climate Change	Throughout Southeast Alaska	Present and beyond	Some climate models for Southeast Alaska predict rising temperatures, a 10 percent decrease in summer precipitation in portions of the region, and decreased soil moisture due to increased evaporation during warmer, drier summer weather. These factors may lead to an increase in fire frequency and severity, further yellow-cedar decline, higher rates of insect and disease infestations, more severe windthrow events, and uncertain effects on stream flows, water temperature, and fisheries.
Fish and Wildlife Habitat Enhancement	Throughout Southeast Alaska	Present and beyond	Fish and wildlife habitat enhancement projects will continue to be implemented on the Forest and other lands.
Yellow Cedar Decline	Throughout Southeast Alaska	Present and beyond	As the climate continues to warm, yellow-cedar decline is likely to continue to spread, especially in the south and east. Conversely, yellow-cedar appears to be spreading northward as climate warms, into areas that retain snow longer into the spring.

Table A-1 (continued)
Regional Projects Considered in Cumulative Effects Analyses

Action or Activity	Location	Timing	Description
Fire	Throughout Southeast Alaska	Present and beyond	Approximately 400 to 500 acres burn annually on the Tongass National Forest. Due to climate change, there may be an increased risk of forest fires but the effects are likely to be minor at the forest level.
Regional Transportation	Throughout Southeast Alaska	Present and beyond	The State of Alaska will continue to maintain and improve its regional transportation system including road and marine systems. As funding allows, new road systems may be developed to connect communities.
Other Transportation Projects	Throughout Southeast Alaska	2016 and beyond	The Forest Service will conduct transportation projects which will vary year to year based on funding and need. These include maintaining or improving existing roads and bridges, placing roads in storage, paving existing dirt roads, and improving fish passage at culverts. The State and local communities will also implement various transportation projects such as paving or resurfacing roads, road realignments, safety improvements, vessel and marine terminal improvements, etc.

Appendix A

Table A-2
Interactions Between Resources and Actions or Projects

Actions or Projects	Roadless Areas	Resource-based Industries	Fish, Wildlife and Biodiversity	Climate	Karst	Sensitive and Invasive Plants	Transportation	Energy	Timber	Minerals	Recreation	Scenery	Subsistence
Past													
Timber harvests and road construction	X	X	X		X	X	X		X		X	X	X
Land Adjustments		X	X		X	X	X	X	X	X	X	X	X
Mining	X	X	X		X								
Energy	X		X	X		X	X	X	X	X	X	X	
Recreation and Tourism	X	X	X	X		X					X	X	
Community Development		X	X	X		X	X	X			X	X	X
Fish and Wildlife Habitat Enhancement			X			X							X
Yellow-cedar decline		X	X						X				
Fire			X	X					X				
Windthrow Events			X	X					X				
Present and Reasonably Foreseeable													
Timber harvests and road construction	X	X	X		X	X	X		X		X	X	X
Land Adjustments		X	X		X	X	X	X	X	X	X	X	X
Mining	X	X	X		X								
Energy	X		X	X		X	X	X	X	X	X	X	
Recreation and Tourism	X	X	X	X		X					X	X	
General – Climate Change			X	X		X		X	X		X		
Fish and Wildlife Habitat Enhancement			X			X							X
Yellow Cedar Decline			X	X					X				
Fire		X	X					X					
Regional Transportation	X	X	X	X		X	X	X		X	X	X	X
Other Transportation Projects	X	X	X	X		X	X	X		X	X	X	X

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Appendix B

Referenced Data Tables from the 2016 Forest Plan Amendment Final EIS by Resource

Note: Alternative 5 in the tables was the selected alternative for the Forest Plan.

Appendix B

2016 Forest Plan Amendment EIS

Biodiversity Tables

Table 3.9-1
Biogeographic Provinces in Southeast Alaska and the Tongass National Forest

No.	Province	Description
1.	Yakutat Forelands	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. Most of the province is inside the Tongass Forest boundary, but the southern lobe that extends into Glacier Bay National Park is not.
2.	Yakutat/ Glacier Bay Upland	The climate varies from very wet hyper-maritime along the coast to very wet maritime inland. Mountains abruptly rising more than 10,000 feet 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	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	This province is dominated by a very wet hyper-maritime 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	This province is colder than West Baranof or East 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 East 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	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 red-cedar 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	This province is represented by 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 but those in the Western red-cedar 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	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 East 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 elevation.
9.	Northern Coast Range	This province has little maritime influence. Topography is rugged and glaciated. The Taku and Whiting Rivers extend into Canada. All forest plant associations except those in the Western red-cedar series and those occurring only on outer coastal areas occur in this province.
10.	Kupreanof/ Mitkof Islands	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 red-cedar 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.

Table 3.9-1
Biogeographic Provinces in Southeast Alaska and the Tongass National Forest

No.	Province	Description
11.	Kuiu Island	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	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	Similar to the Kupreanof/Mitkof Islands Province, this province is also subject to continental influence from the mainland and the Stikine River. Glacial flour (very finely ground particles of rock, silt, or clay created by a glacier when its rock-filled ice scrapes over bedrock and which flow out from beneath a glacier in the meltwater) 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	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	Climate is variable with warm and wet conditions predominating on land nearest the outer coast; much colder conditions occur 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. Muskeg ponds are common on Duke Island, attracting many wintering and migratory birds.
16.	Southern Outer Islands	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 species, including dusky shrew, long-tailed vole, and ermine. Major coastal seabird colonies are present.
17.	Dall Island and Vicinity	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	The climate is warm and wet, and 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-red-cedar plant associations dominate.
19.	North Misty Fiords	Compared to South Misty Fiords, this province has considerable topographic relief and characterized as having 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	South Misty Fiords is typical of the other mainland provinces and is 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	Permanent ice fields, active glaciers (some advancing and some receding), and nunataks (mountain peaks between glaciers) dominate this province.
22.	Chilkat River Complex	The Chilkat River Complex lies at the northern end of the Inside Passage and is outside the Tongass Forest boundary. It consists of tall ridge systems, large glacial rivers, and includes glaciers and snowfields. Many of the rivers and drainage basins extend across the international boundary into Canada. Because of the overlap of coastal and interior floras and faunas, the province contains Alaska's highest vascular plant species richness and the highest mammalian diversity in Southeast Alaska (Carstensen et al. 2007).

Appendix B

Table 3.9-1
Biogeographic Provinces in Southeast Alaska and the Tongass National Forest

No.	Province	Description
23.	Glacier Bay/ Fairweather Range	This is the largest province in Southeast Alaska (2.5 million acres) and is located outside the Tongass Forest boundary. The vast majority is high mountains and glaciers and the majority is non-vegetated. The highest peaks are in the Fairweather Range along the western edge of the province, with Mt. Fairweather at over 15,000 feet. A large flat, foreland, the Gustavus Foreland, occurs in the area around Gustavus and to the north in the Bartlett River valley. Lowlands are also fairly extensive along the Dundee River and other smaller drainages on the southwest side of Glacier Bay. Glacier Bay National Park protects virtually the entire province (97 percent), except for about 75,000 acres in the vicinity of Gustavus.

Table 3.9-3
Distribution of Productive Old-Growth Forest on the Tongass National Forest by Biogeographic Province (NFS Lands Only)

		POG Type							
		Low Volume		Medium Volume		High Volume			
	Biogeographic Province	SD4H	SD4N	SD4S	SD5H	SD5N	SD5S	SD67 (Large-tree)	Total POG[1]
1	Yakutat Forelands	7,236	9,462	17,655	2,027	4,810	9,786	44,086	95,063
2	Yakutat Uplands	2,818	6,338	19,613	940	2,928	7,955	3,422	44,014
3	East Chichagof Island	62,554	53,403	102,274	22,113	45,303	79,309	34,249	399,206
4	West Chichagof Island	14,370	12,889	24,961	1,942	6,255	10,205	2,021	72,643
5	East Baranof Island	10,238	15,056	28,694	4,581	12,165	15,934	1,999	88,668
6	West Baranof Island	32,287	38,900	80,413	7,190	19,561	32,010	4,095	214,457
7	Admiralty Island	86,690	53,040	110,609	43,387	64,465	139,659	97,582	595,432
8	Lynn Canal	21,197	20,584	46,114	9,059	13,009	36,072	11,952	157,988
9	North Coast Range	35,539	38,193	88,207	23,434	42,808	72,156	22,346	322,684
10	Kupreanof/Mitkof Island	83,983	32,071	63,614	21,802	30,124	56,570	19,587	307,752
11	Kuiu Island	42,752	19,502	41,743	24,830	44,565	83,920	34,527	291,839
12	Central Coast Range	30,442	27,179	66,014	12,942	27,058	62,492	20,026	246,153
13	Etolin Island	49,821	24,777	54,019	11,892	25,011	43,053	12,483	221,055
14	North Central Prince of Wales	105,415	26,834	63,175	69,451	42,078	77,283	101,923	486,160
15	Revilla Island/Cleveland Peninsula	79,213	43,718	94,573	54,625	69,974	130,787	31,937	504,827
16	Southern Outer Islands	17,397	10,290	26,735	9,203	15,613	20,346	12,450	112,035
17	Dall Island and Vicinity	7,457	5,724	16,801	3,473	10,995	14,580	7,920	66,951
18	South Prince of Wales	25,437	11,198	32,240	10,316	11,043	22,010	38,830	151,074
19	North Misty Fiords	13,543	35,198	78,979	3,858	18,996	34,893	12,743	198,210
20	South Misty Fiords	52,861	40,471	104,917	11,396	29,521	55,878	14,089	309,132
21	Ice Fields	4,940	21,671	50,563	1,479	10,426	21,939	5,875	116,893
Forest-wide		786,196	546,500	1,211,915	349,950	546,711	1,026,839	534,143	**5,002,255**

[1] Totals may not sum or match exactly to other tables in this section due to rounding.

Appendix B

Table 3.9-4
Distribution of Old-Growth Forest on the Tongass National Forest by Elevation (NFS Lands Only)

Elevation Zone	Description	Productive Old Growth	Unproductive Old Growth	Total Old Growth
Less than 800 feet	All upland old growth below 800 feet in elevation	2,931,865	1,975,371	4,907,236
800 to 1,500 feet	All upland old growth between 800 and 1,500 feet in elevation	1,454,171	1,033,305	2,487,476
Greater than 1,500 feet	All upland old growth more than 1,500 feet in elevation	616,219	1,428,456	2,044,674
Total		5,002,255	4,437,131	9,439,386

Source: Tongass GIS database 2015

Appendix B

Table 3.9-5
Forest-wide Distribution of Young Growth (NFS Lands Only) [1]

	Biogeographic Province	Natural Young Growth (acres)	Harvested Young Growth (acres)[2] 0-25 Years	26-50 Years	>50 Years	Total Harvested Young-growth	Total Young-growth[3] (acres)	Harvested Young Growth in the Beach and Estuary Fringe[4] (acres)	Harvested Young Growth in RMA[4] (acres)	Harvested Young Growth in Old-growth Habitat LUD[4] (acres)
1	Yakutat Forelands	36,670	1,213	2,363	24	40,262	40,314	13	116	10
2	Yakutat Uplands	11,869	708	666		13,242	13,258	-	94	0
3	East Chichagof Island	3,296	9,303	29,180	4,596	47,331	46,456	5,264	10,875	8,041
4	West Chichagof Island	329	0	0	0	329	337	-	-	-
5	East Baranof Island	868	2,192	4,799	6,214	14,283	14,117	2,988	2,932	1,667
6	West Baranof Island	864	6	9,938	6,468	17,716	17,348	2,410	5,302	3,027
7	Admiralty Island	5,280	457	2,094	3,179	14,103	11,088	3,707	1,065	-
8	Lynn Canal	2,951	863	4,519	0	8,320	8,338	480	1,937	1,051
9	North Coast Range	5,253	0	0	459	5,930	5,714	534	76	0
10	Kupreanof/Mitkof Island	1,652	7,714	23,153	4,329	39,036	36,888	5,735	2,523	3,533
11	Kuiu Island	3,463	4,236	18,584	2,121	30,934	28,473	3,585	2,918	1,231
12	Central Coast Range	2,750	589	2,324	3,388	9,269	9,054	1,306	1,382	95
13	Etolin Island	3,403	7,504	23,451	5,352	41,419	39,843	6,874	2,205	3,496
14	North Central Prince of Wales	51	33,570	102,636	25,911	170,306	162,363	14,155	21,197	14,619
15	Revilla Island/Cleveland Peninsula	555	13,969	15,619	14,067	49,119	44,346	9,336	4,905	3,999
16	Southern Outer Islands	258	2,191	12,007	1,042	18,114	15,525	2,634	1,465	920
17	Dall Island and Vicinity	-	0	0	285	1,299	285	762	75	4
18	South Prince of Wales	-	851	1,689	679	4,275	3,226	1,323	565	569
19	North Misty Fiords	280	0	1,001	77	6,549	1,357	673	1,629	313
20	South Misty Fiords	-	0	0	0	2,405	0	353	355	-
21	Ice Fields	3,333	5	4,007	51	10,006	7,395	-	2,457	1,759
	Forest-wide	**83,125**	**85,372**	**258,029**	**78,216**	**421,616**	**544,250**	**62,133**	**64,073**	**44,333**

[1] Totals may not sum or match exactly to other tables in this section due to rounding
[2] Includes 422,000 acres of stands from even-aged harvest.
[3] Includes 83,000 acres of natural young growth, 422,000 acres of managed stands from even-aged harvest, and about 40,000 acres of partial harvested stands.
[4] Includes all harvested acres from even-age and partial harvest.

Appendix B

Table 3.9-12
Estimated Percent of Original POG Remaining (Total and in Reserves) after 100 Years by Biogeographic Province and Alternative (NFS lands only)

		POG		% Original POG Remaining after 100+ Years (Total / In Reserves) by Alternative				
No.	Biogeographic Province	Original Acres	% Remaining in 2015	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1	Yakutat Forelands	98,656	96	95 / 75	96 / 75	96 / 75	96 / 75	96 / 75
2	Yakutat Uplands	45,387	97	97 / 95	97 / 95	97 / 95	97 / 95	97 / 95
3	East Chichagof Island	443,241	90	88 / 52	89 / 52	89 / 52	89 / 52	89 / 52
4	West Chichagof Island	72,643	100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100
5	East Baranof Island	102,083	87	85 / 53	86 / 53	86 / 53	86 / 53	86 / 53
6	West Baranof Island	231,308	93	92 / 78	93 / 78	92 / 78	93 / 78	93 / 78
7	Admiralty Island	604,254	99	99 / 99	99 / 99	99 / 99	99 / 99	99 / 99
8	Lynn Canal	163,358	97	96 / 67	96 / 67	96 / 67	96 / 67	96 / 67
9	North Coast Range	323,361	100	100 / 67	100 / 67	100 / 67	100 / 67	100 / 67
10	Kupreanof/Mitkof Island	345,136	89	87 / 39	88 / 39	87 / 39	88 / 39	87 / 39
11	Kuiu Island	319,310	91	89 / 63	90 / 63	91 / 63	90 / 63	91 / 63
12	Central Coast Range	252,672	97	97 / 68	97 / 68	97 / 68	97 / 68	97 / 68
13	Etolin Island & Vicinity	259,071	85	83 / 39	84 / 39	84 / 39	83 / 39	83 / 39
14	North Central Prince of Wales	656,415	74	72 / 40	73 / 41	73 / 41	72 / 41	72 / 41
15	Revilla Island/ Cleveland Pen.	553,391	91	90 / 62	91 / 62	90 / 62	90 / 62	90 / 62
16	Southern Outer Islands	129,891	86	85 / 69	86 / 69	86 / 69	85 / 69	85 / 69
17	Dall Island and Vicinity	68,249	98	98 / 84	98 / 84	98 / 84	98 / 84	98 / 84
18	South Prince of Wales	155,349	97	97 / 68	97 / 68	97 / 68	97 / 68	97 / 68
19	North Misty Fiords	204,479	97	97 / 90	97 / 90	97 / 90	97 / 90	97 / 90
20	South Misty Fiords	311,537	99	99 / 99	99 / 99	99 / 99	99 / 99	99 / 99
21	Ice Fields	123,566	95	94 / 79	95 / 79	95 / 79	95 / 79	95 / 79
	Forest-wide	**5,463,379**	**92**	**90 / 67**	**91 / 67**	**91 / 67**	**91 / 67**	**91 / 67**

[1] Numbers may not appear to sum correctly due to rounding.

Table 3.9-13
Estimated Percent of Original High-Volume POG Remaining (Total and in Reserves) after 100 Years by Biogeographic Province and Alternative (NFS lands only)[1]

		High-volume POG		% Original High-volume POG Remaining after 100+ Years (Total / In Reserves) by Alternative				
No.	Biogeographic Province	Original Acres	% Remaining in 2015	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1	Yakutat Forelands	61,377	96	94 / 70	95 / 70	96 / 70	96 / 70	96 / 70
2	Yakutat Uplands	15,335	93	93 / 90	93 / 90	93 / 90	93 / 90	93 / 90
3	East Chichagof Island	191,888	83	81 / 49	82 / 49	82 / 49	82 / 49	82 / 49
4	West Chichagof Island	18,480	100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100
5	East Baranof Island	40,159	75	73 / 41	74 / 41	74/ 41	74/ 41	74/ 41
6	West Baranof Island	68,304	81	81 / 70	81 / 70	81 / 70	81 / 70	81 / 70
7	Admiralty Island	308,323	98	98 / 98	98 / 98	98 / 98	98 / 98	98 / 98
8	Lynn Canal	65,061	94	93 / 63	93 / 63	93 / 63	93 / 63	93 / 63
9	North Coast Range	137,818	100	100 / 66	100 / 66	100 / 66	100 / 66	100 / 66
10	Kupreanof/Mitkof Island	134,319	79	77 / 37	78 / 37	78 / 37	78 / 37	78 / 37
11	Kuiu Island	183,616	89	86 / 59	88 / 59	88 / 59	87 / 59	88 / 59
12	Central Coast Range	114,465	96	95 / 67	96/ 67	95 / 67	95 / 67	96 / 67
13	Etolin Island & Vicinity	109,059	74	72 / 34	73 / 34	73 / 34	72 / 34	72 / 34
14	North Central Prince of Wales	348,976	63	62 / 35	62 / 37	63 / 37	62 / 37	62 / 37
15	Revilla Island/ Cleveland Pen.	269,121	86	85 / 60	86 / 60	86 / 60	86 / 60	86 / 60
16	Southern Outer Islands	61,801	78	77 / 59	78 / 59	78 / 59	77 / 59	77 / 59
17	Dall Island and Vicinity	34,469	97	97 / 86	97 / 86	97 / 86	97 / 86	97 / 86
18	South Prince of Wales	75,089	96	95 / 66	95 / 67	95 / 67	95 / 67	95 / 67
19	North Misty Fiords	71,334	93	93 / 86	93 / 86	93 / 86	93 / 86	93 / 86
20	South Misty Fiords	101,292	98	98 / 98	98 / 98	98 / 98	98 / 98	98 / 98
21	Ice Fields	43,245	88	88 / 76	88 / 76	88 / 76	88 / 76	88 / 76
	Forest-wide	**2,453,537**	**86**	**85 / 63**	**85 / 63**	**85 / 63**	**85/ 63**	**85 / 63**

[1] High-volume POG incudes SD5S, SD5N, and SD67 classes.
[2] Numbers may not appear to sum correctly due to rounding.

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Table 3.9-14
Estimated Percent of Original Large-Tree POG Remaining (Total and in Reserves) after 100 Years by Biogeographic Province and Alternative (NFS lands only)[1]

		Large-tree POG		% Original Large-tree POG Remaining after 100+ Years (Total / In Reserves) by Alternative				
No.	Biogeographic Province	Original Acres	% Remaining in 2015	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1	Yakutat Forelands	45,164	98	95 / 68	97 / 68	98 / 68	98 / 68	98 / 68
2	Yakutat Uplands	3,834	89	89 / 83	89 / 83	89 / 83	89 / 83	89 / 83
3	East Chichagof Island	47,460	72	71 / 49	72 /49	72 / 49	72 / 49	71 / 49
4	West Chichagof Island	2,021	100	100 / 100	100 / 100	100 / 100	100 / 100	100 / 100
5	East Baranof Island	56,023	33	33 / 20	33 / 20	33 / 20	33 / 20	33 / 20
6	West Baranof Island	9,150	45	47 / 41	47 / 41	47 / 41	47 / 41	47 / 41
7	Admiralty Island	100,229	97	97 / 97	97 / 97	97 / 97	97 / 97	97 / 97
8	Lynn Canal	13,563	88	88 / 58	88 / 58	88 / 58	88 / 58	88 / 58
9	North Coast Range	22,549	99	99 / 64	99 / 64	99 / 64	99 / 64	99 / 64
10	Kupreanof/Mitkof Island	30,802	64	62 / 31	62 / 31	62 / 31	62 / 31	62 / 31
11	Kuiu Island	42,768	81	77 / 43	79 / 43	79 / 43	78 / 43	79 / 43
12	Central Coast Range	21,982	91	91 / 60	91 / 60	91 / 60	91 / 60	91 / 60
13	Etolin Island & Vicinity	23,888	52	51 / 25	51 / 25	51 / 25	51 / 25	51 / 25
14	North Central Prince of Wales	152,999	67	64 / 38	66 / 40	66 / 40	65 / 40	65 / 40
15	Revilla Island/ Cleveland Pen.	46,506	69	68 / 46	68 / 46	68 / 46	68 / 46	68 / 46
16	Southern Outer Islands	17,807	70	68 / 48	68 / 48	68 / 48	68 / 48	68 / 48
17	Dall Island and Vicinity	8,310	95	95 / 91	95 / 91	95 / 91	95 / 91	95 / 91
18	South Prince of Wales	40,113	97	96 / 69	96 / 69	96 / 69	96 / 69	96 / 69
19	North Misty Fiords	14,623	87	87 / 79	87 / 79	87 / 79	87 / 79	87 / 79
20	South Misty Fiords	14,811	95	95/ 95	95/ 95	95/ 95	95/ 95	95/ 95
21	Ice Fields	7,877	75	75/ 68	75/ 68	75/ 68	75/ 68	75/ 68
	Forest-wide	**672,481**	**79**	**78 / 57**	**79 / 58**	**79 / 58**	**79 / 58**	**79 / 58**

[1] Large tree POG is defined as the SD 67 classes (a subset of high-volume POG).
[2] Numbers may not appear to sum correctly due to rounding.

Table 3.9-16
Cumulative Percent of Original Total POG Remaining on All Landownerships after 100 Years of Forest Plan Implementation by Biogeographic Province and Alternative (NFS and Non-NFS Lands)

No.	Biogeographic Province	Estimated Original Total POG (Acres)	Percent Original Total POG Remaining	Percent Total POG Remaining after 100+ Years[1,2] Alternative 1	2	3	4	5
1	Yakutat Forelands	123,675	85%	79%	79%	80%	80%	80%
2	Yakutat Uplands	45,426	97%	97%	97%	97%	97%	97%
3	East Chichagof Island	507,958	84%	79%	80%	80%	80%	80%
4	West Chichagof Island	72,958	100%	100%	100%	100%	100%	100%
5	East Baranof Island	103,046	87%	84%	85%	85%	85%	86%
6	West Baranof Island	247,420	92%	88%	89%	89%	89%	89%
7	Admiralty Island	634,873	95%	94%	94%	94%	94%	94%
8	Lynn Canal	180,172	97%	90%	91%	91%	91%	91%
9	North Coast Range	382,583	94%	88%	88%	88%	88%	88%
10	Kupreanof/Mitkof Island	406,907	82%	76%	77%	77%	77%	77%
11	Kuiu Island	327,703	91%	88%	89%	90%	89%	89%
12	Central Coast Range	259,558	97%	95%	96%	95%	95%	95%
13	Etolin Island	275,571	85%	80%	82%	81%	81%	81%
14	North Central Prince of Wales	906,143	63%	56%	57%	57%	56%	56%
15	Revilla Island/ Cleveland Peninsula	648,823	88%	81%	82%	81%	81%	81%
16	Southern Outer Islands	141,131	83%	79%	80%	80%	79%	80%
17	Dall Island and Vicinity	135,765	68%	57%	57%	57%	57%	57%
18	South Prince of Wales	192,458	88%	82%	82%	82%	82%	82%
19	North Misty Fiords	207,657	96%	96%	96%	96%	96%	96%
20	South Misty Fiords	311,823	99%	99%	99%	99%	99%	99%
21	Ice Fields	123,674	95%	94%	94%	95%	95%	95%
	Total for Southeast Alaska[3]	**6,235,343**	**86%**	**83%**	**83%**	**83%**	**83%**	**83%**

[1] The estimate assumes all scheduled suitable POG is harvested; does not account for Model Implementation Reduction Factor (MIRF).
[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest by major landowner category. To estimate the future harvest of POG on non-NFS lands, it was assumed that 75 percent of the remaining POG would be harvested on Native corporation lands and 50 percent of the remaining POG would be harvested on state lands, other private lands, and lands owned by municipalities, over the life of the Forest Plan (100 years).
[3] Does not include land area in biogeographic provinces 22 and 23 which are almost exclusively non-NFS land.

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Table 3.9-17
Cumulative Percent of Original High-Volume POG Remaining on All Landownerships after 100 Years of Forest Plan Implementation by Biogeographic Province and Alternative (NFS and Non-NFS Lands)

No.	Biogeographic Province	Estimated Original High-Volume POG (Acres)	Percent Original High-Volume POG Remaining	Percent Original High-Volume POG Remaining after 100+ Years[1,2] Alternative 1	2	3	4	5
1	Yakutat Forelands	74,753	83%	79%	80%	81%	81%	81%
2	Yakutat Uplands	15,384	93%	93%	93%	93%	93%	93%
3	East Chichagof Island	225,290	75%	72%	72%	72%	72%	72%
4	West Chichagof Island	18,598	100%	100%	100%	100%	100%	100%
5	East Baranof Island	40,496	75%	73%	74%	74%	73%	74%
6	West Baranof Island	74,710	81%	78%	78%	78%	78%	78%
7	Admiralty Island	325,440	94%	93%	93%	93%	93%	93%
8	Lynn Canal	71,127	94%	89%	90%	90%	90%	90%
9	North Coast Range	165,343	91%	86%	87%	87%	87%	87%
10	Kupreanof/Mitkof Island	166,887	69%	65%	66%	65%	66%	65%
11	Kuiu Island	186,894	89%	85%	87%	87%	86%	87%
12	Central Coast Range	117,349	95%	94%	94%	94%	94%	94%
13	Etolin Island	116,073	73%	70%	70%	70%	70%	70%
14	North Central Prince of Wales	485,130	52%	48%	49%	49%	48%	48%
15	Revilla Island/ Cleveland Peninsula	310,772	83%	78%	78%	78%	78%	78%
16	Southern Outer Islands	67,773	74%	71%	72%	72%	71%	72%
17	Dall Island and Vicinity	70,553	60%	55%	55%	55%	55%	55%
18	South Prince of Wales	93,875	83%	80%	80%	80%	80%	80%
19	North Misty Fiords	72,780	93%	92%	92%	92%	92%	92%
20	South Misty Fiords	101,392	98%	98%	98%	98%	98%	98%
21	Ice Fields	43,282	88%	88%	88%	88%	90%	88%
Total for Southeast Alaska[3]		**2,845,053**	**79%**	**76%**	**76%**	**76%**	**76%**	**76%**

[1] The estimate assumes all scheduled suitable POG is harvested; does not account for Model Implementation Reduction Factor (MIRF).
[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest.
[3] Does not include land area in biogeographic provinces 22 and 23 which are almost exclusively non-NFS land.

Table 3.9-18
Cumulative Percent of Original Large-tree POG Remaining on All Landownerships after 100 Years of Forest Plan Implementation by Biogeographic Province and Alternative (NFS and Non-NFS Lands)

No.	Biogeographic Province	Estimated Original SD67 POG (Acres)	Percent Original SD67 POG Remaining	Percent SD67 POG Remaining after 100+ Years[1,2] Alternative 1	2	3	4	5
1	Yakutat Forelands	52,545	87%	84%	85%	86%	86%	86%
2	Yakutat Uplands	3,841	89%	89%	89%	89%	89%	89%
3	East Chichagof Island	65,774	60%	55%	56%	56%	55%	55%
4	West Chichagof Island	2,079	100%	97%	98%	98%	97%	98%
5	East Baranof Island	6,192	35%	33%	33%	34%	33%	33%
6	West Baranof Island	12,468	52%	42%	42%	42%	42%	42%
7	Admiralty Island	109,747	90%	90%	90%	90%	90%	90%
8	Lynn Canal	16,623	89%	78%	79%	78%	78%	78%
9	North Coast Range	37,331	77%	64%	66%	67%	65%	66%
10	Kupreanof/Mitkof Island	48,728	49%	44%	45%	45%	45%	45%
11	Kuiu Island	44,459	81%	78%	79%	79%	78%	78%
12	Central Coast Range	23,494	89%	72%	80%	81%	76%	75%
13	Etolin Island	27,581	53%	48%	48%	48%	48%	48%
14	North Central Prince of Wales	228,389	51%	48%	48%	48%	48%	48%
15	Revilla Island/ Cleveland Peninsula	68,569	64%	55%	55%	55%	55%	55%
16	Southern Outer Islands	21,098	63%	9%	60%	60%	59%	59%
17	Dall Island and Vicinity	28,220	44%	36%	36%	36%	36%	36%
18	South Prince of Wales	50,376	83%	80%	80%	80%	80%	80%
19	North Misty Fiords	15,397	85%	84%	84%	84%	84%	84%
20	South Misty Fiords	14,861	95%	95%	95%	95%	95%	95%
21	Ice Fields	7,896	75%	75%	75%	75%	75%	75%
Total for Southeast Alaska		**886,260**	**68%**	**63%**	**63%**	**64%**	**63%**	**63%**

[1] The estimate assumes all scheduled suitable POG is harvested; does not account for Model Implementation Reduction Factor (MIRF).
[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest by major landowner category.
[3] Does not include land area in biogeographic provinces 22 and 23 which are almost exclusively non-NFS land.

Commented [U29]: How can the percentages stay the same as the acres change through out the alternatives?

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Wildlife Tables

Table 3.10-2
Existing Forest-wide Deer Habitat Capability Using the Interagency Deer Model (NFS Lands Only)

	Biological Province	Existing Habitat Capability 2015 (Deer per Square Mile)	Original (1954) Habitat Capability (Deer per Square Mile)	% Original Habitat Capability Remaining	No. WAAs with Modeled Deer Density of at least 18 Deer per Square Mile[1/]
1	Yakutat Forelands	13.3	13.7	97%	2
2	Yakutat Uplands	2.3	2.4	98%	0
3	East Chichagof Island	11.7	13.7	86%	1
4	West Chichagof Island	14.5	14.5	100%	1
5	East Baranof Island	7.0	8.5	82%	0
6	West Baranof Island	12.2	13.7	89%	4
7	Admiralty Island	17.6	17.9	98%	10
8	Lynn Canal	5.5	5.8	95%	1
9	North Coast Range	6.2	6.2	100%	0
10	Kupreanof/Mitkof Island	16.9	19.2	88%	7
11	Kuiu Island	25.5	28.1	91%	7
12	Central Coast Range	9.0	9.5	96%	1
13	Etolin Island	15.7	18.9	83%	3
14	North Central Prince of Wales	17.7	24.5	72%	11
15	Revilla Island/Cleveland Peninsula	13.5	15.0	90%	7
16	Southern Outer Islands	28.1	32.1	88%	9
17	Dall Island and Vicinity	30.4	30.6	99%	3
18	South Prince of Wales	21.8	22.2	98%	5
19	North Misty Fiords	3.7	3.8	99%	2
20	South Misty Fiords	8.4	8.4	100%	0
21	Ice Fields	0.7	0.8	94%	0
	Forest-wide	**10.1**	**11.3**	**89%**	**57**

[1] For WAAs that overlap a biological province boundary only the overlapping portion counted toward the total.
[2] Note that the model treats harvested stands in the stem exclusion stage (25 years old or older) the same value regardless of thinning treatments that are implemented.[3] Note that wolves very rarely occur on Admiralty, Baranof, and Chichagof Islands.

Table 3.10-6
Migratory and Resident Birds Identified as Species of Concern in Southeast Alaska[1]

Common Name	Scientific Name	General Habitat	Preferred Habitat[2]	Abundance and Occurrence
Sooty Grouse	*Dendragapus fuliginosus*	Habitat affinities vary by season and region. Coastal birds tend to remain in old-growth or recently logged forests all year. Inland birds prefer forest edges in summer, coniferous forests in winter (Kaufman 1996). Found in coniferous and mixed forests in Southeastern Alaska; also in dwarf conifer forests at treeline.	2, 3	Rare; breeding, winter
Western Screech-Owl	*Megascops kennicottii*	Open coniferous and deciduous forests and along rivers, creeks, ponds and bogs. Also forest edges and in suburban areas in parks, orchards and gardens. Often nest near water (Campbell et al. 1990). In southern part of range in mesquite groves and saguaros (Kaufman 1996). Probably non-migratory in Alaska due to sufficient habitat to meet year-round requirements (P. Schempf, pers. commun.). In Yakutat, appears to favor riparian spruce (B. Andres, pers. commun.).	2	Uncommon; breeding, winter
Black Swift	*Cypseloides niger (borealis)*	Appear to be restricted to river valleys with steep unvegetated cliffs. Although nesting has not been confirmed in Southeastern Alaska, summer sightings in adequate habitat suggest Black Swifts are a probable breeder.	5	Rare; breeding
Vaux's Swift	*Chaetura vauxi*	Nests in coniferous and mixed forests, especially old growth. Often observed foraging over lakes, rivers, open country and clearcuts. Many records from Southeastern Alaska are along rivers and estuaries.	2	Uncommon; migration, breeding
Rufous Hummingbird	*Selasphorus rufus*	Found in a variety of habitats throughout breeding range including old growth, young growth, thickets, and shrubby hillsides	2	Common; migration, breeding
Red-Breasted Sapsucker	*Sphyrapicus ruber*	Often associated with mature stands, especially hemlock and/or spruce in Pacific Northwest and Southeastern Alaska, but may not be an obligate old-growth species.	2	Abundant; breeding
Olive-sided Flycatcher	*Contopus cooperi*	In Central Alaska, most often found in open conifer forest. Usually associated with openings (muskegs, meadows, burns, and logged areas) and water (streams, beaver ponds, bogs, and lakes). Apparently requires an uneven canopy or openings for aerial hawking, and wet areas productive of insect prey.	3	Uncommon; breeding
Western Wood-Pewee	*Contopus sordidulus*	In Southeastern Alaska, occurs along large mainland rivers, much less common on islands.	3	Uncommon; breeding
Hammond's Flycatcher	*Empidonax hammondii*	In Southeastern Alaska, found in riparian deciduous forests.	2, 3	Uncommon; breeding
Pacific-slope Flycatcher	*Empidonax difficilis*	Prefers old-growth coniferous forests, especially near streams.	2, 3	Common; breeding
Steller's Jay	*Cyanocitta stelleri*	In Alaska, found predominately in coniferous forests	2	Abundant; breeding, winter

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Table 3.10-6 (continued)
Migratory and Resident Birds Identified as Species of Concern in Southeast Alaska[1]

Common Name	Scientific Name	General Habitat	Preferred Habitat[2]	Abundance and Occurrence
Northwestern Crow	*Corvus caurinus*	Coastal beaches, rocky shores, estuaries, coastal ponds and inshore islands.	2, 6, 7, 8	Abundant; breeding, winter
Chestnut-backed Chickadee	*Poecile rufescens*	In Southeastern Alaska, common in mature hemlock/spruce forests and also in pole and sawtimber stages of successional forests	2	Abundant; breeding, winter
American Dipper	*Cinclus mexicanus*	Dippers are a riparian-obligate species and are totally dependent on the productivity of streams and rivers.	4, 5	Fairly common; breeding
Varied Thrush	*Ixoreus naevius*	Found mostly in thick, wet, coniferous forests of the coast.	1, 2, 3	Abundant; migration, breeding, winter
Townsend's Warbler	*Dendroica townsendi*	Largely restricted to mature forests with tall coniferous trees throughout its breeding range. Most abundant in large undisturbed tracts of contiguous forest, but will also use forests in late successional stages.	2, 3	Common; breeding
Blackpoll Warbler	*Dendroica striata*	Habitat preference variable, but usually found in tall shrubs (riparian woodland) or in coniferous or deciduous forest or woodland	2	Rare; migration
MacGillivray's Warbler	*Oporornis tolmiei*	In southeastern Alaska, it is found in shrubs along hemlock/spruce edges, deciduous woodlands with shrubs, clearcuts, and riparian shrubs.	1	Uncommon; breeding
Golden-crowned Sparrow	*Regulus satrapa*	Prefers low to tall alder and willow scrub on hillsides and near tundra. Commonly found in proximity to lakes, streams, and bogs. In winter prefers uninterrupted brushland, streamside thickets, and chaparral.	1	Fairly common; breeding, winter
Golden-crowned kinglet	*Zonotrichia atricapilla*	Found in coniferous forests (spruce, fir, and hemlock) all times of year; also in mixed forests in south coastal and central Alaska. In winter and migration, can be found in other trees and shrubs.	1, 3	Common; breeding, winter

[1] Source: Boreal Partners in Flight Landbird Conservation Plan for Alaska Biogeographic Regions (1999)
[2] 1=shrub thicket; 2=hemlock/Sitka spruce/cedar forest; 3=mixed deciduous/spruce woodland; 4=fluvial waters; 5=cliffs, bluffs, and screes; 6=moraines, alluvia, and barrier islands; 7=beaches and tidal flats; 8=rocky shores and reefs.

Table 3.10-7
Endemic Wildlife Species Documented on the Tongass National Forest

Species	Known Distribution
Prince of Wales spruce grouse (*Falcipennis canadensis isleibi*)	Prince of Wales Island and nearby island including Heceta, Suemez, Warren, Kosciusko, Zarembo, and Mitkof
Admiralty Island beaver (*Castor canadensis phaeus*)	Admiralty Island
Prince of Wales flying squirrel (*Glaucomys sabrinus griseifrons*)	Prince of Wales Archipelago
Pacific marten (*Martes caurina*)	In Southeast Alaska, restricted to Admiralty and Kuiu islands
Coronation Island long-tailed vole (*Microtus longicaudus coronarius*)	Coronation, Warren, and Forrester islands
Sitka root vole (*Microtus oeconomus sitkensis*)	Baranof and Chichagof islands complex
Admiralty Island meadow vole (*Microtus pennsylvanicus admiraltiae*)	Admiralty Island
Baranof Island ermine (*Mustela ermine initis*)	Baranof and Chichagof islands
Admiralty Island ermine (*Mustela erminea salva*)	Admiralty Island
Revillagigedo Island red-backed vole (*Myodes gapperi solus*)	Revillagigedo Island
Warren Island red-backed vole (*Myodes gapperi wrangeli*)	Wrangell and Sergief islands
Keen's myotis (*Myotis keenii*)	Records from Juneau south
Alexander Archipelago mink (*Neovison vison nesolestes*)	Admiralty Island
Forrester Island deermouse (*Peromyscus keeni oceanicus*)	Forrester Island
Sitka deermouse (*Peromyscus keeni sitkensis*)	Baranof, Chichagof, Warren, Coronation, and Duke islands
Insular dusky shrew (*Sorex monticolus elassodon*)	Alexander Archipelago and Haida Gwaii
Warren Island dusky shrew (*Sorex monticolus malitiosus*)	Warren Island
Alexander Archipelago black bear (*Ursus americanus pugnax*)	Throughout Southeast Alaska, except Admiralty, Baranof, and Chichagoff islands
"Glacier bear" (*Ursus americanus emmonsii*)	Yakutat/Glacier Bay region
Yakutat brown bear (*Ursus arctos dallli*)	North mainland from Yakutat to Glacier Bay
Sitka brown bear (*Ursus arctos sitkensis*)	Alexander Archipelago and northern mainland

Source: ISLES 2013

Table 3.10-11
Habitat Conditions Resulting from Each Alternative Using the FRESH Deer Model in 25 years and 100 years (NFS Lands Only)

No.	Biogeographic Province	Existing Habitat Quality (Deer Days Per Hectare)	Percent of Existing Habitat Quality Remaining									
			Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
			25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs
1	Yakutat Forelands	0.0	--	--	--	--	--	--	--	--	--	--
2	Yakutat Uplands	0.0	--	--	--	--	--	--	--	--	--	--
3	East Chichagof Island	35.7	99	98	99	97	99	97	99	98	99	97
4	West Chichagof Island	89.1	100	100	100	100	100	100	100	100	100	100
5	East Baranof Island	30.6	99	99	100	100	100	99	100	99	100	99
6	West Baranof Island	56.9	100	100	101	100	101	100	100	100	100	100
7	Admiralty Island	50.6	100	100	100	100	100	100	100	100	100	100
8	Lynn Canal	24.4	100	100	102	100	100	100	100	100	100	100
9	North Coast Range	19.3	100	100	100	100	100	100	100	100	100	100
10	Kupreanof/Mitkof Island	96.8	99	99	100	99	100	99	99	99	99	99
11	Kuiu Island	64.8	99	99	99	98	99	98	99	98	99	98
12	Central Coast Range	31.8	101	100	102	100	102	100	101	100	101	100
13	Etolin Island	72.9	99	98	100	98	100	98	99	98	99	98
14	North Central Prince of Wales	79.1	99	98	101	98	101	98	100	98	100	97
15	Revilla Island/ Cleveland Peninsula	68.8	100	99	100	99	100	99	100	99	100	99
16	Southern Outer Islands	96.4	99	99	100	99	100	99	100	99	100	99
17	Dall Island and Vicinity	76.5	100	100	100	100	100	100	100	100	100	100
18	South Prince of Wales	95.1	100	100	100	100	100	100	100	100	100	100
19	North Misty Fiords	21.6	100	100	100	100	101	100	100	100	100	100
20	South Misty Fiords	56.3	100	100	100	100	100	100	100	100	100	100
21	Ice Fields	3.0	100	100	101	100	101	100	100	101	100	100
	Forest-wide	**40.9**	**100**	**99**	**100**	**99**	**100**	**99**	**100**	**99**	**100**	**99**

Note: No snow zone assigned to Biogeographic Province 1 and 2 due to very low use by deer; therefore, model not run.

Table 3.10-13
Estimated Harvest (acres) of High-Volume (SD5N, SD5S, and SD67) and Large-Tree (SD67) Productive Old-Growth by Elevation Category and Alternative after 100 years (NFS lands only)

Elevation Category	Alternative				
	1	2	3	4	5
High-Volume POG					
< 800 feet	16,116	8,120	6,297	9,921	9,844
> 800 feet	11,349	5,901	7,420	8,328	7,972
Total	**27,464**	**14,022**	**13,716**	**18,248**	**17,816**
Large-Tree POG					
< 800 feet	6,076	2,989	1,937	3,542	3,594
> 800 feet	3,227	1,640	1,748	2,478	2,211
Total	**9,303**	**4,629**	**3,685**	**6,021**	**5,805**

Appendix B

Table 3.10-14
Comparison of Alternatives in terms of their Long-term Ability to Meet the Wolf Guideline of Providing Sufficient Habitat to Support 18 Deer per Square Mile after 25 and 100+ Years of Forest Plan Implementation 1 (NFS Lands Only)

		Existing Habitat Capability	Existing No. WAAs with Modeled Deer Density of at least	Model-generated Habitat Capability by Alternative (Deer Per Square Mile and Number of WAAs with Modeled Deer Density of at least 18 Deer per Square Mile)[2]									
				Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
No.	Biogeographic Province	2015 (Deer per Square Mile)	18 Deer per Square Mile[1/]	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs
1	Yakutat Forelands	13.3	2	12.4(2)	11.9(2)	12.6(2)	11.9(2)	12.7(2)	12.7(2)	12.7(2)	12.7(2)	12.7(2)	12.7(2)
2	Yakutat Uplands	2.3	0	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)	2.3(0)
3	East Chichagof Island	11.7	1	11.4(1)	11.3(1)	11.6(1)	11.4(1)	11.5(1)	11.4(1)	11.5(1)	11.3(1)	11.5(1)	11.4(1)
4	West Chichagof Island	14.5	1	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)	14.0(0)
5	East Baranof Island	7.0	0	6.8(0)	6.8(0)	6.9(0)	6.8(0)	6.8(0)	6.8(0)	6.9(0)	6.8(0)	6.8(0)	6.8(0)
6	West Baranof Island	12.2	4	11.9(4)	11.9(4)	12.1(4)	12.0(4)	12.0(4)	11.9(4)	11.9(4)	11.9(4)	11.9(4)	11.9(4)
7	Admiralty Island	17.6	10	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)	17.3(10)
8	Lynn Canal	5.5	1	5.4(1)	5.4(1)	5.4(1)	5.4(1)	5.5(1)	5.4(1)	5.4(1)	5.4(1)	5.4(1)	5.4(1)
9	North Coast Range	6.2	0	6.1(0)	6.1(0)	6.1(0)	6.1(0)	6.1(0)	6.1(0)	6.1(0)	6.1(0)	6.1(10)	6.1(0)
10	Kupreanof/Mitkof Island	16.9	7	16.5(3)	16.4(3)	16.8(3)	16.6(3)	16.8(3)	16.6(3)	16.6(3)	16.5(3)	16.7(3)	16.4(3)
11	Kuiu Island	25.5	7	25.0(7)	25.1(7)	25.1(7)	25.1(7)	25.1(7)	25.1(7)	25.1(7)	25.1(7)	25.1(7)	25.0(7)
12	Central Coast Range	9.0	1	8.9(1)	8.8(1)	8.9(1)	8.8(1)	8.9(1)	8.8(1)	8.9(1)	8.8(1)	8.9(1)	8.8(1)
13	Etolin Island	15.7	3	15.2(2)	14.9(2)	15.5(1)	15.1(1)	15.5(1)	15.0(1)	15.4(2)	14.9(1)	15.3(2)	14.9(1)
14	North Central Prince of Wales	17.7	11	16.8(9)	16.5(9)	17.4(11)	16.7(10)	17.4(11)	16.7(10)	17.3(11)	16.6(10)	17.2(11)	16.6(10)
15	Revilla Island/ Cleveland Peninsula	13.5	7	12.9(6)	12.9(6)	13.1(6)	12.9(6)	13.1(6)	12.9(6)	13.0(6)	12.9(6)	13.0(6)	12.8(6)
16	Southern Outer Islands	28.1	9	27.4(9)	27.0(9)	27.8(9)	27.4(9)	27.8(9)	27.3(9)	27.9(9)	26.9(9)	27.9(9)	27.1(9)
17	Dall Island and Vicinity	30.4	3	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)	29.5(3)
18	South Prince of Wales	21.8	5	20.9(5)	20.8(5)	21.0(5)	20.9(5)	20.9(5)	20.9(5)	20.9(5)	20.8(5)	20.9(5)	20.8(5)
19	North Misty Fiords	3.7	2	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)	3.7(1)
20	South Misty Fiords	8.4	0	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)	8.2(0)
21	Ice Fields	0.7	0	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)	0.7(0)
	Forest-wide	**10.1**	**74**	**9.8(64)**	**9.7(64)**	**9.9(65)**	**9.8(64)**	**9.9(65)**	**9.8(64)**	**9.9(66)**	**9.8(64)**	**9.9(66)**	**9.8(64)**

1 For WAAs that overlap a biological province boundary only the overlapping portion counted toward the total.
2 Note that the model treats harvested stands in the stem exclusion stage (25 years old or older) the same value regardless of thinning treatments that are implemented.3 Note that wolves very rarely occur on Admiralty, Baranof, and Chichagof Islands.

Table 3.10-15
Estimated Road Miles and Average Road Density below 1,200 ft. in Elevation on NFS Lands and All Lands Combined for All Roads and for Open Roads by Alternative after 100 Years

	Existing		Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
Category	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands
Road Miles												
All Roads	4,858	8,900	5,726	11,917	5,830	12,020	5,796	11,987	5,659	11,850	5,772	11,963
Open Roads	2,201	5,777	2,327	6,264	2,353	6,290	2,347	6,283	2,322	6,259	2,341	6,277
Road Density (mi/mi^2)												
All Roads	0.39	0.63	0.46	0.85	0.47	0.86	0.47	0.85	0.46	0.84	0.46	0.85
Open Roads	0.18	0.41	0.19	0.45	0.19	0.45	0.19	0.45	0.19	0.45	0.19	0.45

Appendix B

Table 3.10-16
Relative Changes in Deer Habitat Capability (DHC) by Biogeographic Province by Alternative in 25 years and 100 years based on the Interagency Deer Habitat Capability Model (All Lands)

				Deer Habitat Capability By Alternative (% Original Habitat Quality Remaining)									
				Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
	Biogeographic Province	Original Deer Habitat Capability (Deer/mi^2)	Existing Deer Habitat Capability as % Original	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs
1	Yakutat Forelands	13.6	84%	82%	79%	84%	79%	84%	84%	84%	84%	84%	84%
2	Yakutat Uplands	2.3	98%	97%	97%	98%	97%	98%	98%	98%	98%	98%	98%
3	East Chichagof Island	14.4	74%	73%	72%	74%	73%	74%	73%	74%	73%	73%	73%
4	West Chichagof Island	14.0	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
5	East Baranof Island	8.3	81%	81%	81%	82%	81%	81%	81%	82%	81%	81%	81%
6	West Baranof Island	13.7	83%	83%	84%	84%	84%	84%	84%	83%	83%	84%	83%
7	Admiralty Island	18.3	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%
8	Lynn Canal	6.2	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%	83%
9	North Coast Range	7.2	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%	76%
10	Kupreanof/Mitkof Island	19.6	76%	76%	75%	77%	76%	77%	76%	76%	76%	76%	75%
11	Kuiu Island	27.7	88%	88%	89%	88%	88%	88%	88%	88%	88%	88%	88%
12	Central Coast Range	9.5	92%	92%	92%	93%	92%	93%	92%	92%	92%	92%	92%
13	Etolin Island	18.7	79%	77%	76%	79%	78%	79%	77%	78%	76%	78%	76%
14	North Central Prince of Wales	24.7	54%	53%	52%	55%	53%	55%	53%	54%	52%	54%	52%
15	Revilla Island/ Cleveland Peninsula	13.6	79%	79%	78%	79%	79%	79%	78%	79%	78%	79%	78%
16	Southern Outer Islands	31.8	81%	81%	80%	82%	81%	82%	81%	82%	80%	82%	80%

Appendix B

Table 3.10-16
Relative Changes in Deer Habitat Capability (DHC) by Biogeographic Province by Alternative in 25 years and 100 years based on the Interagency Deer Habitat Capability Model (All Lands)

				Deer Habitat Capability By Alternative (% Original Habitat Quality Remaining)									
				Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
	Biogeographic Province	Original Deer Habitat Capability (Deer/mi^2)	Existing Deer Habitat Capability as % Original	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs	25 yrs	100 yrs
17	Dall Island and Vicinity	25.4	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%
18	South Prince of Wales	22.6	82%	82%	81%	82%	82%	82%	82%	82%	81%	82%	81%
19	North Misty Fiords	3.8	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%
20	South Misty Fiords	8.2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
21	Ice Fields	0.8	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%
	Forest-wide	**11.8**	**78%**	**78%**	**77%**	**79%**	**78%**	**79%**	**78%**	**78%**	**78%**	**78%**	**78%**

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Water Tables

Table 3.4-6
Estimated Road Miles and Percent of 6th Field Subwatersheds in Road Density Categories on NFS Lands under Existing Conditions and after 100 Years of Full Implementation[1]

		Alternative				
Road Type	**Existing**	**1**	**2**	**3**	**4**	**5**
Existing Roads [2] (miles)	5,093	5,093	5,093	5,093	5,093	5,093
New Road Construction (miles)	–	944	1,056	1,020	871	994
Road Construction over Decommissioned Roadbeds (miles)	–	428	600	566	445	527
Road Reconstruction[3] (miles)	–	887	1,191	1,129	900	1,058
Total Roads (miles)	5,093	6,036	6,148	6,113	5,964	6,086
Percent New Road Increase	-	19%	21%	20%	17%	19%
Road Density Categories (Mi/Sq. Mi.)[4]						
0	66.6%	57.1%	54.6%	56.4%	62.4%	60.8%
>0 - 1.0	23.9%	32.4%	34.5%	32.5%	27.0%	27.9%
>1.0 - 2.4	8.4%	8.2%	8.4%	8.6%	8.2%	8.6%
>2.4 - 3.0	0.8%	1.3%	1.4%	1.5%	1.5%	1.5%
>3.0	0.3%	1.1%	1.1%	1.0%	1.0%	1.1%
Percent of watersheds with Average Road Density less than 1.0 mile/sq. mi.	90.5%	89.4%	89.1%	88.9%	89.3%	88.8%
Average Road Density (miles/sq. mi.) for all NFS Lands	0.20	0.23	0.24	0.23	0.23	0.23

[1] Assumes full implementation of Forest Plan at PTSQ levels. Includes adjusted road miles estimated to be needed to harvest all scheduled timber in the alternative.
[2] Note that the 5,093 miles of existing roads consists of 46% open roads, 27% closed roads (i.e., in storage), and 27% decommissioned roads.
[3] Estimated existing road miles that would need to be reconstructed.
[4] Percentages are based on 927 6th field subwatersheds that contain at least 100 acres of NFS lands.

Appendix C

Recreation Data Tables

Table C-1 Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative..... C-1
Table C-2 Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative..... C-6
Table C-3 Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative C-11
Table C-4 Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative.... C-16

Appendix C

Table C-1
Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Roadless Acres	Change in Roadless Acres from Alt 1					
		Alt 1	Alt 2	Alt 3	Alt 4a	Alt 4b	Alt 5	Alt 6
01-01 SKAGWAY AREA	255,036	246,399	0	0	0	-2,168	-246,399	-2,168
01-02 HAINES AREA	19,514	18,345	48	48	0	-2,666	-18,345	-7,728
01-03 EAST CHILKATS	361,545	242,377	-1,975	-1,975	-1,975	-18,405	-242,377	-49,984
01-04A BERNERS BAY	239,889	230,291	325	-41,197	324	-17,454	-230,291	-19,951
01-04B N. JUNEAU COAST	49,659	44,382	0	0	0	0	-44,382	-15,567
01-04C TAKU INLET	259,153	241,670	-37	-37	-37	-37	-241,670	-31,760
01-04D SLOCUM INLET	17,214	16,113	0	0	0	0	-16,113	-13,653
01-04E JUNEAU ICEFIELD	230,787	230,065	0	-2	0	0	-230,065	-25,693
01-05A TAKU HARBOR	19,639	13,992	0	0	0	0	-13,992	-3,085
01-05B PORT SNETTISHAM	370,367	351,849	32	32	0	0	-351,849	-32,546
01-05C WINDHAM BAY	161,216	158,831	380	380	0	-43,769	-158,831	-117,288
01-05D TRACY ARM	330,739	3	0	0	0	0	-3	0
01-05E FORDS TERROR	24,386	0	0	0	0	0	0	0
01-05F ENDICOTT ARM	368,545	1,135	0	0	0	-6	-1,135	-6
04-01A GUT BAY, BARANOF	93,986	5	0	0	0	0	-5	0
04-01B PORT ARMSTRONG	70,962	66,670	14	14	0	0	-66,670	0
04-01C NELSON BAY	44,166	42,659	0	0	0	0	-42,659	0
04-02A REDOUBT LAKE	45,074	40,552	542	542	-26	-5,416	-40,552	-5,849
04-02B WHALE BAY	221,835	9	5	5	0	0	-9	0
04-02C NECKER ISLANDS	6,197	3,133	2,862	2,862	0	-20	-3,133	-20
04-02D SW BARANOF	54,366	52,229	276	276	0	0	-52,229	0
04-03 SITKA AREA	345,862	293,354	1,004	1,004	-617	-25,894	-293,354	-59,090
04-04A RODMAN BAY	75,427	45,273	7,777	7,777	-159	-5,197	-45,273	-34,269
04-04B KELP BAY	144,680	129,335	92	92	-83	-11,369	-129,335	-22,229
04-04C BARANOF WARM SPRINGS	28,929	28,690	0	0	0	0	-28,690	0
04-05 SW ADMIRALTY	114,955	0	0	0	0	0	0	0
04-05B MITCHELL BAY	61,008	0	0	0	0	0	0	0
04-06A PYBUS BAY	55,674	0	0	0	0	0	0	0
04-06B ELIZA HARBOR	85,206	0	0	0	0	0	0	0
04-07A GAMBIER BAY	119,252	0	0	0	0	0	0	0
04-07B CANOE ROUTE	86,687	0	0	0	0	0	0	0
04-08 NE ADMIRALTY	128,063	39,831	-192	-192	-192	-192	-39,831	-2,351
04-09A SEYMOUR CANAL	88,164	58	0	0	0	0	-58	0
04-09B PACK CREEK	65,426	0	0	0	0	0	0	0
04-10A GREENS CREEK	2,575	350	0	0	0	0	-350	0
04-10B NW ADMIRALTY	256,234	39,172	1	1	0	0	-39,172	-10,674

Commented [U30]: Please explain. This is the first time we've seen any reference to Alternative 4a or 4b.

Table C-1
Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Roadless Acres	Change in Roadless Acres from Alt 1					
		Alt 1	Alt 2	Alt 3	Alt 4a	Alt 4b	Alt 5	Alt 6
04-11A PORT FREDERICK	112,512	86,804	2,491	2,333	-46	-24,019	-86,804	-47,650
04-11B FRESHWATER BAY	160,078	97,253	-1,170	-10,968	-1,331	-48,396	-97,253	-49,151
04-12 TENAKEE INLET	312,370	246,547	7,224	-50,608	-10,478	-43,634	-246,547	-103,908
04-13 PERIL STRAIT	232,130	167,544	25,959	-63,632	5,119	-1,164	-167,544	-52,108
04-14 SLOCUM ARM	97,008	115	2	1	0	0	-115	-61
04-15A LISIANSKI	90,638	87,687	85	-53,515	75	75	-87,687	-4,560
04-15B WEST YAKOBI ISLAND	39,706	16	0	-1	0	0	-16	-1
04-15C STAG BAY	26,663	2	0	-1	0	0	-2	0
04-15D PORTLOCK HARBOR	107,904	3	0	-3	0	0	-3	0
04-16A POINT ADOLPHUS	8,888	8,864	0	-6,788	-2	-2	-8,864	0
04-16B NORTH CHICHAGOF	64,726	59,180	164	-40,495	-465	-15,500	-59,180	-15,129
04-16C IDAHO INLET	53,504	52,050	61	-51,951	37	36	-52,050	-94
04-16D PLI WILDERNESS	23,079	0	0	0	0	0	0	0
04-16E PORT ALTHORP	19,475	18,531	115	-13,966	-2	-2	-18,531	0
CRD 00-00NO AREA DESIGNATED	925,876	715,371	-1,872	-153,736	-28,584	-117,634	-715,371	-269,571
J09 JUNEAU ICEFIELD 9 - TWIN	61,660	58,247	0	0	0	0	-58,247	0
JUNEAU ICEFIELD 1 - GILKEY BACKCOUNTRY	315,751	312,611	0	-150	0	0	-312,611	0
JUNEAU ICEFIELD 2 - EAGLE	10,300	10,299	0	0	0	0	-10,299	0
JUNEAU ICEFIELD 3 - HERBERT	12,636	12,636	0	0	0	0	-12,636	-226
JUNEAU ICEFIELD 4 - MENDENHALL	38,095	36,240	0	0	0	0	-36,240	-8,958
JUNEAU ICEFIELD 5 - LEMON	12,427	12,399	0	0	0	0	-12,399	-1,539
JUNEAU ICEFIELD 6 - DEATH VALLEY	54,498	54,498	0	0	0	0	-54,498	0
JUNEAU ICEFIELD 7 - NORRIS	37,781	37,558	0	0	0	0	-37,558	0
JUNEAU ICEFIELD 8 - TAKU	35,343	35,343	0	0	0	0	-35,343	0
K01 WEST MISTY	192,830	38	0	-7	-3	-15	-38	-16
K02 NORTHEAST MISTY	1,300,687	128,050	0	0	0	-9	-128,050	-11
K03 SOUTH MISTY	628,890	2,396	0	0	0	0	-2,396	0
K04 DUKE ISLAND	40,202	39,104	314	314	0	0	-39,104	0
K05 SOUTH MISTY LAKES	14,878	920	0	0	0	0	-920	0
K06 MISTY CORE LAKES	57,861	6	0	0	0	0	-6	0
K07 WALKER CHICKAMIN	14,320	0	0	0	0	0	0	0
K08 BURROUGHS UNUK	29,455	0	0	0	0	0	0	0
K09 ALAVA PRINCESS MANZANITA	20,568	0	0	0	0	0	0	0
K10 RUDYERD WINSTANLEY	20,285	0	0	0	0	0	0	0
K11 GRAVINA ISLAND	39,700	37,104	257	257	0	-3,222	-37,104	-16,621
K12 BELL ISLAND	137,694	132,575	-107	-112	-148	-148	-132,575	-21,582

Appendix C

Table C-1
Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Roadless Acres	Change in Roadless Acres from Alt 1					
		Alt 1	Alt 2	Alt 3	Alt 4a	Alt 4b	Alt 5	Alt 6
K13 EAST CLEVELAND	87,531	84,111	-71	-71	-175	-175	-84,111	-33,996
K14 WEST CLEVELAND	73,232	71,967	-959	-959	-1,041	-1,041	-71,967	-28,208
K15 WILSON BAKEWELL	13,440	10,921	0	0	0	0	-10,921	0
K16 KETCHIKAN CORE SPNW	46,341	42,995	17	-8,705	-872	-7,953	-42,995	-17,407
K17 GEORGE CARROLL THORNE	137,434	115,968	-3,545	-23,516	-7,143	-46,479	-115,968	-55,230
K18 CENTRAL REVILLA SPNW	92,792	60,796	-211	-29,577	-3,601	-29,942	-60,796	-27,940
K19 NORTH REVILLA	70,401	58,474	-275	-275	-277	-9,496	-58,474	-13,234
K20 HYDER SPNW	121,348	117,154	0	0	0	0	-117,154	-35,150
K21 PERCY HOTSPUR MARY	6,924	5,278	601	601	0	0	-5,278	0
K22 HYDER NA	7,261	4,126	0	0	0	0	-4,126	-4,003
K23 BETTON ISLAND	5,028	4,327	636	636	-1	-1	-4,327	-1
K24 KETCHIKAN CORE NA	19,239	13,970	-295	-905	-295	-957	-13,970	-957
K25 SOUTH REVILLA	40,219	8,319	-4,104	-5,518	-4,735	-7,001	-8,319	-6,696
K26 CENTRAL REVILLA NA	15,451	405	1	-374	-9	-405	-405	-405
K27 MARGARET BAY	9,707	627	4	-238	4	-434	-627	-505
K28 NAHA BAY	5,273	4,475	97	-4,257	73	71	-4,475	-112
P01 MITKOF ISLAND	109,302	34,625	-28	-3,994	-125	-17,855	-34,625	-22,154
P02 DUNCAN CANAL - WEST SIDE	73,636	66,507	1,445	1,445	-3	-9,652	-66,507	-29,547
P04 DUNCAN CANAL - EAST SIDE	53,325	31,394	-5,803	-17,584	-17,584	-24,484	-31,394	-22,889
P05 WRANGELL NARROWS/WOEWODSKI IS.	17,033	14,843	171	-11	-296	-1,554	-14,843	-11,864
P06 KUPREANOF ISLAND - NORTH SHORE	11,303	11,203	3	-130	-133	-1,562	-11,203	-1,431
P07 PETERSBURG CREEK/DUNCAN SALT CHUCK	49,950	1,235	-2	-86	-67	-87	-1,235	-51
P08 NORTH LINDENBERG PENINSULA	75,605	58,697	-10,504	-27,975	-20,635	-38,860	-58,697	-48,631
P09 CENTRAL KUPREANOF ISLAND/ROAD SYSTEM	223,302	189,522	-13,136	-16,403	-16,409	-51,685	-189,522	-131,908
P10 SOUTHWEST KUPREANOF ISLAND	93,507	86,894	188	-33,391	-249	-10,288	-86,894	-42,816
P11 ROWAN BAY/BAY OF PILLARS	28,721	24,586	1,203	-19,404	663	663	-24,586	0
P12A SAGINAW/SECURITY/WASHINGTON BAYS	32,450	25,213	71	-69	-141	-511	-25,213	-1,061
P12B KUIU ISLAND ROAD SYSTEM	134,852	41,215	3,380	-3,632	-107	-18,005	-41,215	-30,442
P13 TEBENKOF BAY/KUIU WILDERNESS	127,218	42	27	3	-1	-3	-42	-3
P14 KEKU STRAIT/PORT CAMDEN	102,299	96,505	1,875	1,837	0	-2,604	-96,505	-21,871
P15 SOUTH KUIU ISLAND	62,824	61,572	266	266	0	0	-61,572	0
P16 REID/NO NAME BAYS	43,191	26,964	14,010	10,785	166	-607	-26,964	-11,873

Table C-1
Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Roadless Acres	Change in Roadless Acres from Alt 1					
		Alt 1	Alt 2	Alt 3	Alt 4a	Alt 4b	Alt 5	Alt 6
P21 MUDDY RIVER AREA	63,357	42,959	4,591	-3,103	-5	-24,568	-42,959	-28,700
P22 THOMAS BAY/POINT VANDEPUT	76,810	73,211	29	29	0	-4,006	-73,211	-12,087
P23 FARRAGUT BAY/CAPE FANSHAW	66,716	65,709	61	61	0	-2,795	-65,709	-33,449
P24 BAIRD/PATTERSON GLACIERS	402,216	399,160	0	0	0	-9	-399,160	-1,651
SI-EF SKAGWAY ICEFIELD - EAST FORK	499	499	0	0	0	0	-499	0
SI-LG SKAGWAY ICEFIELD - LE GRANDE	640	640	0	0	0	0	-640	0
SKAGWAY ICEFIELD - DENVER	19,600	19,542	0	0	0	0	-19,542	0
SKAGWAY ICEFIELD - MEADE	25,730	25,710	0	0	0	0	-25,710	0
SKAGWAY ICEFIELD - SCHUBEE	2,934	2,846	0	0	0	0	-2,846	0
TBRD 00-00NO AREA DESIGNATED	901,507	356,596	10,601	-177,576	-31,434	-92,680	-356,596	-130,321
W10 STIKINE - LECONTE WILDERNESS	263,581	34	0	0	0	-14	-34	-18
W100 NORTH ETOLIN ISLAND	151,750	119,827	-4,465	-19,111	-13,209	-34,680	-119,827	-73,665
W120 SOUTH ETOLIN ISLAND WILDERNESS	82,517	146	-10	-10	-10	-73	-146	-142
W130 VANK ISLAND GROUP	22,927	13,047	161	161	0	0	-13,047	-8,802
W140 KASHEVAROF GROUP	11,470	4,564	1,014	1,014	0	0	-4,564	0
W150 LECONTE BAY (S-LC WILDERNESS)	175,361	234	14	14	0	-5	-234	-5
W30 GARNET/MILL CREEK	56,850	54,974	0	0	0	-33	-54,974	-45,028
W40 MADAN/BOULDER	105,035	103,718	27	27	0	0	-103,718	-21,855
W50 BRADFIELD CANAL AND RIVER	516,308	486,087	258	-4,413	-4,639	-127,006	-486,087	-147,458
W60 ANAN CREEK	38,615	36,832	298	-36,539	176	14	-36,832	-247
W70 CLEVELAND PEN./DEER ISLAND	48,383	37,356	-3,749	-7,430	-8,392	-15,452	-37,356	-28,345
W80 WRANGELL ISLAND	113,539	69,420	-4,658	-20,383	-16,082	-36,397	-69,420	-51,148
W90 ZAREMBO	116,402	53,861	-8,205	-11,881	-11,891	-31,987	-53,861	-31,979
Y01 YAKUTAT BAY	69,745	8,299	300	-7,358	-7,754	-7,754	-8,299	-96
Y02 LOST TAWAH	9,112	3,275	0	0	0	-3,165	-3,275	-3,275
Y03 KUNYOSH SEAL CREEKS	49,765	46,882	-496	-496	-496	-5,260	-46,882	-5,307
Y04 AHRNKLIN ANTLEN	30,315	28,212	0	0	0	-2,059	-28,212	-2,126
Y05 PIKE LAKES MOSER CREEK	43,577	10,658	0	0	0	-5,401	-10,658	-5,476
Y06 DANGEROUS RIVER	27,110	24,483	0	-18,285	-4,044	-4,418	-24,483	-4,475
Y07 OLD MIDDLE ITALIO	20,869	19,689	0	-19,689	-1,723	-1,723	-19,689	-1,723
Y08 ITALIO	23,500	23,293	0	-23,028	-48	-48	-23,293	-48
Y09 LOWER AKWE	3,234	1,638	0	-1,638	-1,422	-1,422	-1,638	-1,422
Y10 UPPER AKWE	43,230	41,747	0	-32,614	-183	-183	-41,747	-183
Y11 USTAY TANIS	53,356	49,773	0	-24,034	-497	-497	-49,773	0
Y12 DRY BAY ALSEK	53,339	51,215	0	-28,803	-3,571	-3,571	-51,215	0
Y13 BRABAZONS	436,629	425,585	0	0	0	0	-425,585	0

Table C-1
Change in Roadless Area Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Roadless Acres	Change in Roadless Acres from Alt 1					
		Alt 1	Alt 2	Alt 3	Alt 4a	Alt 4b	Alt 5	Alt 6
Y14 HARLEQUIN LAKE	103,270	75,232	0	-290	0	-1,066	-75,232	-1,074
Y15 RUSSELL NUNATAK FJORDS	214,066	1,826	-64	-64	-64	-64	-1,826	-64
Y16 SITUK RIVER	38,676	19,634	-5,665	-7,458	-7,513	-11,012	-19,634	-9,243
Total	**16,725,517**	**9,200,105**	**19,783**	**-1,097,795**	**-224,391**	**-1,084,471**	**-9,200,105**	**-2,294,889**

Table C-2
Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Development LUD Acres	Change in Development LUD Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
01-01 SKAGWAY AREA	255,036	0	0	0	0	2,168	2,168
01-02 HAINES AREA	19,514	482	0	0	0	5,261	5,261
01-03 EAST CHILKATS	361,545	16,662	1,880	1,880	1,880	49,885	49,885
01-04A BERNERS BAY	239,889	1,554	0	0	0	18,903	18,903
01-04B N. JUNEAU COAST	49,659	631	0	0	0	3,044	3,044
01-04C TAKU INLET	259,153	2,914	37	37	37	28,885	28,885
01-04D SLOCUM INLET	17,214	297	0	0	0	13,653	13,653
01-04E JUNEAU ICEFIELD	230,787	12	0	0	0	14	14
01-05A TAKU HARBOR	19,639	2,462	0	0	0	3,085	3,085
01-05B PORT SNETTISHAM	370,367	831	0	0	0	32,546	32,546
01-05C WINDHAM BAY	161,216	1,148	0	0	0	117,288	117,288
01-05D TRACY ARM	330,739	0	0	0	0	0	0
01-05E FORDS TERROR	24,386	0	0	0	0	0	0
01-05F ENDICOTT ARM	368,545	36	0	0	0	6	6
04-01A GUT BAY, BARANOF	93,986	0	0	0	0	0	0
04-01B PORT ARMSTRONG	70,962	0	0	0	0	0	0
04-01C NELSON BAY	44,166	0	0	0	0	0	0
04-02A REDOUBT LAKE	45,074	1,686	26	26	26	5,849	5,849
04-02B WHALE BAY	221,835	0	0	0	0	0	0
04-02C NECKER ISLANDS	6,197	0	0	0	0	20	20
04-02D SW BARANOF	54,366	0	0	0	0	0	0
04-03 SITKA AREA	345,862	24,617	204	204	247	58,721	58,721
04-04A RODMAN BAY	75,427	24,411	-6,317	-6,317	153	34,263	34,263
04-04B KELP BAY	144,680	10,500	129	129	142	22,288	22,288
04-04C BARANOF WARM SPRINGS	28,929	0	0	0	0	0	0
04-05A SW ADMIRALTY	114,955	0	0	0	0	0	0
04-05B MITCHELL BAY	61,008	0	0	0	0	0	0
04-06A PYBUS BAY	55,674	0	0	0	0	0	0
04-06B ELIZA HARBOR	85,206	0	0	0	0	0	0
04-07A GAMBIER BAY	119,252	0	0	0	0	0	0
04-07B CANOE ROUTE	86,687	0	0	0	0	0	0
04-08 NE ADMIRALTY	128,063	0	0	0	0	0	0
04-09A SEYMOUR CANAL	88,164	0	0	0	0	0	0
04-09B PACK CREEK	65,426	0	0	0	0	0	0
04-10A GREENS CREEK	2,575	0	0	0	0	0	0
04-10B NW ADMIRALTY	256,234	0	0	0	0	0	0
04-11A PORT FREDERICK	112,512	15,851	-2,171	-2,076	37	47,641	47,641

Table C-2
Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Development LUD Acres	Change in Development LUD Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
04-11B FRESHWATER BAY	160,078	47,178	1,298	10,401	1,298	49,118	49,118
04-12 TENAKEE INLET	312,370	47,757	-4,632	6,274	8,191	103,837	103,837
04-13 PERIL STRAIT	232,130	49,702	-17,629	-17,616	465	52,108	52,108
04-14 SLOCUM ARM	97,008	34	0	0	0	61	61
04-15A LISIANSKI	90,638	0	0	0	0	0	0
04-15B WEST YAKOBI ISLAND	39,706	0	0	0	0	0	0
04-15C STAG BAY	26,663	0	0	0	0	0	0
04-15D PORTLOCK HARBOR	107,904	0	0	0	0	0	0
04-16A POINT ADOLPHUS	8,888	0	0	0	0	0	0
04-16B NORTH CHICHAGOF	64,726	4,864	1	1	1	15,129	15,129
04-16C IDAHO INLET	53,504	0	0	0	0	94	94
04-16D PLI WILDERNESS	23,079	0	0	0	0	0	0
04-16D PORT ALTHORP	19,475	0	0	0	0	0	0
CRD 00-00NO AREA DESIGNATED	925,876	72,885	15,026	35,795	32,873	249,980	249,980
J01 JUNEAU ICEFIELD 1 - GILKEY BACKCOUNTRY	315,751	0	0	0	0	0	0
J02 JUNEAU ICEFIELD 2 - EAGLE	10,300	0	0	0	0	0	0
J03 JUNEAU ICEFIELD 3 - HERBERT	12,636	0	0	0	0	0	0
J04 JUNEAU ICEFIELD 4 - MENDENHALL	38,095	0	0	0	0	0	0
J05 JUNEAU ICEFIELD 5 - LEMON	12,427	0	0	0	0	0	0
J06 JUNEAU ICEFIELD 6 - DEATH VALLEY	54,498	0	0	0	0	0	0
J07 JUNEAU ICEFIELD 7 - NORRIS	37,781	0	0	0	0	0	0
J08 JUNEAU ICEFIELD 8 - TAKU	35,343	0	0	0	0	0	0
J09 JUNEAU ICEFIELD 9 - TWIN	61,660	0	0	0	0	0	0
K01 WEST MISTY	192,830	244	0	7	3	16	16
K02 NORTHEAST MISTY	1,300,687	32	0	0	0	9	9
K03 SOUTH MISTY	628,890	0	0	0	0	0	0
K04 DUKE ISLAND	40,202	0	0	0	0	0	0
K05 SOUTH MISTY LAKES	14,878	0	0	0	0	0	0
K06 MISTY CORE LAKES	57,861	0	0	0	0	0	0
K07 WALKER CHICKAMIN	14,320	0	0	0	0	0	0
K08 BURROUGHS UNUK	29,455	0	0	0	0	0	0
K09 ALAVA PRINCESS MANZANITA	20,568	0	0	0	0	0	0
K10 RUDYERD WINSTANLEY	20,285	0	0	0	0	0	0
K11 GRAVINA ISLAND	39,700	1,229	-29	-29	0	16,033	16,033
K12 BELL ISLAND	137,694	412	0	0	0	21,435	21,435
K13 EAST CLEVELAND	87,531	425	0	0	0	33,235	33,235

Table C-2
Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Development LUD Acres	Change in Development LUD Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
K14 WEST CLEVELAND	73,232	23	-17	-17	0	24,193	24,193
K15 WILSON BAKEWELL	13,440	0	0	0	0	0	0
K16 KETCHIKAN CORE SPNW	46,341	2,251	16	4,984	802	17,353	17,353
K17 GEORGE CARROLL THORNE	137,434	17,604	3,871	23,417	7,091	55,182	55,182
K18 CENTRAL REVILLA SPNW	92,792	24,930	268	6,313	1,528	27,903	27,903
K19 NORTH REVILLA	70,401	9,384	245	245	245	13,203	13,203
K20 HYDER SPNW	121,348	267	0	0	0	3,932	3,932
K21 PERCY HOTSPUR MARY	6,924	0	0	0	0	0	0
K22 HYDER NA	7,261	2,875	0	0	0	3,411	3,411
K23 BETTON ISLAND	5,028	0	0	0	0	0	0
K24 KETCHIKAN CORE NA	19,239	1,707	0	611	0	662	662
K25 SOUTH REVILLA	40,219	29,442	3,981	4,856	4,257	6,523	6,523
K26 CENTRAL REVILLA NA	15,451	12,318	9	385	9	405	405
K27 MARGARET BAY	9,707	7,090	58	206	58	497	497
K28 NAHA BAY	5,273	54	0	24	24	112	112
P01 MITKOF ISLAND	109,302	56,934	96	4,061	96	22,124	22,124
P02 DUNCAN CANAL - WEST SIDE	73,636	2,071	3	3	3	29,547	29,547
P04 DUNCAN CANAL - EAST SIDE	53,325	19,031	5,258	14,549	14,549	22,344	22,344
P05 WRANGELL NARROWS/WOEWODSKI IS.	17,033	756	113	295	295	11,863	11,863
P06 KUPREANOF ISLAND - NORTH SHORE	11,303	15	0	1	1	1,431	1,431
P07 PETERSBURG CREEK/DUNCAN SALT CHUCK	49,950	156	2	27	8	51	51
P08 NORTH LINDENBERG PENINSULA	75,605	13,772	10,080	24,215	16,867	48,200	48,200
P09 CENTRAL KUPREANOF ISLAND/ROAD SYSTEM	223,302	29,374	12,691	14,294	14,294	131,457	131,457
P10 SOUTHWEST KUPREANOF ISLAND	93,507	3,303	0	0	0	42,816	42,816
P11 ROWAN BAY/BAY OF PILLARS	28,721	46	0	0	0	0	0
P12A SAGINAW/SECURITY/WASHINGTON BAYS	32,450	4,044	1	139	139	1,061	1,061
P12B KUIU ISLAND ROAD SYSTEM	134,852	77,174	-3,159	3,849	107	30,442	30,442
P13 TEBENKOF BAY/KUIU WILDERNESS	127,218	46	-12	-12	0	3	3
P14 KEKU STRAIT/PORT CAMDEN	102,299	1,548	0	38	0	21,870	21,870
P15 SOUTH KUIU ISLAND	62,824	0	0	0	0	0	0
P16 REID/NO NAME BAYS	43,191	13,399	-11,948	-11,948	0	11,873	11,873
P21 MUDDY RIVER AREA	63,357	16,664	-3,343	4,333	5	28,700	28,700

Table C-2
Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Development LUD Acres	Change in Development LUD Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
P22 THOMAS BAY/POINT VANDEPUT	76,810	1,183	0	0	0	12,087	12,087
P23 FARRAGUT BAY/CAPE FANSHAW	66,716	264	0	0	0	33,449	33,449
P24 BAIRD/PATTERSON GLACIERS	402,216	0	0	0	0	1,651	1,651
SI-D SKAGWAY ICEFIELD - DENVER	19,600	0	0	0	0	0	0
SI-EF SKAGWAY ICEFIELD - EAST FORK	499	0	0	0	0	0	0
SI-LG SKAGWAY ICEFIELD - LE GRANDE	640	0	0	0	0	0	0
SI-M SKAGWAY ICEFIELD - MEADE	25,730	0	0	0	0	0	0
SI-S SKAGWAY ICEFIELD - SCHUBEE	2,934	0	0	0	0	0	0
TBRD 00-00NO AREA DESIGNATED	901,507	327,916	4,355	54,025	30,566	125,863	125,863
W10 STIKINE - LECONTE WILDERNESS	263,581	29	0	0	0	18	18
W100 NORTH ETOLIN ISLAND	151,750	26,582	5,692	17,851	10,518	73,460	73,460
W120 SOUTH ETOLIN ISLAND WILDERNESS	82,517	34	10	10	10	142	142
W130 VANK ISLAND GROUP	22,927	9,469	0	0	0	8,802	8,802
W140 KASHEVAROF GROUP	11,470	5,507	-4	-4	0	0	0
W150 LECONTE BAY (S-LC WILDERNESS)	175,361	46	0	0	0	5	5
W30 GARNET/MILL CREEK	56,850	996	0	0	0	44,825	44,825
W40 MADAN/BOULDER	105,035	88	0	0	0	14,632	14,632
W50 BRADFIELD CANAL AND RIVER	516,308	17,987	0	3,156	3,156	147,457	147,457
W60 ANAN CREEK	38,615	0	0	63	63	247	247
W70 CLEVELAND PEN./DEER ISLAND	48,383	9,235	4,812	6,237	6,237	28,280	28,280
W80 WRANGELL ISLAND	113,539	30,677	4,759	16,383	12,870	50,941	50,941
W90 ZAREMBO	116,402	49,974	6,162	9,716	9,717	29,928	29,928
Y01 YAKUTAT BAY	69,745	57	0	0	0	0	0
Y02 LOST TAWAH	9,112	4,489	0	0	0	3,275	3,275
Y03 KUNYOSH SEAL CREEKS	49,765	2,563	496	496	496	5,307	5,307
Y04 AHRNKLIN ANTLEN	30,315	1,608	0	0	0	2,126	2,126
Y05 PIKE LAKES MOSER CREEK	43,577	2,617	0	0	0	5,476	5,476
Y06 DANGEROUS RIVER	27,110	426	0	0	0	431	431
Y07 OLD MIDDLE ITALIO	20,869	0	0	0	0	0	0
Y08 ITALIO	23,500	0	0	0	0	0	0
Y09 LOWER AKWE	3,234	0	0	0	0	0	0
Y10 UPPER AKWE	43,230	0	0	0	0	0	0
Y11 USTAY TANIS	53,356	0	0	0	0	0	0
Y12 DRY BAY ALSEK	53,339	0	0	0	0	0	0
Y13 BRABAZONS	436,629	0	0	0	0	0	0
Y14 HARLEQUIN LAKE	103,270	429	0	0	0	1,074	1,074

Table C-2
Change in Development LUD Acres without Roadless Protection by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Total Development LUD Acres	Change in Development LUD Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Y15 RUSSELL NUNATAK FJORDS	214,066	727	64	64	64	64	64
Y16 SITUK RIVER	38,676	7,713	2,237	2,237	2,237	5,760	5,760
Total	**16,725,517**	**1,175,751**	**34,622**	**233,819**	**181,669**	**2,137,028**	**2,137,028**

Table C-3
Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Old-Growth Suitable Acres	Change in Old-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
01-01 SKAGWAY AREA	255,036	0	0	0	0	0	0
01-02 HAINES AREA	19,514	0	0	0	0	0	0
01-03 EAST CHILKATS	361,545	6,355	256	256	3,420	4,341	4,341
01-04A BERNERS BAY	239,889	95	0	0	7	9	9
01-04B N. JUNEAU COAST	49,659	0	0	0	0	0	0
01-04C TAKU INLET	259,153	13	0	0	0	0	0
01-04D SLOCUM INLET	17,214	0	0	0	0	0	0
01-04E JUNEAU ICEFIELD	230,787	1	0	0	0	0	0
01-05A TAKU HARBOR	19,639	0	0	0	0	0	0
01-05B PORT SNETTISHAM	370,367	0	0	0	0	0	0
01-05C WINDHAM BAY	161,216	110	0	0	4	4	4
01-05D TRACY ARM	330,739	0	0	0	0	0	0
01-05E FORDS TERROR	24,386	0	0	0	0	0	0
01-05F ENDICOTT ARM	368,545	10	0	0	1	1	1
04-01A GUT BAY, BARANOF	93,986	0	0	0	0	0	0
04-01B PORT ARMSTRONG	70,962	0	0	0	0	0	0
04-01C NELSON BAY	44,166	0	0	0	0	0	0
04-02A REDOUBT LAKE	45,074	7	8	8	12	12	12
04-02B WHALE BAY	221,835	0	0	0	0	0	0
04-02C NECKER ISLANDS	6,197	0	0	0	0	0	0
04-02D SW BARANOF	54,366	0	0	0	0	0	0
04-03 SITKA AREA	345,862	2,335	-16	-16	2,517	2,517	2,517
04-04A RODMAN BAY	75,427	749	19	19	2,661	2,662	2,662
04-04B KELP BAY	144,680	2,530	26	26	3,875	3,875	3,875
04-04C BARANOF WARM SPRINGS	28,929	0	0	0	0	0	0
04-05A SW ADMIRALTY	114,955	0	0	0	0	0	0
04-05B MITCHELL BAY	61,008	0	0	0	0	0	0
04-06A PYBUS BAY	55,674	0	0	0	0	0	0
04-06B ELIZA HARBOR	85,206	0	0	0	0	0	0
04-07A GAMBIER BAY	119,252	0	0	0	0	0	0
04-07B CANOE ROUTE	86,687	0	0	0	0	0	0
04-08 NE ADMIRALTY	128,063	0	0	0	0	0	0
04-09A SEYMOUR CANAL	88,164	0	0	0	0	0	0
04-09B PACK CREEK	65,426	0	0	0	0	0	0
04-10A GREENS CREEK	2,575	0	0	0	0	0	0
04-10B NW ADMIRALTY	256,234	0	0	0	0	0	0
04-11A PORT FREDERICK	112,512	1,999	15	69	3,269	3,369	3,369

Table C-3
Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Old-Growth Suitable Acres	Change in Old-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
04-11B FRESHWATER BAY	160,078	16,587	341	3,480	12,073	12,236	12,236
04-12 TENAKEE INLET	312,370	13,380	359	3,595	11,656	11,656	11,656
04-13 PERIL STRAIT	232,130	2,998	-35	-35	1,534	2,536	2,536
04-14 SLOCUM ARM	97,008	0	0	0	0	0	0
04-15A LISIANSKI	90,638	0	0	0	0	0	0
04-15B WEST YAKOBI ISLAND	39,706	0	0	0	0	0	0
04-15C STAG BAY	26,663	0	0	0	0	0	0
04-15D PORTLOCK HARBOR	107,904	0	0	0	0	0	0
04-16A POINT ADOLPHUS	8,888	0	0	0	0	0	0
04-16B NORTH CHICHAGOF	64,726	0	0	0	0	0	0
04-16C IDAHO INLET	53,504	0	0	0	0	0	0
04-16D PLI WILDERNESS	23,079	0	0	0	0	0	0
04-16D PORT ALTHORP	19,475	0	0	0	0	0	0
CRD 00-00NO AREA DESIGNATED	925,876	13,959	4,366	8,259	14,383	16,266	16,266
J01 JUNEAU ICEFIELD 1 - GILKEY BACKCOUNTRY	315,751	0	0	0	0	0	0
J02 JUNEAU ICEFIELD 2 - EAGLE	10,300	0	0	0	0	0	0
J03 JUNEAU ICEFIELD 3 - HERBERT	12,636	0	0	0	0	0	0
J04 JUNEAU ICEFIELD 4 - MENDENHALL	38,095	0	0	0	0	0	0
J05 JUNEAU ICEFIELD 5 - LEMON	12,427	0	0	0	0	0	0
J06 JUNEAU ICEFIELD 6 - DEATH VALLEY	54,498	0	0	0	0	0	0
J07 JUNEAU ICEFIELD 7 - NORRIS	37,781	0	0	0	0	0	0
J08 JUNEAU ICEFIELD 8 - TAKU	35,343	0	0	0	0	0	0
J09 JUNEAU ICEFIELD 9 - TWIN	61,660	0	0	0	0	0	0
K01 WEST MISTY	192,830	49	0	0	0	1	1
K02 NORTHEAST MISTY	1,300,687	0	0	0	0	0	0
K03 SOUTH MISTY	628,890	0	0	0	0	0	0
K04 DUKE ISLAND	40,202	0	0	0	0	0	0
K05 SOUTH MISTY LAKES	14,878	0	0	0	0	0	0
K06 MISTY CORE LAKES	57,861	0	0	0	0	0	0
K07 WALKER CHICKAMIN	14,320	0	0	0	0	0	0
K08 BURROUGHS UNUK	29,455	0	0	0	0	0	0
K09 ALAVA PRINCESS MANZANITA	20,568	0	0	0	0	0	0
K10 RUDYERD WINSTANLEY	20,285	0	0	0	0	0	0
K11 GRAVINA ISLAND	39,700	94	0	0	1,020	1,021	1,021
K12 BELL ISLAND	137,694	0	0	0	0	0	0
K13 EAST CLEVELAND	87,531	15	0	0	0	101	101

Table C-3
Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Old-Growth Suitable Acres	Change in Old-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
K14 WEST CLEVELAND	73,232	0	0	0	0	0	0
K15 WILSON BAKEWELL	13,440	0	0	0	0	0	0
K16 KETCHIKAN CORE SPNW	46,341	583	13	1,745	2,486	3,136	3,136
K17 GEORGE CARROLL THORNE	137,434	3,973	1,465	5,972	9,529	9,530	9,530
K18 CENTRAL REVILLA SPNW	92,792	6,148	88	1,431	5,258	5,258	5,258
K19 NORTH REVILLA	70,401	2,181	78	78	2,384	2,655	2,655
K20 HYDER SPNW	121,348	8	0	0	0	1	1
K21 PERCY HOTSPUR MARY	6,924	0	0	0	0	0	0
K22 HYDER NA	7,261	14	0	0	0	1	1
K23 BETTON ISLAND	5,028	0	0	0	0	0	0
K24 KETCHIKAN CORE NA	19,239	450	0	48	53	53	53
K25 SOUTH REVILLA	40,219	8,016	1,620	1,729	2,257	2,257	2,257
K26 CENTRAL REVILLA NA	15,451	3,564	7	217	221	221	221
K27 MARGARET BAY	9,707	2,058	25	80	203	203	203
K28 NAHA BAY	5,273	0	0	0	0	0	0
P01 MITKOF ISLAND	109,302	15,557	2	1,426	3,384	3,542	3,542
P02 DUNCAN CANAL - WEST SIDE	73,636	0	0	0	0	0	0
P04 DUNCAN CANAL - EAST SIDE	53,325	3,762	2,252	4,489	6,362	6,592	6,592
P05 WRANGELL NARROWS/WOEWODSKI IS.	17,033	130	18	64	349	497	497
P06 KUPREANOF ISLAND - NORTH SHORE	11,303	0	0	0	0	0	0
P07 PETERSBURG CREEK/DUNCAN SALT CHUCK	49,950	35	0	1	1	1	1
P08 NORTH LINDENBERG PENINSULA	75,605	4,666	3,227	6,708	8,764	8,856	8,856
P09 CENTRAL KUPREANOF ISLAND/ROAD SYSTEM	223,302	8,384	425	957	5,781	5,781	5,781
P10 SOUTHWEST KUPREANOF ISLAND	93,507	0	0	0	0	0	0
P11 ROWAN BAY/BAY OF PILLARS	28,721	4	0	0	0	0	0
P12A SAGINAW/SECURITY/WASHINGTON BAYS	32,450	311	0	0	0	0	0
P12B KUIU ISLAND ROAD SYSTEM	134,852	14,741	-1,281	1,148	4,247	4,248	4,248
P13 TEBENKOF BAY/KUIU WILDERNESS	127,218	0	0	0	0	0	0
P14 KEKU STRAIT/PORT CAMDEN	102,299	180	0	13	811	811	811
P15 SOUTH KUIU ISLAND	62,824	0	0	0	0	0	0
P16 REID/NO NAME BAYS	43,191	0	0	0	297	297	297
P21 MUDDY RIVER AREA	63,357	2,891	-738	2,397	6,026	6,771	6,771

Table C-3
Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Old-Growth Suitable Acres	Change in Old-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
P22 THOMAS BAY/POINT VANDEPUT	76,810	0	0	0	0	0	0
P23 FARRAGUT BAY/CAPE FANSHAW	66,716	0	0	0	0	0	0
P24 BAIRD/PATTERSON GLACIERS	402,216	0	0	0	0	0	0
SI-D SKAGWAY ICEFIELD - DENVER	19,600	0	0	0	0	0	0
SI-EF SKAGWAY ICEFIELD - EAST FORK	499	0	0	0	0	0	0
SI-LG SKAGWAY ICEFIELD - LE GRANDE	640	0	0	0	0	0	0
SI-M SKAGWAY ICEFIELD - MEADE	25,730	0	0	0	0	0	0
SI-S SKAGWAY ICEFIELD - SCHUBEE	2,934	0	0	0	0	0	0
TBRD 00-00NO AREA DESIGNATED	901,507	62,406	1,866	13,676	20,254	21,217	21,217
W10 STIKINE - LECONTE WILDERNESS	263,581	4	0	0	0	0	0
W100 NORTH ETOLIN ISLAND	151,750	3,208	-5	1,587	2,969	4,101	4,101
W120 SOUTH ETOLIN ISLAND WILDERNESS	82,517	4	0	0	16	16	16
W130 VANK ISLAND GROUP	22,927	459	0	0	0	0	0
W140 KASHEVAROF GROUP	11,470	706	0	0	0	0	0
W150 LECONTE BAY (S-LC WILDERNESS)	175,361	0	0	0	0	0	0
W30 GARNET/MILL CREEK	56,850	1	0	0	0	0	0
W40 MADAN/BOULDER	105,035	0	0	0	0	0	0
W50 BRADFIELD CANAL AND RIVER	516,308	2	0	0	0	0	0
W60 ANAN CREEK	38,615	0	0	12	12	13	13
W70 CLEVELAND PEN./DEER ISLAND	48,383	1,529	101	329	1,697	1,697	1,697
W80 WRANGELL ISLAND	113,539	8,221	1,581	5,162	9,677	9,678	9,678
W90 ZAREMBO	116,402	14,336	1,818	2,776	8,427	8,525	8,525
Y01 YAKUTAT BAY	69,745	0	0	0	0	0	0
Y02 LOST TAWAH	9,112	52	0	0	0	0	0
Y03 KUNYOSH SEAL CREEKS	49,765	0	0	0	0	0	0
Y04 AHRNKLIN ANTLEN	30,315	0	0	0	0	0	0
Y05 PIKE LAKES MOSER CREEK	43,577	0	0	0	0	0	0
Y06 DANGEROUS RIVER	27,110	0	0	0	0	0	0
Y07 OLD MIDDLE ITALIO	20,869	0	0	0	0	0	0
Y08 ITALIO	23,500	0	0	0	0	0	0
Y09 LOWER AKWE	3,234	0	0	0	0	0	0
Y10 UPPER AKWE	43,230	0	0	0	0	0	0
Y11 USTAY TANIS	53,356	0	0	0	0	0	0
Y12 DRY BAY ALSEK	53,339	0	0	0	0	0	0
Y13 BRABAZONS	436,629	0	0	0	0	0	0
Y14 HARLEQUIN LAKE	103,270	0	0	0	0	0	0

Table C-3
Change in Old-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Old-Growth Suitable Acres	Change in Old-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Y15 RUSSELL NUNATAK FJORDS	214,066	0	0	0	0	0	0
Y16 SITUK RIVER	38,676	11	0	0	0	0	0
Total	**16,725,517**	**229,881**	**17,898**	**67,707**	**157,895**	**166,565**	**166,565**

Table C-4
Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Young-Growth Suitable Acres	Change in Young-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
01-01 SKAGWAY AREA	255,036	0	0	0	38	38	38
01-02 HAINES AREA	19,514	654	0	0	0	75	5
01-03 EAST CHILKATS	361,545	3,791	688	688	688	1,091	1,055
01-04A BERNERS BAY	239,889	3	0	0	12	95	37
01-04B N. JUNEAU COAST	49,659	2	0	0	0	0	0
01-04C TAKU INLET	259,153	15	6	6	6	69	69
01-04D SLOCUM INLET	17,214	31	0	0	0	15	11
01-04E JUNEAU ICEFIELD	230,787	0	0	0	0	0	0
01-05A TAKU HARBOR	19,639	0	0	0	0	122	0
01-05B PORT SNETTISHAM	370,367	69	0	0	0	0	0
01-05C WINDHAM BAY	161,216	66	0	0	24	55	24
01-05D TRACY ARM	330,739	0	0	0	0	0	0
01-05E FORDS TERROR	24,386	0	0	0	0	0	0
01-05F ENDICOTT ARM	368,545	0	0	0	0	0	0
04-01A GUT BAY, BARANOF	93,986	0	0	0	0	0	0
04-01B PORT ARMSTRONG	70,962	0	0	0	0	0	0
04-01C NELSON BAY	44,166	0	0	0	0	0	0
04-02A REDOUBT LAKE	45,074	702	0	0	1	60	1
04-02B WHALE BAY	221,835	0	0	0	0	0	0
04-02C NECKER ISLANDS	6,197	0	0	0	0	0	0
04-02D SW BARANOF	54,366	0	0	0	0	0	0
04-03 SITKA AREA	345,862	9,857	1	1	1	28	1
04-04A RODMAN BAY	75,427	7,508	-30	-30	0	0	0
04-04B KELP BAY	144,680	3,535	0	0	1	6	1
04-04C BARANOF WARM SPRINGS	28,929	0	0	0	0	0	0
04-05A SW ADMIRALTY	114,955	0	0	0	0	0	0
04-05B MITCHELL BAY	61,008	0	0	0	0	0	0
04-06A PYBUS BAY	55,674	0	0	0	0	0	0
04-06B ELIZA HARBOR	85,206	0	0	0	0	0	0
04-07A GAMBIER BAY	119,252	0	0	0	0	0	0
04-07B CANOE ROUTE	86,687	0	0	0	0	0	0
04-08 NE ADMIRALTY	128,063	0	0	0	0	0	0
04-09A SEYMOUR CANAL	88,164	0	0	0	0	0	0
04-09B PACK CREEK	65,426	0	0	0	0	0	0
04-10A GREENS CREEK	2,575	0	0	0	0	0	0
04-10B NW ADMIRALTY	256,234	0	0	0	0	0	0

Table C-4
Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Young-Growth Suitable Acres	Change in Young-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
04-11A PORT FREDERICK	112,512	3,800	-2	-2	0	115	5
04-11B FRESHWATER BAY	160,078	12,374	178	203	303	1,204	350
04-12 TENAKEE INLET	312,370	10,145	89	89	89	143	140
04-13 PERIL STRAIT	232,130	9,063	85	85	112	188	129
04-14 SLOCUM ARM	97,008	0	0	0	0	0	0
04-15A LISIANSKI	90,638	0	0	0	0	0	0
04-15B WEST YAKOBI ISLAND	39,706	0	0	0	0	0	0
04-15C STAG BAY	26,663	0	0	0	0	0	0
04-15D PORTLOCK HARBOR	107,904	0	0	0	0	0	0
04-16A POINT ADOLPHUS	8,888	0	0	0	0	0	0
04-16B NORTH CHICHAGOF	64,726	855	0	0	3	3	3
04-16C IDAHO INLET	53,504	0	0	0	0	0	0
04-16D PLI WILDERNESS	23,079	0	0	0	0	0	0
04-16D PORT ALTHORP	19,475	0	0	0	0	0	0
CRD 00-00NO AREA DESIGNATED	925,876	17,069	2,569	3,574	3,892	4,199	4,074
J01 JUNEAU ICEFIELD 1 - GILKEY BACKCOUNTRY	315,751	0	0	0	0	0	0
J02 JUNEAU ICEFIELD 2 - EAGLE	10,300	0	0	0	0	0	0
J03 JUNEAU ICEFIELD 3 - HERBERT	12,636	0	0	0	0	0	0
J04 JUNEAU ICEFIELD 4 - MENDENHALL	38,095	0	0	0	0	0	0
J05 JUNEAU ICEFIELD 5 - LEMON	12,427	0	0	0	0	0	0
J06 JUNEAU ICEFIELD 6 - DEATH VALLEY	54,498	0	0	0	0	0	0
J07 JUNEAU ICEFIELD 7 - NORRIS	37,781	0	0	0	0	0	0
J08 JUNEAU ICEFIELD 8 - TAKU	35,343	0	0	0	0	0	0
J09 JUNEAU ICEFIELD 9 - TWIN	61,660	0	0	0	0	0	0
K01 WEST MISTY	192,830	5	0	0	0	0	0
K02 NORTHEAST MISTY	1,300,687	0	0	0	0	0	0
K03 SOUTH MISTY	628,890	0	0	0	0	0	0
K04 DUKE ISLAND	40,202	0	0	0	0	0	0
K05 SOUTH MISTY LAKES	14,878	0	0	0	0	0	0
K06 MISTY CORE LAKES	57,861	0	0	0	0	0	0
K07 WALKER CHICKAMIN	14,320	0	0	0	0	0	0
K08 BURROUGHS UNUK	29,455	0	0	0	0	0	0
K09 ALAVA PRINCESS MANZANITA	20,568	0	0	0	0	0	0
K10 RUDYERD WINSTANLEY	20,285	0	0	0	0	0	0
K11 GRAVINA ISLAND	39,700	340	-1	-1	27	466	323

Table C-4
Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Young-Growth Suitable Acres	Change in Young-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
K12 BELL ISLAND	137,694	12	0	0	0	33	33
K13 EAST CLEVELAND	87,531	117	0	0	0	80	69
K14 WEST CLEVELAND	73,232	1	0	0	0	55	21
K15 WILSON BAKEWELL	13,440	0	0	0	0	0	0
K16 KETCHIKAN CORE SPNW	46,341	507	0	1	3	96	42
K17 GEORGE CARROLL THORNE	137,434	4,179	317	318	365	369	365
K18 CENTRAL REVILLA SPNW	92,792	7,655	4	19	53	80	48
K19 NORTH REVILLA	70,401	2,278	5	5	133	154	144
K20 HYDER SPNW	121,348	19	0	0	0	1	1
K21 PERCY HOTSPUR MARY	6,924	0	0	0	0	0	0
K22 HYDER NA	7,261	186	0	0	0	29	29
K23 BETTON ISLAND	5,028	0	0	0	0	0	0
K24 KETCHIKAN CORE NA	19,239	272	12	12	35	38	35
K25 SOUTH REVILLA	40,219	8,230	424	426	436	437	435
K26 CENTRAL REVILLA NA	15,451	4,575	0	2	2	2	2
K27 MARGARET BAY	9,707	2,505	0	0	0	7	0
K28 NAHA BAY	5,273	0	0	0	0	0	0
P01 MITKOF ISLAND	109,302	9,761	3	4	20	52	25
P02 DUNCAN CANAL - WEST SIDE	73,636	647	0	0	0	44	33
P04 DUNCAN CANAL - EAST SIDE	53,325	4,356	826	826	826	826	826
P05 WRANGELL NARROWS/WOEWODSKI IS.	17,033	71	0	0	0	35	35
P06 KUPREANOF ISLAND - NORTH SHORE	11,303	11	0	0	0	9	0
P07 PETERSBURG CREEK/DUNCAN SALT CHUCK	49,950	0	0	0	0	0	0
P08 NORTH LINDENBERG PENINSULA	75,605	3,685	742	755	756	815	804
P09 CENTRAL KUPREANOF ISLAND/ROAD SYSTEM	223,302	6,887	1,312	1,318	1,347	1,404	1,368
P10 SOUTHWEST KUPREANOF ISLAND	93,507	1,632	0	0	0	124	118
P11 ROWAN BAY/BAY OF PILLARS	28,721	288	0	0	0	0	0
P12A SAGINAW/SECURITY/WASHINGTON BAYS	32,450	390	0	0	14	14	14
P12B KUIU ISLAND ROAD SYSTEM	134,852	19,585	0	0	25	49	34
P13 TEBENKOF BAY/KUIU WILDERNESS	127,218	0	0	0	0	0	0
P14 KEKU STRAIT/PORT CAMDEN	102,299	332	0	0	18	124	104

Table C-4
Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Young-Growth Suitable Acres	Change in Young-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
P15 SOUTH KUIU ISLAND	62,824	0	0	0	0	0	0
P16 REID/NO NAME BAYS	43,191	381	-86	-86	13	67	41
P21 MUDDY RIVER AREA	63,357	4,218	0	0	0	13	0
P22 THOMAS BAY/POINT VANDEPUT	76,810	384	0	0	0	0	0
P23 FARRAGUT BAY/CAPE FANSHAW	66,716	12	0	0	0	49	0
P24 BAIRD/PATTERSON GLACIERS	402,216	0	0	0	0	0	0
SI-D SKAGWAY ICEFIELD - DENVER	19,600	0	0	0	0	0	0
SI-EF SKAGWAY ICEFIELD - EAST FORK	499	0	0	0	0	0	0
SI-LG SKAGWAY ICEFIELD - LE GRANDE	640	0	0	0	0	0	0
SI-M SKAGWAY ICEFIELD - MEADE	25,730	0	0	0	0	0	0
SI-S SKAGWAY ICEFIELD - SCHUBEE	2,934	0	0	0	0	0	0
TBRD 00-00NO AREA DESIGNATED	901,507	127,019	1,054	1,109	1,320	1,536	1,322
W10 STIKINE - LECONTE WILDERNESS	263,581	0	0	0	0	0	0
W100 NORTH ETOLIN ISLAND	151,750	4,460	513	547	587	1,142	958
W120 SOUTH ETOLIN ISLAND WILDERNESS	82,517	0	0	0	0	0	0
W130 VANK ISLAND GROUP	22,927	4,426	0	0	0	95	81
W140 KASHEVAROF GROUP	11,470	2,812	0	0	0	0	0
W150 LECONTE BAY (S-LC WILDERNESS)	175,361	0	0	0	0	0	0
W30 GARNET/MILL CREEK	56,850	0	0	0	0	221	49
W40 MADAN/BOULDER	105,035	27	0	0	0	12	12
W50 BRADFIELD CANAL AND RIVER	516,308	4,572	0	0	25	35	26
W60 ANAN CREEK	38,615	1	0	0	0	0	0
W70 CLEVELAND PEN./DEER ISLAND	48,383	1,641	0	0	0	3	0
W80 WRANGELL ISLAND	113,539	5,841	487	495	496	512	502
W90 ZAREMBO	116,402	13,998	749	874	922	1,084	922
Y01 YAKUTAT BAY	69,745	43	0	205	205	205	0
Y02 LOST TAWAH	9,112	727	0	0	0	0	0
Y03 KUNYOSH SEAL CREEKS	49,765	462	4	4	4	4	4
Y04 AHRNKLIN ANTLEN	30,315	76	0	0	350	355	355
Y05 PIKE LAKES MOSER CREEK	43,577	193	0	0	690	927	693
Y06 DANGEROUS RIVER	27,110	229	0	0	181	223	223
Y07 OLD MIDDLE ITALIO	20,869	0	0	0	0	0	0
Y08 ITALIO	23,500	0	0	0	0	0	0
Y09 LOWER AKWE	3,234	0	0	0	0	0	0
Y10 UPPER AKWE	43,230	0	0	0	0	0	0

Table C-4
Change in Young-Growth Suitable Acres by Outfitter/Guide Use Area and Alternative

Outfitter/Guide Use Area	Total Acres	Young-Growth Suitable Acres	Change in Young-Growth Suitable Acres from Alt 1				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Y11 USTAY TANIS	53,356	0	0	0	0	0	0
Y12 DRY BAY ALSEK	53,339	0	0	0	0	0	0
Y13 BRABAZONS	436,629	0	0	0	0	0	0
Y14 HARLEQUIN LAKE	103,270	189	0	0	209	214	214
Y15 RUSSELL NUNATAK FJORDS	214,066	345	0	0	0	0	0
Y16 SITUK RIVER	38,676	3,935	338	348	353	361	351
Total	**16,725,517**	**334,054**	**10,288**	**11,797**	**14,587**	**19,907**	**16,606**

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Appendix D

Communities

Affected Environment

Southeast Alaska includes more than 30 towns and villages located in and around the Forest (Table D-1). The communities identified in Table D-1 include incorporated places, as well as Census Designated Places (CDPs). CDPs are statistical areas delineated by the U.S. Census Bureau. CDPs typically represent areas with local population, but have no legal status. Estimated population totals by community ranged from less than 20 (Elfin Cove and Point Baker) to more than 32,000 (Juneau) in 2017. About one-third (11) of the 32 Southeast communities identified in Table D-1 lost population between 2010 and 2017, with estimated decreases ranging from -1 percent (Hydaburg and Sitka) to -30 percent (Elfin Cove). Viewed in absolute terms, losses ranged from less than 10 residents (Elfin Cove, Kupreanof, Point Baker, and Hydaburg) to more than 100 (Sitka, Craig, and Yakutat), reflecting the relative size of the affected communities. The regional population total fluctuated over this period, increasing from 71,664 in 2010 to a high of 74,518 in 2014 and has since dropped three years in a row, by a combined total of 1,600 people, with Juneau experiencing the largest declines (Alaska DOL 2018; see *Key Issue 2* in this EIS, Figure 2-1).

Table D-1
Southeast Alaska Community Statistics

	Population			Median Household Income			
Community	2017[1]	Percent Change 2010 to 2017	Percent Native in 2017[2]	2017[2]	Percent of State Median[3]	Percent Below Poverty Line in 2017[2]	Sub-sistence Use (lbs per capita)[4]
Angoon	404	-12	49	34,375	45	21	182
Coffman Cove	199	13	3	63,375	83	0	276
Craig	1,089	-9	20	62,826	83	15	232
Edna Bay	43	2	0	na	na	100	383
Elfin Cove	14	-30	28	na	na	0	263
Gustavus	544	23	11	61,875	81	4	241
Haines	1,738	1	10	76,506	101	3	137
Hollis	128	14	11	93,375	123	10	169
Hoonah	773	2	53	60,625	80	12	343
Hydaburg	374	-1	84	31,250	41	31	531
Hyder	90	3	na	na	na	na	345
Juneau	32,269	3	11	90,749	119	7	na
Kake	604	8	65	52,500	69	16	179
Kasaan	80	63	39	50,000	66	14	452
Ketchikan	8,125	1	16	56,372	74	12	na
Klawock	833	10	45	46,000	60	24	350
Kupreanof	21	-22	33	na	na	0	na
Metlakatla	1,422	1	72	54,250	71	13	70
Naukati Bay	119	5	13	na	na	39	242
Pelican	67	-24	47	54,250	71	8	355
Petersburg	2,896	-2	7	64,201	84	8	161
Point Baker	13	-13	0	na	na	100	289
Port Alexander	55	6	0	66,875	88	0	312
Port Protection	34	-29	0	na	na	73	451
Saxman	444	8	74	40,000	53	15	217
Sitka	8,748	-1	14	70,765	93	9	205
Skagway	1,034	12	7	70,000	92	6	48
Tenakee Springs	135	3	0	59,688	78	2	330
Thorne Bay	533	13	1	51,354	67	8	118
Whale Pass	43	39	0	na	na	0	247
Wrangell	2,387	1	22	56,094	74	12	168

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Table D-1
Southeast Alaska Community Statistics

Community	Population 2017[1]	Population Percent Change 2010 to 2017	Population Percent Native in 2017[2]	Median Household Income 2017[2]	Median Household Income Percent of State Median[3]	Percent Below Poverty Line in 2017[2]	Sub-sistence Use (lbs per capita)[4]
Yakutat	552	-17	30	64,583	85	6	386

Notes:
na = not available
[1] Population estimates are from the Alaska DOL (2018).
[2] Estimates are annual totals developed as part of the 2013-2017 American Community Survey (ACS) 5-Year Estimates. Total population estimates developed as part of the ACS differ in some cases from those prepared by the Alaska DOL.
[3] Median state income in Alaska was $76,114 in 2017 (U.S. Census Bureau 2018b).
[4] The year these data were collected varies by community, as follows:
1987: Elfin Cove, Gustavus, Hyder, Metlakatla, Meyers Chuck, Pelican, Port Alexander, Skagway, and Tenakee Springs;
1996: Kake, Point Baker, Port Protection, and Sitka.
1997: Craig and Klawock.
1998: Coffman Cove, Edna Bay, Hollis, Kasaan, Naukati Bay, and Thorne Bay.
1999: Saxman
2000: Petersburg, Wrangell, and Yakutat.
2012: Angoon, Haines, Hoonah, Hydaburg, and Whale Pass.
Source: ADF&G 2018, Alaska DOL 2018, U.S. Census Bureau 2018a, 2018b, 2018c

Communities in Southeast Alaska include places that are predominantly Native, such as Hydaburg, Saxman, Metlakatla, and Kake; communities that are predominantly non-Native, like Edna Bay, Point Baker, and Whale Pass; and places with more mixed ethnicity where Alaska Natives range from about one-third to two-thirds of the population (Table D-1; see also Figure 3.12-1 in the *Subsistence* section).

The U.S. Census identified 16 communities in Southeast Alaska with 10 percent or more of their population below the poverty line. All but three of the communities identified in Table D-1 where data are available had median household incomes below the state average. It should, however, be noted that using standard socioeconomic indicators to characterize communities in Southeast Alaska is challenging due to the small population sizes, alternative lifestyle choices and values, and the mixing of cash and subsistence economies. What may be perceived as a low-income community by standard economic metrics may more accurately be characterized as a community where residents practice a subsistence lifestyle, value a homestead culture, and earn seasonal or project-based income.

Wild foods account for a large share of the diet for residents of the studied communities, ranging from 48 pounds per capita for Skagway in 1987 to over 500 pounds per capita for Hydaburg in 2012 (Table D-1). The average American diet includes about 225 pounds of meat, fish, and poultry on a per capita basis (Schroeder and Mazza 2005). In more than half of the identified communities, wild foods came close to, or exceeded, this national average (Table D-1). Although residents of subsistence communities purchase food, most could meet their entire protein need from wild sources.

Marine resources, including fish, mammals, and plants, comprise the majority of subsistence harvests in all communities when measured by food weight. Marine resources account for more than half of total per capita harvest in all Southeast Alaska communities, ranging from 55 percent in Tenakee Springs to 88 percent in Skagway (see Figure 3.12-2 in the *Subsistence* section of this EIS). As a result, management activities that restrict access for subsistence harvest of land mammals have had a relatively small effect on overall subsistence harvest by weight (Schroeder and Mazza 2005).

Individual Community Profiles

The following community profiles are presented alphabetically. Data cited in the profiles are from Table D-1 unless otherwise noted.

Angoon

Angoon is a Tlingit village and the only settlement on Admiralty Island located on the southwest coast of Kootznahoo Inlet. The population totaled 404 residents in 2017. Angoon is located 55 air miles southwest of Juneau and 41 air miles northeast of Sitka. Angoon residents practice a subsistence lifestyle and participate in commercial fishing. The community is only accessible by floatplane or boat. Scheduled and charter floatplane services are available from the state-owned seaplane base on Kootznahoo Inlet. Angoon's facilities also include a deep draft dock, small boat harbor, and an Alaska Marine Highway System ferry terminal.

Coffman Cove

Coffman Cove is located on the northeast coast of Prince of Wales Island. It was first settled as a logging camp during the 1950s and incorporated as a city government in 1989. Residents that remained after closure of the pulp mills have largely transitioned to livelihoods such as value-added niche forest products, tourism, and seafood products. Population has fluctuated over the past two decades; as of 2017, the population totaled 199 residents. Coffman Cove is accessible by floatplane, boat, and paved road from Hollis, where the ferry terminal is located. Nearby recreational opportunities including camping, hiking, biking, kayaking, and wildlife viewing attract visitors to the community.

Craig

Craig is located on the west coast of Prince of Wales Island. Tlingit and Haida tribes historically utilized the area around Craig for its rich natural resources. Cold storage, fish processing, canneries, and a nearby sawmill have been mainstays of Craig's local economy since the early 1900s. Craig includes a city government, federally-recognized tribe (Craig Tribal Association), and a village corporation established via the 1971 Alaska Native Claims Settlement Act (Shaan-Seet Incorporated). Craig's population totaled 1,089 in 2017. The community serves as the Prince of Wales Island regional hub for medical services, retail goods and services, arts and entertainment, educational opportunities, and gatherings for island residents. With the decline of the timber industry, Craig has worked to diversify its economy including adding marine infrastructure, encouraging independent tourism, and improving an industrial park.

Edna Bay

Edna Bay is a small, remote community on Kosciusko Island, located off Prince of Wales Island's northwest coast. It is one of Alaska's newest city governments, incorporating in 2014. Edna Bay was originally established as a company logging camp for assembling ocean-going log rafts. Currently, Edna Bay is largely a community of commercial fishing families and includes both seasonal and year-round residents. Year-round residents are largely either retired or work in commercial fishing or forest products. Because of Edna Bay's remote location, household livelihoods are supplemented with subsistence hunting, fishing, and gathering. Edna Bay's population has declined by about half from 1990 to 2017, from 86 to 43 residents.

Elfin Cove

Elfin Cove, located on Chichagof Island at Cross Sound, is a fish-buying and supply center for the commercial fishing industry. The population is highly seasonal as residents participate in commercial fishing, sport fishing, and charter services. The July 2017 population was 14 residents. There are several lodges located in Elfin Cove that operate on a seasonal basis. Additional retail businesses that serve visitors also provide employment opportunities. A state-owned seaplane base is available with air taxi service from Juneau. Skiffs provide local transportation.

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Gustavus

Gustavus is the gateway community to Glacier Bay National Park and attracts a large quantity of seasonal residents and recreation enthusiasts. The population totaled 544 in 2017. Glacier Bay National Park is the largest employer in the community followed by a variety of tourism establishments. Gustavus offers a state-owned airport with year-round daily air taxi service and jet service during the summer season. Floatplanes also land at nearby Bartlett Cove. Air traffic is relatively high during peak summer months, and several cruise ships include Glacier Bay in their itinerary, but do not visit the Gustavus community. There is a 10-mile paved road connecting the national park with the airport. Gustavus residents use portions of the project area for their recreation use and subsistence gathering. There are also outfitters and guides who use National Forest System lands who have businesses originating in Gustavus.

Haines

Haines is a northern terminus of the Alaska Marine Highway System, a cruise ship port of call, and hub for transportation to and from Southeast Alaska. The population totaled 1,738 residents in 2017. Many jobs are seasonal, with tourism businesses and access to the interior Alaska highway system becoming increasingly important. Haines is a major transshipment point because of its ice-free deep-water port and dock and year-round road access to Canada and interior Alaska. Air service is provided daily via the Haines airport and seaplane base.

Hollis

Hollis is situated on the east side of Prince of Wales Island on Twelvemile Arm. Hollis was originally a mining town in the early 1900s with nearby gold and silver deposits. During the 1950s, Hollis transitioned to a company logging camp and timber operations base for Ketchikan's pulp mill. Today, Hollis is considered a community that provides timber and recreation industry support services, and contains a growing number of seasonal residences. Hollis also serves as the island's transportation gateway; the year-round, daily ferry service between Ketchikan and Hollis is a key mode of access to Prince of Wales Island. The population totaled 128 residents in 2017.

Hoonah

Hoonah is the largest Tlingit village in Alaska, with a population of 773 residents as of 2017. Many residents maintain a subsistence lifestyle that includes hunting, fishing, and gathering edible plants and berries. The State of Alaska owns and operates the local airport and seaplane base. Air taxi services and the Alaska Marine Highway System provide regular access to Hoonah. Icy Strait Point, a restored cannery at Point Sophia owned by Huna Totem Corporation, opened as Southeast's newest cruise industry port of call in 2004. The introduction of cruise industry to Hoonah's local economy has yielded multiple economic benefits as new retail, leisure, and hospitality businesses have opened or increased operations to serve visitors. Hoonah is surrounded by an extensive road system on northwest Chichagof Island.

Hydaburg

Hydaburg is located on the southwest coast of Prince of Wales Island and is Alaska's largest Haida village, dating from the early 1700s. Current-day Hydaburg was established in the early 1900s and was incorporated as a city government during the 1960s. Hydaburg includes a federally-recognized tribe (Hydaburg Cooperative Association) and a village corporation established via the 1971 Alaska Native Claims Settlement Act (Haida Corporation). As of 2017, the population totaled 374 residents. Fisheries are important to the community, both for subsistence and employment opportunities. Hydaburg is also home to world-renowned totem carvers, culture bearers, and other artisans practicing Haida art, culture, and tradition.

Hyder

Hyder is a small community located at the head of Portland Canal, a 70-mile-long fjord that forms part of the United States/Canadian border. As of 2017, Hyder had a population of 90 residents. Historically, 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, with an initial economic base in mining. Hyder’s present-day economy is primarily based on tourism, mining, logging, fishing, and sport hunting/fishing, and, as such, is largely seasonal. Hyder is just 2 miles from Stewart, British Columbia, and the two towns share visitor services. Hyder is one of three Southeast Alaska communities connected by road to Canada and many tourists enter Hyder from Canada.

Juneau

Juneau, Alaska’s state capital, is the largest community in the analysis area with an estimated population of 32,269 in 2017. The community is a service and recreation center for residents and visitors alike. Tourism is a significant contributor to the local economy, especially during the summer months. The most popular local attractions include the Mendenhall Glacier, Mount Roberts Tram, Juneau Icefield, and Tracy Arm. Juneau is accessible by only air or water transportation. Scheduled commercial jet and air taxi service is available year-round at the Juneau International Airport. Marine facilities include multiple seaplane facilities, deep draft docks, small boat harbors, and a state ferry terminal. The Alaska Marine Highway System and commercial barge services provide year-round marine transportation access.

Kake

Kake, a predominantly Tlingit village, is located on the west side of Kupreanof Island alongside Keku Strait – just south of Admiralty Island. The population totaled 604 residents in 2017. Kake is 38 air miles northwest of Petersburg and 95 air miles southwest of Juneau. Kake’s economy is primarily based on ~~timber~~ government and education employment, tourism, fishing, and subsistence. Kake was incorporated as a city government in 1912; it includes a federally-recognized tribe (Organized Village of Kake, 1947), and a village corporation established via the 1971 Alaska Native Claims Settlement Act (Kake Tribal Corporation). The community has extensively used all Kuiu Island, all Kupreanof Island, southern & eastern Admiralty Island, the southeast side of Baranof Island, and the mainland near Hobart Bay for subsistence activities. (see attached OVK Community Use Map).

Kasaan

Kasaan is located on eastern Prince of Wales Island in Kasaan Bay. 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 subsequently relocated to this new site in 1904. Kasaan was incorporated as a city government during the 1970s. It includes a federally-recognized tribe (Organized Village of Kasaan), and a village corporation established via the 1971 Alaska Native Claims Settlement Act (Kavilco Incorporated). In 2017, the population totaled 80 residents. The majority of local residents are employed in the public sector. In recent years, Kasaan has also been encouraging tourism by marketing its Totems Historic District, newly-built Discovery Cabins, and reopening the Totem Trail Café.

Ketchikan

Ketchikan is located on Revillagigedo Island near the southernmost boundary of Alaska, approximately 235 miles south of Juneau. As of 2017, Ketchikan had a population of 8,125 residents. Historically, the Ketchikan area was a summer fishing camp for the Tlingit Alaska Natives. Its abundant fish and timber resources eventually attracted non-Natives, with the first cannery opening in Ketchikan in 1886 and four more by 1912. Currently, Ketchikan is an industrial center and a major port of entry in Southeast Alaska (it is the first Alaska port-of-call for northbound ships). It has a diverse economy, supported by a large fishing fleet, fish processing facilities, timber and tourism. While the timber industry remains important to the economy and a home base for several timber companies, the Ketchikan Pulp Corporation’s pulp mill

closed in 1997. Tourism and local retail are growing economic sectors, particularly related to cruise ship passengers.

Klawock

Klawock is on the west coast of Prince of Wales Island, 7 miles from Craig, connected by paved road. The city population totaled 833 residents in 2017, and together, Klawock and Craig form the major population center of Prince of Wales Island. Originally, Klawock was used by the Tlingits as a summer fishing camp, later becoming a permanent village site. Currently, Klawock includes a federally-recognized tribe (Klawock Cooperative Association), and Alaska Native Claims Settlement Act (1971) village corporation (Klawock Heenya Corporation). Klawock's economy includes commercial fishing, retail and other service professionals, and the timber industry; Viking Lumber is located between Klawock and Craig. At the same time, many residents continue to pursue a subsistence lifestyle. Klawock airport has the only runway that can accommodate wheeled-aircraft on Prince of Wales Island. The community maintains a strong Tlingit cultural tradition with the Klawock Totem Park, which includes restored totem poles, a heritage center, and a traditional long house.

Kupreanof

The City of Kupreanof is located across the Wrangell Narrows from Petersburg, on the northeast shore of Kupreanof Island. Incorporated as a city in 1975, the municipality has no full-time staff, few services, and no public utilities. Kupreanof is a small, non-Native community, with a total estimated population of 21 residents in 2017. The community is built entirely on the waterfront; there are no roads. Residents use skiffs to travel to Petersburg for schooling, goods, and services. The majority of Kupreanof's working residents are self-employed, although some commute by boat to jobs in Petersburg. Subsistence and recreation uses of resources around Kupreanof supplement household incomes; deer, salmon, halibut, shrimp and crab are favorites.

Metlakatla

Metlakatla is located on Annette Island, 15 miles south of Ketchikan, with an estimated population of 1,422 in 2017. Believed to have been occupied at one time by Tlingit Indians, Metlakatla 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. Today, Metlakatla is a traditional Tsimshian community with a subsistence lifestyle. The 86,000-acre Island reservation and surrounding 3,000 feet of coastal waters are not subject to state jurisdiction. The Metlakatla Indian Community regulates commercial fishing in these waters, and as the largest employer, operates a salmon hatchery on Tamgas Creek, the tribal court, and all local services and utilities.

Naukati Bay

Naukati Bay, commonly referred to as "Naukati", is located on the northwest coast of Prince of Wales Island. The population totaled 119 residents in 2017. Naukati was originally established as a logging camp to support Ketchikan's pulp mill. The community remained after the pulp mill closed and, while unincorporated as a city, residents are represented by two non-profit associations (*i.e.*, Naukati West and Naukati East) for addressing local issues and improving local infrastructure. Residents are primarily logging, small sawmill, and homesteading families, with growth in emerging tourism enterprises during the past decade. Many residents rely on subsistence activities to maintain cultural ties and support economic well-being. Naukati is also home to Shikat Bay Farm, an oyster nursery that raises oyster spat (seed) for oyster farmers across coastal Alaska.

Pelican

Pelican is a fishing community with most residents participating in commercial, sport, and subsistence fishing activities. Located in Chichagof Island's remote Lisianski Inlet, Pelican is dependent on boats, floatplanes, and the Alaska Marine Highway System for service. Daily scheduled air taxi service is

available from Juneau and Sitka. Additional community facilities include a state-owned seaplane base, a small boat harbor, dock, and state ferry terminal. As of 2017, the population totaled 67 residents.

Petersburg

Petersburg is located on the northern tip of Mitkof Island, with an estimated population of 2,896 in 2017. Petersburg's economy is primarily based on the commercial fishing and timber industries. The city includes several fish processors operating cold storage, canneries, and custom packing services and the state-run Crystal Lake salmon hatchery. Petersburg also has two small active saw mills, and provides supplies and services for many of the area logging camps. Many residents also participate in subsistence gathering. While there is no deep-water dock suitable for large cruise ships, there are outfitters and guides who use National Forest System lands who have businesses originating in Petersburg.

Point Baker

Point Baker is on the northern tip of Prince of Wales Island and is only accessible via seaplane or boat, with an estimated population of 13 residents in 2017. Point Baker is considered a small fishing community, but neighboring lodges have been established providing sportfishing, wildlife viewing, and other outdoor experiences. The community's proximity to Sumner Strait, an exceptional fishing site for all five species of Pacific salmon and halibut, makes Point Baker a particularly appealing fishing destination. Point Baker remains an unincorporated community where residents practice a subsistence and homestead lifestyle without city government.

Port Alexander

Port Alexander is a small community located on the south end of Baranof Island, 65 air miles south of Sitka. The population totaled 55 residents in 2017. Port Alexander has long provided safe harbor for commercial fishing boats during Chatham Strait gales and storms. Commercial fishing, subsistence activities, and tourism are important elements of the local economy. Access to Port Alexander is by floatplane or boat. The State of Alaska owns and maintains a seaplane base. Residents and visitors fly to Port Alexander via commercial or chartered floatplane service from Sitka, Petersburg, Wrangell, and Juneau. Other local facilities include a breakwater, dock, and small boat harbor. There are no roads in Port Alexander; skiffs provide local transportation.

Port Protection

Port Protection is on the northern tip of Prince of Wales Island, near Point Baker, and is only accessible via seaplane or boat. The population totaled 34 residents in 2017. Port Protection was established as a fish buying center that provided safe harbor, fuel, and supplies for commercial fishing vessels. Port Protection has remained a small fishing community with no roads, where residents practice a rural and subsistence lifestyle. All homes and other buildings are located along docks or upland boardwalks.

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, about three miles south of Ketchikan. The population totaled 444 residents in 2017. In 1894, Tlingits from the old Cape Fox and Tongass villages chose Saxman as the site for a new village and the location of a government school and a Presbyterian church, later incorporating as a municipality in 1929. In 1971 and 1973, respectively, Saxman was recognized and then certified as a Native village under the Alaska Native Claims Settlement Act. Most employment opportunities for Saxman residents are in the City of Ketchikan, though the City of Saxman, the Saxman Seaport, and the Cape Fox Corporation provide employment for some residents. The Saxman Totem Park, with a tribal house, a carving center, and a cultural hall for traditional Tlingit dance, has become an attraction for Ketchikan area visitors.

Sitka

With an estimated population of 8,748 in 2017, Sitka is one of the larger communities in the analysis area and a popular visitor destination. Sitka is located on scenic Baranof Island and is a port of call for cruise ships throughout the summer season. Despite varied cruise ship visitation during the past decade, the leisure and hospitality industry remains an important part of Sitka's economy. Other economic sectors include fishing, fish processing, government, health care services, transportation, and retail. The local government operates five small boat harbors, a seaplane base, and an airport. The community is served by the Alaska Marine Highway System and goods are transported to the community via regular commercial barge service.

Skagway

Skagway, with a population of 1,034 in 2017, is an important port of call for cruise ships and a transfer site for interior bus tours, such as to the Klondike Gold Rush National Historic Park. More than 600,000 cruise ship passengers and numerous state ferry travelers visit Skagway each year. Skagway is also the site of trans-shipment of lead/zinc ore, fuel, and freight via the Port and Klondike Highway to and from Canada. The Klondike Highway and Alaska Highway provide road connections to British Columbia, the Yukon Territory, interior Alaska, and the Lower 48 states. Skagway is primarily accessed by air, road, and marine services. The State of Alaska owns the airport and seaplane base at the boat harbor with scheduled air service from Juneau.

Tenakee Springs

Tenakee Springs, located on Chichagof Island, has long been considered a retirement community and summer retreat for Juneau and Sitka residents, with limited opportunities for local employment. The population totaled 135 residents in 2017. While fish processing has been a mainstay of its economy, tourism is growing in importance. Tenakee Springs is dependent on seaplanes and the Alaska Marine Highway Service for access. The City of Tenakee Springs operates a seaplane base and heliport with scheduled or chartered service from Juneau. The Alaska Marine Highway System provides access on a limited basis. Additional marine facilities include a small boat harbor and ferry terminal. Local transportation is primarily by bicycle or off-highway vehicle along a 3-mile local path.

Thorne Bay

Thorne Bay is on the east coast of Prince of Wales Island, with a population of 533 residents in 2017. Originally established as a floating logging camp for the Ketchikan pulp mill in 1960, it grew substantially in 1962 when the Hollis logging camp was relocated there. A shop, log sort yard, and camp were built and soon thereafter, roads were constructed connecting Thorne Bay to Hollis, Craig, and Klawock. During the peak of island timber activities, Thorne Bay was considered the largest logging camp in North America. Today, Thorne Bay contains one of the log transfer sites on the island. Employment is primarily in barge and freight services, small sawmills, government, commercial fishing, and tourism as guided sport fishing charter opportunities increasingly attract visitors. To supplement incomes, residents engage in subsistence activities, fish, and trap.

Whale Pass

Whale Pass is a small community located on northern Prince of Wales Island, with a population of 43 residents in 2017. It was originally established as a logging camp during the early 1960s and the camps remained through the early 1980s. Whale Pass is situated at a remote area of the island, but is connected to other island communities via a gravel road. State government land disposal sales facilitated the transition from company-owned logging camp to a year-round community that incorporated in 2016. The economy is dependent on natural resources and tourism, with high levels of employment in both the natural resources and mining and leisure and hospitality sectors. Residents also engage in subsistence activities.

Appendix D

Wrangell

Wrangell is located on the north end of Wrangell Island, near the mouth of the Stikine River, an historic trade route to the Canadian interior. Total estimated population was 2,387 as of 2017. Wrangell began as an important Tlingit site primarily because of its proximity to the Stikine River. In 1867, a military post named Fort Wrangell was established as part of the Alaska Territory. The community continued to grow as a fur trading center, and as an outfitter for gold prospectors between 1861 and the 1930s. In 2008, residents decided by local election that the City of Wrangell should dissolve and incorporate as the City and Borough of Wrangell. This added the communities of Meyers Chuck, Union Bay, Thoms Place, Olive Cove, and Farm Island to the new unified city and borough. The Wrangell economy is primarily based on commercial fishing, fish processing, and tourism. While timber used to be part of the economy, by 2012 no timber-related employment was identified in Wrangell.

Yakutat

Yakutat is located along the northern Gulf of Alaska at the mouth of Yakutat Bay. The population totaled 552 residents in 2017. The original settlers, believed to have been Eyak people from the Copper River area, were later conquered by the Tlingits. 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. Incorporated as a first-class city in 1948, Yakutat is governed by a mayor and a city council. Yakutat Borough, incorporated in 1992, expanded the original city boundaries to include a large section of the Gulf Coast north of Cape Fairweather. Yakutat is accessible by jet service from Juneau and Anchorage. The economy is primarily dependent on fishing, fish processing, government, and tourism. Wrangell-Saint Elias National Park, Russell Fiords Wilderness, and Glacier Bay National Park are located northwest, northeast, and southeast of Yakutat, respectively.

Environmental Consequences

Analyzing Impacts to Communities

This EIS provides a programmatic assessment of the potential impacts that may result from the alternatives considered for a proposed Alaska Roadless Rule. This assessment and the proposed alternatives are programmatic, meaning that they establish direction and allowable activities for broad land areas, rather than schedule specific activities in specific locations. This 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 could be affected. While many potentially affected outputs of forest management, such as scheduled timber harvest, generally translate into social and economic activity, such as employment in the timber industry, it is difficult to predict which communities would benefit the most from that activity. Forest Service activities provide economic opportunities to the private sector. How that sector and the various industries that comprise it respond depends on many variables in addition to Forest Service management. Communities that rely on a given resource-related industry would, however, be expected to be the first to benefit or lose from significant changes in planned output levels affecting that industry.

The 2016 Forest Plan EIS provides detailed assessments for the 32 communities addressed in the preceding section. In addition to providing detailed overviews of existing conditions, the 2016 EIS profiles evaluated potential effects to each community’s use area. Originally identified as part of the 1997 Forest Plan Revision (USDA Forest Service 1997a), community use areas represent the general area commonly used or related to by many of the community’s residents in their local day-to-day work, recreational, and subsistence activities. In addition, the Sitka black-tailed deer habitat capability model output was analyzed for the Wildlife Analysis Areas (WAAs) where each community obtained approximately 75 percent of their average annual deer harvest. This analysis originally prepared for the 1997 Forest Plan EIS was updated for the 2016 Forest Plan EIS. WAAs are a division of land used by ADF&G for wildlife analysis.

The analysis presented here draws upon these information sources to assess the effects of the six alternatives under consideration by community. Each community discussion includes a map of that community’s use area. These maps are accompanied by tables that summarize the Alaska Roadless

Area (AKRA) management categories and change in roadless area acres that would occur in the community's use area by alternative. The summary tables also identify changes in acres in development LUDs, changes in suitable acres available for harvest, and changes in acres of estimated harvest over 100 years by alternative for each community use area. These community use area 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 surroundings under each alternative.

The following assessment considers potential impacts to 32 Southeast Alaska communities using four primary measures by alternative: 1) acres by AKRA management category and change in acres managed as roadless; 2) change in acres in development LUDs; 3) change in suitable old-growth acres available for harvest, and 4) changes in estimated harvest over 100 years.

AKRA Management Categories and Changes in Roadless Area Acres

Alternatives 2, 3, 4, and 6 propose to correct and modify IRA boundaries based on ownership changes and updated mapping. Updated roadless areas would be known as Alaska Roadless Areas (or AKRAs) and the Alaska Roadless Rule would apply to those identified lands. AKRAs would be assigned to one of four categories of Alaska roadless areas: Watershed Priority, Land Use Designation (LUD) II Priority, Roadless Priority, and Timber Priority. These categories are described in Chapter 2 of this EIS and briefly summarized below:

- The **Watershed Priority** management category is more protective than the 2001 Roadless Rule and provides for activities specific to aquatic habitat improvement and protection. Alternative 2 is the only alternative with lands that would be managed under this category.
- The **LUD II Priority** management category provides for lands to be managed in a roadless state to retain their wildland character in accordance with applicable LUD II requirements.
- The **Roadless Priority** management category is similar to the 2001 Roadless Rule but is less restrictive and provides for Alaska specific concerns, specifically for infrastructure development to connect and support local communities, and road construction for leasable minerals.
- The **Timber Priority** management category excepts timber harvest and road construction/reconstruction within AKRAs to facilitate timber management. This management category is only proposed for Alternative 4.

As ordered above, these management categories proceed from most protective (Watershed Priority) to least protective (Timber Priority) of roadless area characteristics.

Management activities have the potential to have detrimental effects to roadless area characteristics. This is especially the case with timber harvest and associated road building. Additional timber harvest opportunities would primarily be provided by dropping roadless protections for areas that are currently protected under the 2001 Roadless Rule (i.e., areas that are presently within IRAs). Timber harvest would also be allowed in AKRAs assigned to the Timber Priority management category.

Under Alternative 3, roadless protection would be removed from the 826,000 LUD II acres that are currently within an IRA. LUD II acres dropped from roadless designation would still retain their Congressionally-designated protections, which require that these areas be managed in a roadless state to retain their wildland character. Therefore, decreases shown for Alternative 3 tend to overstate the number of acres that would no longer be protected.

Changes in Development LUDs

Not all acres dropped from roadless management would be available for development. LUD II acres dropped from roadless designation under Alternative 3, for example, would, as noted above, still retain their Congressionally-designated protections, which require that these areas be managed in a roadless state to retain their wildland character. Other areas dropped from roadless protection would be assigned to non-development LUDs, such as Old-Growth Habitat and Remote and Semi-remote Recreation, which do not allow old-growth timber harvest. The change in acres in development LUDs (Timber Production,

Modified Landscape, and Scenic Viewshed) serves as a measure of development potential as it presently exists under the current Forest Plan. Approximately 6.7 percent (1,176,000 acres) of the Forest is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 34,600 acres (Alternative 2) to 2.1 million acres (Alternatives 5 and 6).

Changes in Suitable Timber

Not all lands allocated to development LUDs are available for timber management. As described in Appendix A to the 2016 Forest Plan, old-growth forest located within Phases 2 and 3 of the Tongass Timber Sale Program Adaptive Management Strategy or within the T77 Watersheds and The Nature Conservancy/Audubon Conservation Priority Areas is identified as not suitable for timber production. As a result, not all increases in development LUD acres would provide additional opportunities for timber harvest. Changes in suitable old-growth and young-growth acres available for harvest are, therefore, used as a relative measure of timber opportunity to differentiate between alternatives. These estimated changes do not represent estimates of how much harvest would occur under each alternative. Actual harvest locations would depend on the timber sales that are carried out during plan implementation.

Forest-wide, approximately 230,000 acres are presently considered suitable old-growth available for harvest. This total would increase under all the action alternatives, with gains ranging from about 18,000 acres (Alternative 2) to 166,600 acres (Alternatives 5 and 6). Approximately 334,000 acres are considered suitable for young-growth harvest, with estimated increases ranging from 2 to 5 percent of the existing total, about 10,300 acres (Alternative 2) to 19,900 acres (Alternative 5).

Estimated Timber Harvest over 100 Years

Total acres harvested are assumed to remain constant across all alternatives. After 25 years of Forest Plan implementation, an estimated 24,000 old-growth acres would be harvested. Old growth would continue to be harvested over time, but at a much reduced rate, with an estimated total of 42,500 old-growth acres expected to be harvested after 100 years. The corresponding totals for young-growth are 43,300 acres after 25 years and 284,100 acres after 100 years. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Viewed by community use area, this measure is sensitive to the relative distribution of Forest-wide suitable acres. Decreases in the share of total Forest-wide suitable acres relative to Alternative 1, for example, result in corresponding decreases in estimated harvest over 100 years, despite the increase in suitable acres available for harvest.

Potential Impacts by Resource Area

The alternatives have implications for specific places on the Forest and particular parts of the community use areas of various communities. They also have potential implications for resource dependent industries, infrastructure development, Alaska Native customary and traditional uses, and the availability of subsistence resources. The following paragraphs discuss these potential implications in general terms to provide some background for the following community assessments.

Wood Products

The action alternatives would all increase the suitable acres available for harvest, with the potential to provide additional opportunities for the Forest Service to develop economic timber sale offerings. Suitable acres would be added in three broad categories or areas: roaded roadless (Alternatives 2 to 6); logical extension areas (Alternatives 3 to 6); and areas more distant from roads (Alternatives 4 to 6) (as discussed in Chapter 2 and the *Key Issue 2* section of this EIS). The added suitable acres in areas where roads already exist (roaded roadless) or could be logically extended (logical extensions) are generally considered relatively economic to harvest. Acres identified as more distant from roads are likely to be more expensive to harvest and less likely to be accessed for timber production under the current Forest Plan.

Estimated direct wood products employment in the first decade of implementation would be very similar under all six alternatives as discussed in the *Key Issue 2*. Estimated employment is presented as a range from a maximum allowable export of timber scenario based on the existing R10 limited export policy to a maximum domestic processing scenario that assumes only Alaska yellow-cedar would be exported unprocessed.

Recreation and Tourism

Changes in land management have the potential to affect recreation opportunities on the Forest. Impacts could occur where timber management and development activities conflict with recreation opportunities for community residents and/or commercial recreation operators and their clients. Changes in suitable old-growth and young-growth acres for harvest provide an indicator of potential timber opportunity for each community use area by alternative. For some recreation uses, additional development for timber harvest and other infrastructure could provide increased access to the Forest and more opportunities. Impacts to ROS settings and recreation places are assessed in the *Recreation* section of this EIS.

The *Recreation* section also assesses potential impacts to commercial outfitter/guide businesses. This assessment used changes in suitable old-growth acres in conjunction with information on existing outfitter/guide use to help focus on potentially affected areas. The resulting analysis identified 15 outfitter/guide use areas where potential conflicts between existing outfitter/guide use and future management could occur. These potential impacts are discussed in more detail in the *Recreation* section.

Infrastructure Development

With some exceptions, Federal and state road development is presently limited in IRAs. Exceptions include roads with reserved or outstanding rights, roads provided for by statute or treaty, or road development related to a Federal Aid Highway. Roadless protection would be removed to various degrees under the action alternatives with corresponding implications for regional highway development. In most cases, changes in roadless management, as well as changes in the number of acres managed as roadless, would be more permissive with respect to regional road systems. In addition to those roads presently excepted, Roadless Priority AKRAs would also allow roads needed for the connection of communities and development of the regional transportation system as identified in the State of Alaska's SATP. Timber Priority AKRAs and areas dropped from roadless protection would remove roadless rule-related restrictions on road building. As a result, more areas would be available for additional types of regional road development under Alternatives 4 to 6. Future road projects would be subject to funding constraints and evaluated in detail on a project-by-project basis. Potential transportation effects are discussed in more detail in the *Transportation* section of this EIS.

None of the alternatives are expected to substantially affect the development of energy projects or related infrastructure. Removing roadless designations in areas under Alternatives 2 through 6 would simplify the process for projects but would not necessarily result in an increase in the number of projects developed. In areas where new roadless areas are added or expanded, the permitting process could be more complicated, but projects would not be prohibited. An exemption for public utility systems in Roadless Priority AKRAs under Alternatives 2, 3, 4, and 6, would allow for tree cutting and road construction. Under Alternative 4, Timber Priority AKRAs would not prohibit tree cutting or road construction at all. Where restrictions are removed, or exemptions added, the greatest effect may be in making the permitting process for developers less burdensome, resulting in more a rapid permitting process rather than an increase in the number of sites developed.

Alaska Native Customary and Traditional Uses

Areas allocated to Roadless Priority AKRAs would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority AKRAs, which allow all timber harvest and road

construction. These types of uses would also be allowed in areas dropped from roadless protection, subject to applicable Forest Plan standards and guidelines.

Subsistence

Marine resources, including fish, mammals, and plants, account for more than half of total per capita harvest in all Southeast Alaska communities, ranging from 55 percent in Tenakee Springs to 88 percent in Skagway (see Figure 3.12-2 in the *Subsistence* section of this EIS). These resources are not expected to be affected by any of the alternatives. Among the subsistence resources of greatest importance (salmon, other finfish, marine invertebrates, and deer), deer is the only one that could be potentially significantly affected by the alternatives evaluated in the 2016 Forest Plan EIS (USDA Forest Service 2016). Therefore, the subsistence analyses prepared for each community use area for that EIS used deer as a key indicator for potential impacts to subsistence resources.

Extensive analysis on deer was done for the 1997 Forest Plan and subsequent 2008 and 2016 Forest Plan Amendments. Analyses conducted during the 2016 Forest Plan amendment also included information on summer and winter forage and effects of roadbuilding, noting that the expected ecological response of deer to old-growth and mature young-growth timber harvest, road building, and vegetation succession will be similar to those predicted previously, but the extent of future impacts would be expected to be reduced from earlier analyses because lower levels of old-growth harvest are proposed in all action alternatives.

As part of the 2016 Forest Plan Final EIS, the interagency deer habitat capability model was used to assess existing habitat capability within the planning area, and describes model limitations, and results. Forest-wide, approximately 89 percent of the original (1954) habitat capability remains, ranging from 72 to 100 percent depending on the biogeographic province. The greatest reductions in deer habitat capability have occurred, and will continue to occur, in provinces where timber harvest has been concentrated (the North Central Prince of Wales, East Baranof, and Etolin Island biogeographic provinces). The model output was also analyzed for the WAAs where each community obtained approximately 75 percent of their average annual deer harvest. This analysis originally prepared for the 1997 Forest Plan EIS was updated for the 2016 Forest Plan EIS (USDA Forest Service 2016).

All six alternatives evaluated in this EIS, including No Action, would result in a reduction in deer habitat capability from existing conditions due to the harvest of mature young-growth and productive old-growth (POG) forest. Over the long term, reductions in habitat capability would reduce carrying capacity, or the numbers of deer an area is capable of supporting given the available resources. This could lead to a decline in the deer population, particularly following severe winters, if the demand for resources (e.g., food or habitat) exceeds the amount available.

Timber harvest tends to affect deer-related subsistence activities in two ways. In the short run, approximately 20 to 30 years following harvest, deer populations tend to increase in harvested areas. In the long run, populations tend to decline as the canopy in even-aged forest stands closes, resulting in lower habitat quality. Reductions in habitat quality can be reduced through management (e.g., thinning) of young-growth stands. Deer populations in unharvested areas are likely to remain at fairly constant levels that are typically lower than a comparable harvested area in the short run, but higher in the long run. Road construction also affects subsistence by providing subsistence hunters with ready access to areas that may have been previously inaccessible. This effect may be perceived as either positive or negative depending on the parties involved, as increased access may lead to increased competition for resources. Potential effects are likely to vary by community and may be perceived differently by members of the same or neighboring communities. Potential effects by community are assessed in the *Communities* section in the 2016 Forest Plan EIS (USDA Forest Service 2016).

While there would be some new road access under all alternatives in the long run, nearly all new roads constructed under the alternatives would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They would, however, be available for access by other methods and would, as a result, have the potential to affect existing subsistence patterns.

Individual Community Assessments

The following community assessments are presented in alphabetical order.

Angoon

Angoon's community use area (CUA) encompasses a total of 1,083,231 acres (Figure D-1). Almost half of this area (43 percent) is presently managed as roadless (Table D-2). This share would drop to 36 percent under Alternative 3 and 26 percent under Alternative 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 97 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 15 percent of the AKRA areas in the Angoon CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-1
Angoon's Community Use Area

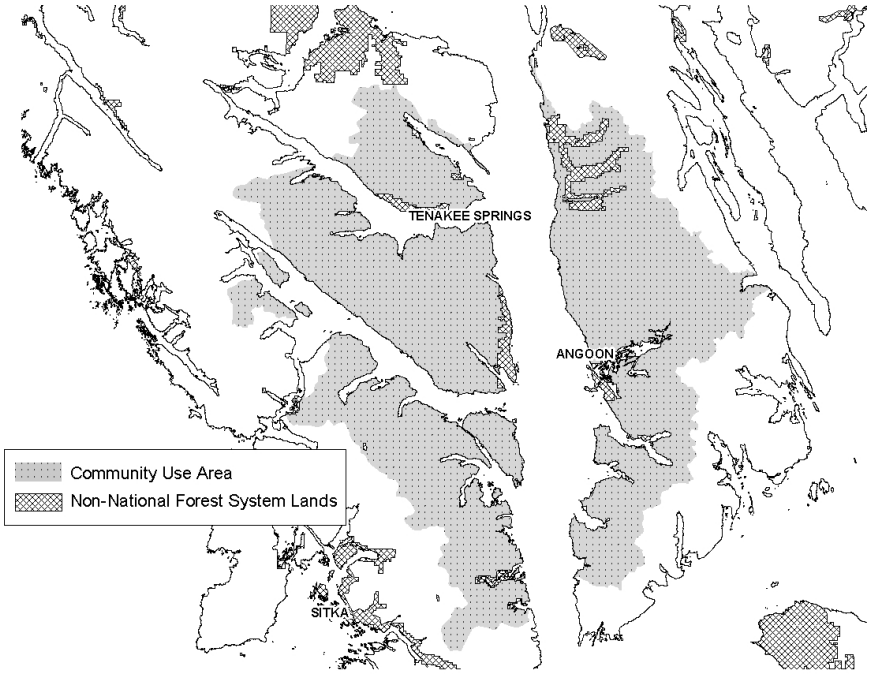

Table D-2
Roadless Areas, AKRA Management Categories, and Development Opportunity in Angoon's Community Use Area

Roadless Category (acres)	Alternative					
	1	2	3	4	5	6
Total Community Use Area	1,083,231	1,083,231	1,083,231	1,083,231	1,083,231	1,083,231
Total Roadless Area	465,353	489,721	390,137	458,134	0	280,708
Roadless Share	43%	45%	36%	42%	0%	26%
AKRA Management Categories (acres)						
LUD II Priority	na	78,523	0	78,523	0	72,957
Roadless Priority	na	193,179	390,137	309,351	0	207,750
Watershed Priority	na	218,020	0	0	0	0
Timber Priority	na	0	0	70,261	0	0
Development Opportunity						
Development LUDs (acres)	137,947	121,290	137,633	146,028	322,608	322,608
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	26,485	26,327	31,086	49,455	50,571	50,571
Young-Growth	34,357	34,423	34,423	34,472	34,816	34,505
Estimated Harvest over 100 Years (acres)						
Old-Growth	4,894	4,513	4,437	5,418	5,419	5,419
Young-Growth	29,224	28,405	28,281	28,095	27,949	27,960

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 13 percent (137,947 acres) of the Angoon CUA is presently managed in development LUDs. This total would increase under Alternatives 4, 5, and 6, with net gains ranging from about 8,081 acres (Alternative 4) to 184,661 acres (Alternatives 5 and 6). Under Alternatives 2 and 3, the total area of the Angoon CUA managed in development LUDs would decrease by approximately 16,657 and 314 acres, respectively.

Suitable old-growth and young-growth acres available for harvest would increase under Alternatives 3 through 6, as well as for young-growth under Alternative 2. Net gains in suitable old-growth would range from about 4,600 acres (Alternative 3) to 24,086 acres (Alternatives 5 and 6). Under Alternative 2, suitable old-growth acres available for harvest would decrease by about 159 acres. Increases in suitable young-growth acres would be 1 percent or less under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 4,437 acres (Alternative 3) to 5,419 acres (Alternatives 5 and 6) in the Angoon CUA. This represents a decrease relative to Alternative 1 for Alternatives 2 and 3, and an increase for Alternatives 4 to 6. Estimated young-growth harvest would range from about 27,949 acres (Alternative 5) to 29,224 acres (Alternative 1), with a decrease in potential young-growth harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table 1).

Coffman Cove

Coffman Cove's CUA encompasses a total of 1,228,787 acres (Figure D-2). Almost half of this area (46 percent) is presently managed as roadless (Table D-3). This share would drop to 28 percent under Alternatives 3 and 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 68 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 13 percent of the AKRA areas in the

Coffman Cove CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-2
Coffman Cove's Community Use Area

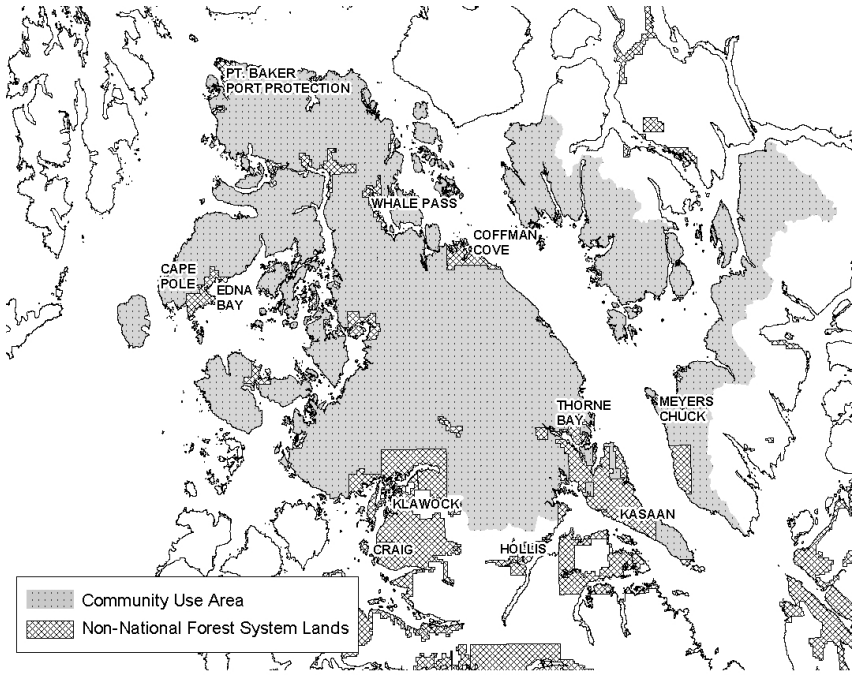

Table D-3
Roadless Areas, AKRA Management Categories, and Development Opportunity in Coffman Cove's Community Use Area

Roadless Category (acres)	Alternative 1	2	3	4	5	6
Total Community Use Area	1,228,787	1,228,787	1,228,787	1,228,787	1,228,787	1,228,787
Total Roadless Area	565,615	574,404	345,671	524,909	0	346,465
Roadless Share	46%	47%	28%	43%	0%	28%
AKRA Management Categories (acres)						
LUD II Priority	na	161,231	0	161,231	0	148,641
Roadless Priority	na	170,727	345,671	295,462	0	197,824
Watershed Priority	na	242,446	0	0	0	0
Timber Priority	na	0	0	68,217	0	0
Development Opportunity						
Development LUDs (acres)	355,672	364,688	415,861	392,556	566,284	566,284
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	65,237	67,198	79,249	87,303	89,399	89,399
Young-Growth	133,794	134,822	134,877	135,114	135,852	135,487
Estimated Harvest over 100 Years (acres)						
Old-Growth	12,055	11,520	11,312	9,564	9,579	9,579
Young-Growth	113,804	111,252	110,812	110,118	109,056	109,787

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 29 percent (355,672 acres) of the Coffman Cove community use area is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 9,000 acres (Alternative 2) to 210,600 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 2,000 acres (Alternative 2) to 24,200 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be less than 2 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Coffman Cove CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table 2).

Craig

Craig's CUA encompasses a total of 766,933 acres (Figure D-3). Over half of this area (54 percent) is presently managed as roadless (Table D-4). This share would drop to 31 percent under Alternatives 3 and 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 55 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 17 percent of the AKRA areas in the Craig CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-3
Craig's Community Use Area

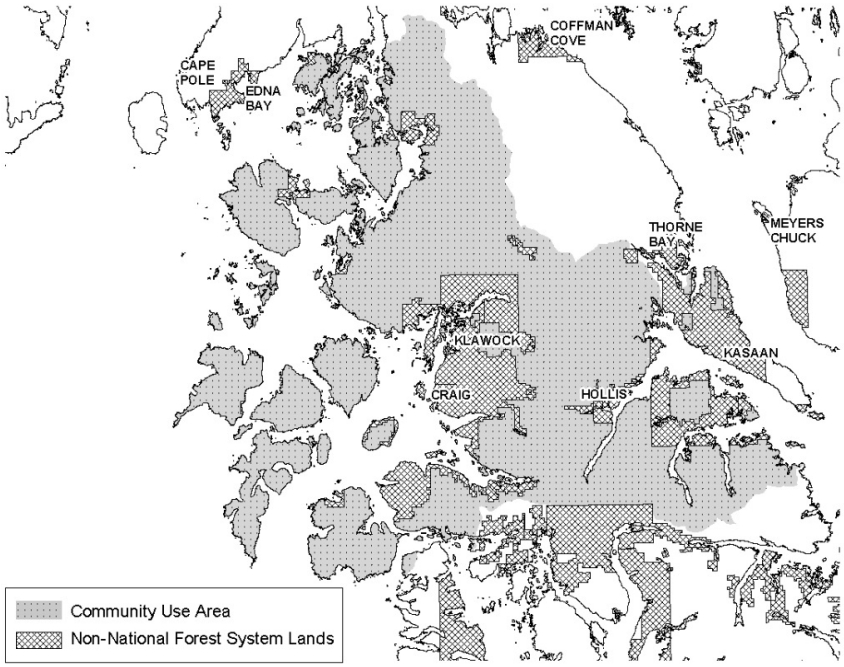

Table D-4
Roadless Areas, AKRA Management Categories, and Development Opportunity in Craig's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	766,933	766,933	766,933	766,933	766,933	766,933
Total Roadless Area	411,230	395,075	240,033	348,930	0	236,032
Roadless Share	54%	52%	31%	45%	0%	31%
AKRA Management Categories (acres)						
LUD II Priority	na	96,486	0	96,486	0	94,952
Roadless Priority	na	167,347	240,033	191,549	0	141,080
Watershed Priority	na	131,242	0	0	0	0
Timber Priority	na	0	0	60,895	0	0
Development Opportunity						
Development LUDs (acres)	201,512	219,532	271,245	253,498	370,882	370,882
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	41,173	46,572	58,653	64,161	65,494	65,494
Young-Growth	72,387	75,808	76,842	77,012	77,186	77,067
Estimated Harvest over 100 Years (acres)						
Old-Growth	7,608	7,984	8,372	7,029	7,018	7,018
Young-Growth	61,572	62,555	63,132	62,766	61,962	62,448

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 26 percent (201,512 acres) of the Craig CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 18,021 acres (Alternative 2) to 169,371 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 5,399 acres (Alternative 2) to 24,321 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from net gains of about 3,421 acres (Alternative 2) to 4,799 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 7,018 acres (Alternatives 5 and 6) to 8,372 acres (Alternative 3). Estimated young-growth harvest would range from about 61,572 acres (Alternative 1) to 63,132 acres (Alternative 3), with an increase in potential young-growth harvest relative to Alternative 1 in all case (Table D-4)

Edna Bay

Edna Bay's CUA encompasses a total of 665,386 acres (Figure D-4). About half of this area (52 percent) is presently managed as roadless (Table D-5). This share would drop to 27 percent under Alternative 3 and 34 percent under Alternative 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 86 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 17 percent of the AKRA areas in the Edna Bay CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-4
Edna Bay's Community Use Area

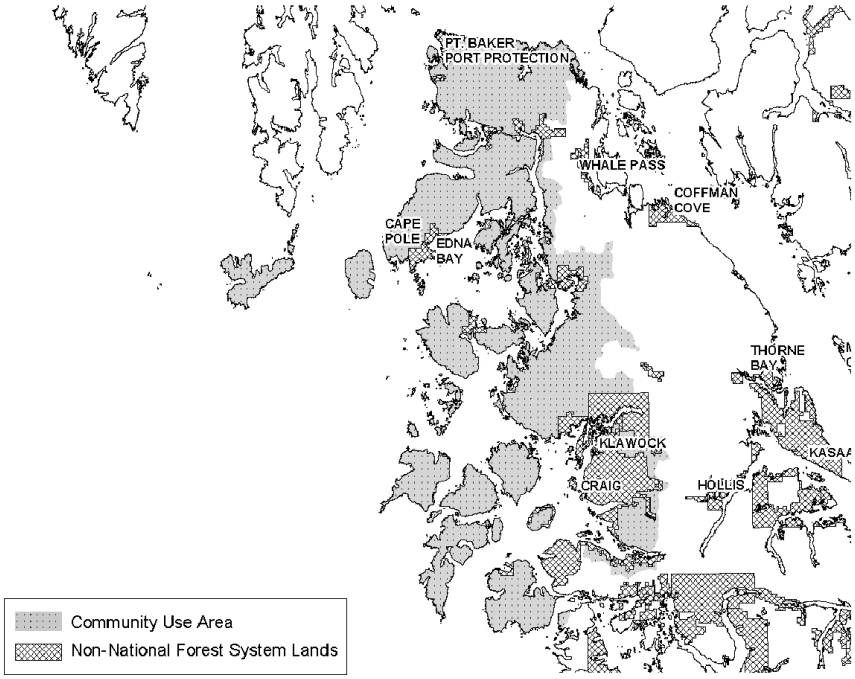

Table D-5
Roadless Areas, AKRA Management Categories, and Development Opportunity in Edna Bay's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	665,386	665,386	665,386	665,386	665,386	665,386
Total Roadless Area	344,742	365,789	176,731	336,981	0	228,032
Roadless Share	52%	55%	27%	51%	0%	34%
AKRA Management Categories (acres)						
LUD II Priority	na	157,985	0	157,985	0	144,315
Roadless Priority	na	116,738	176,731	121,894	0	83,717
Watershed Priority	na	91,066	0	0	0	0
Timber Priority	na	0	0	57,102	0	0
Development Opportunity						
Development LUDs (acres)	166,492	164,610	190,316	182,926	282,749	282,749
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	32,514	33,621	40,271	49,946	50,553	50,553
Young-Growth	64,004	64,527	64,546	64,605	64,717	64,614
Estimated Harvest over 100 Years (acres)						
Old-Growth	6,008	5,764	5,748	5,471	5,417	5,417
Young-Growth	54,441	53,246	53,030	52,654	51,952	52,357

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 25 percent (166,492 acres) of the Edna Bay CUA is presently managed in development LUDs. This total would increase under all action alternatives except for Alternative 2, with net gains ranging from about 16,434 acres (Alternative 4) to 116,257 acres (Alternatives 5 and 6). Under Alternative 2, development LUD acres would decrease by approximately 1,882 acres.

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 1,108 acres (Alternative 2) to 18,040 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be about 1 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Edna Bay CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-5).

Elfin Cove

Elfin Cove's CUA encompasses a total of 357,385 acres (Figure D-5). About half of this area (53 percent) is presently managed as roadless (Table D-6). This share would drop to 12 percent under Alternative 3, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for the entire decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. However, Timber Priority acres would account for less than a tenth of one percent of the AKRA areas in the Elfin Cove CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-5
Elfin Cove's Community Use Area

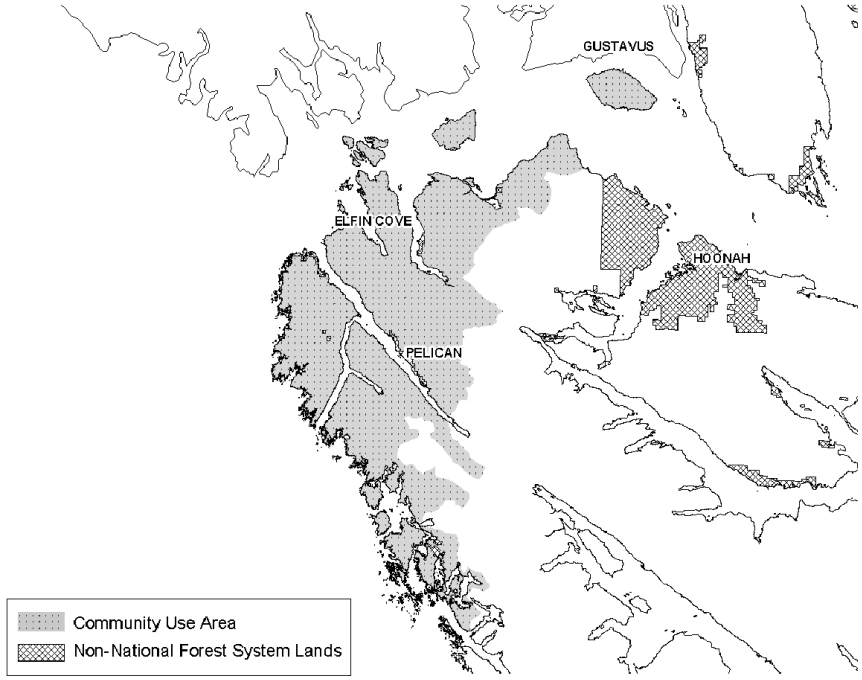

Table D-6
Roadless Areas, AKRA Management Categories, and Development Opportunity in Elfin Cove's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	357,385	357,385	357,385	357,385	357,385	357,385
Total Roadless Area	190,165	190,591	43,408	189,809	0	185,600
Roadless Share	53%	53%	12%	53%	0%	52%
AKRA Management Categories (acres)						
LUD II Priority	na	146,520	0	146,520	0	146,213
Roadless Priority	na	38,892	43,408	43,285	0	39,387
Watershed Priority	na	5,180	0	0	0	0
Timber Priority	na	0	0	0	0	0
Development Opportunity						
Development LUDs (acres)	0	0	0	0	0	0
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	0	0	0	0	0	0

Table D-6
Roadless Areas, AKRA Management Categories, and Development Opportunity in Elfin Cove's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Young-Growth	0	0	0	0	0	0
Estimated Harvest over 100 Years (acres)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	0	0

na = not applicable

There would be no acres available for development or suitable for old-growth or young-growth harvest in the Elfin Cove CUA under any of the alternatives.

Gustavus

The Gustavus CUA encompasses a total of 480,541 acres (Figure D-6). Most of this area (80 percent) is presently managed as roadless (Table D-7). This share would drop to 55 and 58 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 96 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 19 percent of the AKRA areas in the Gustavus CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-6
Gustavus Community Use Area

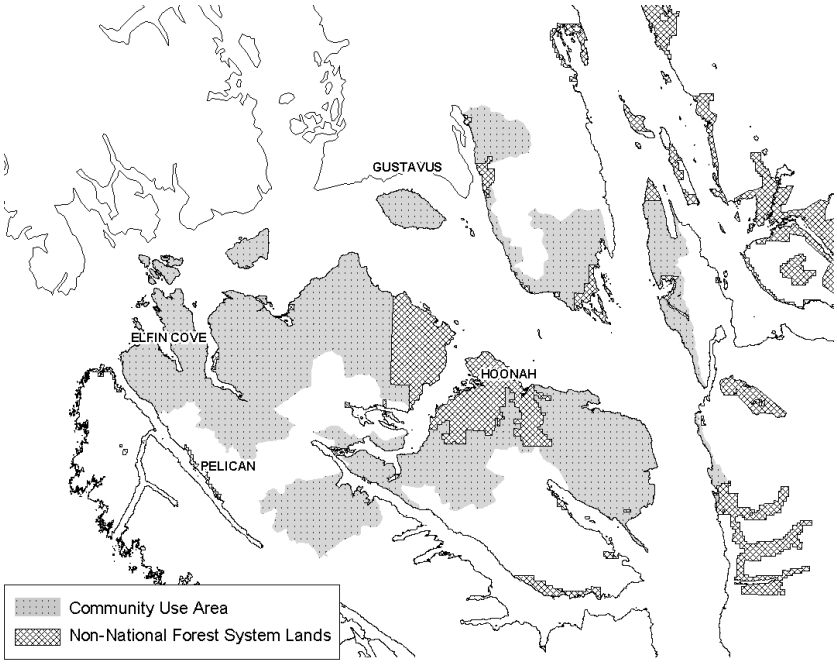

Table D-7
Roadless Areas, AKRA Management Categories, and Development Opportunity in Gustavus' Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	480,541	480,541	480,541	480,541	480,541	480,541
Total Roadless Area	383,079	383,464	265,235	381,253	0	279,161
Roadless Share	80%	80%	55%	79%	0%	58%
AKRA Management Categories (acres)						
LUD II Priority	na	113,111	0	113,111	0	112,882
Roadless Priority	na	194,370	265,235	195,840	0	166,279
Watershed Priority	na	75,983	0	0	0	0
Timber Priority	na	0	0	72,302	0	0
Development Opportunity						
Development LUDs (acres)	44,469	44,519	48,281	45,789	144,643	144,643
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	14,106	14,454	16,124	26,653	27,623	27,623
Young-Growth	11,341	11,516	11,542	11,646	12,530	11,770

Table D-7
Roadless Areas, AKRA Management Categories, and Development Opportunity in Gustavus' Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Estimated Harvest over 100 Years (acres)						
Old-Growth	2,607	2,478	2,302	2,920	2,960	2,960
Young-Growth	9,647	9,503	9,483	9,491	10,059	9,537

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 9 percent (44,469 acres) of the Gustavus CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 50 acres (Alternative 2) to 100,174 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 348 acres (Alternative 2) to 13,516 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from net gains of about 175 acres (Alternative 2) to 1,189 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 2,478 acres (Alternative 2) to 2,960 acres (Alternatives 5 and 6). Estimated young-growth harvest would range from about 9,483 acres (Alternative 3) to 10,059 acres (Alternative 5).

Haines

Haines' CUA encompasses a total of 232,496 acres (Figure D-7). Nearly all of this area (97 percent) is presently managed as roadless (Table D-8). This share would lower to 83 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 8 percent of the AKRA areas in the Haines CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-7
Haines Community Use Area

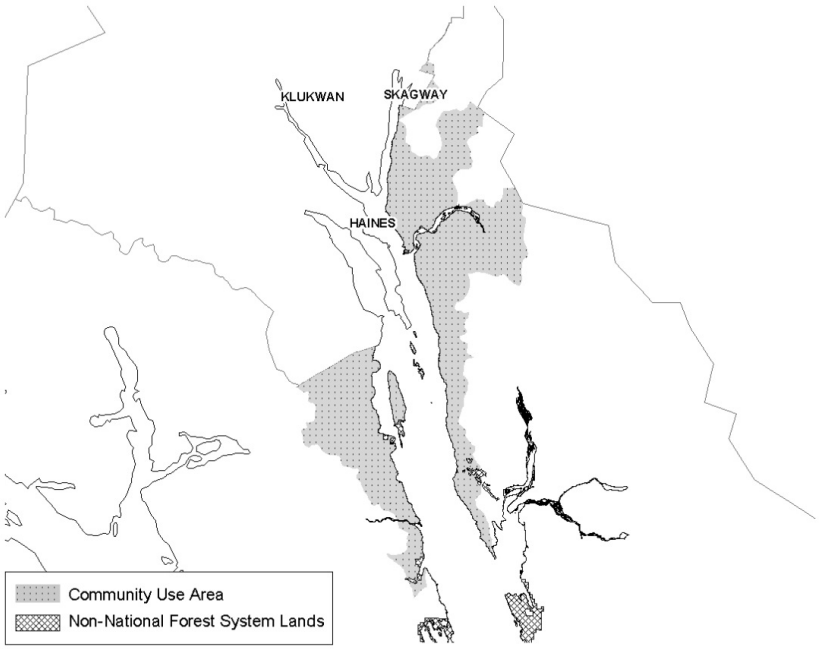

Table D-8
Roadless Areas, AKRA Management Categories, and Development Opportunity in Haines' Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	232,496	232,496	232,496	232,496	232,496	232,496
Total Roadless Area	226,271	224,851	224,851	224,803	0	193,317
Roadless Share	97%	97%	97%	97%	0%	83%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	139,931	224,851	206,536	0	193,317
Watershed Priority	na	84,920	0	0	0	0
Timber Priority	na	0	0	18,267	0	0
Development Opportunity						
Development LUDs (acres)	3,009	4,446	4,446	4,446	32,581	32,581
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	65	65	65	72	72	72
Young-Growth	1,434	2,093	2,093	2,139	2,406	2,336
Estimated Harvest over 100 Years (acres)						
Old-Growth	12	11	9	8	8	8
Young-Growth	1,220	1,727	1,720	1,743	1,932	1,893

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 1 percent (3,009 acres) of the Haines CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 1,437 acres (Alternative 2) to 29,572 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would stay the same or increase under all action alternatives. Net gains in suitable old-growth are negligible under all alternatives. Increases in suitable young-growth acres would range from net gains of about 659 acres (Alternatives 2 and 3) to 972 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated young-growth harvest would increase relative to Alternative 1 under all action alternatives, from about 500 acres (Alternative 3) to 712 acres (Alternative 5).

Hollis

The Hollis CUA encompasses a total of 289,872 acres (Figure D-8). Over half of this area (63 percent) is presently managed as roadless (Table D-9). This share would drop to 48 and 30 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 16 percent of the AKRA areas in the Hollis CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-8
Hollis' Community Use Area

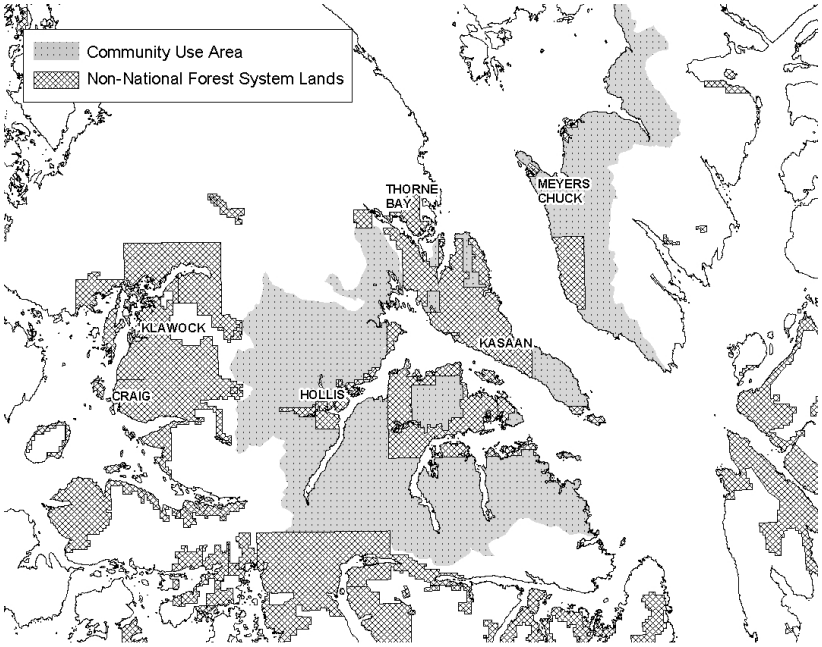

Table D-9
Roadless Areas, AKRA Management Categories, and Development Opportunity in Hollis' Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	289,872	289,872	289,872	289,872	289,872	289,872
Total Roadless Area	183,768	162,641	139,869	148,658	0	86,202
Roadless Share	63%	56%	48%	51%	0%	30%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	76,666	139,869	124,664	0	86,202
Watershed Priority	na	85,975	0	0	0	0
Timber Priority	na	0	0	23,994	0	0
Development Opportunity						
Development LUDs (acres)	41,204	58,999	80,070	70,482	131,665	131,665
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	8,949	12,867	17,082	17,634	18,590	18,590
Young-Growth	12,916	15,566	16,598	16,603	16,841	16,633
Estimated Harvest over 100 Years (acres)						
Old-Growth	1,654	2,206	2,438	1,932	1,992	1,992
Young-Growth	10,986	12,845	13,637	13,531	13,519	13,478

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 14 percent (41,204 acres) of the Hollis CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 17,795 acres (Alternative 2) to 90,461 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 3,918 acres (Alternative 2) to 9,641 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from 2,651 acres (Alternative 2) to 3,925 acres (Alternative 5), representing a 21 to 30 percent increase under the action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Hollis CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with larger increases under Alternatives 3 to 6 (Table D-9).

Hoonah

Hoonah's CUA encompasses a total of 583,825 acres (Figure D-9). About three-quarters of this area (76 percent) is presently managed as roadless (Table D-10). This share would drop to 57 and 49 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 90 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 22 percent of the AKRA areas in the Hoonah CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-9
Hoonah's Community Use Area

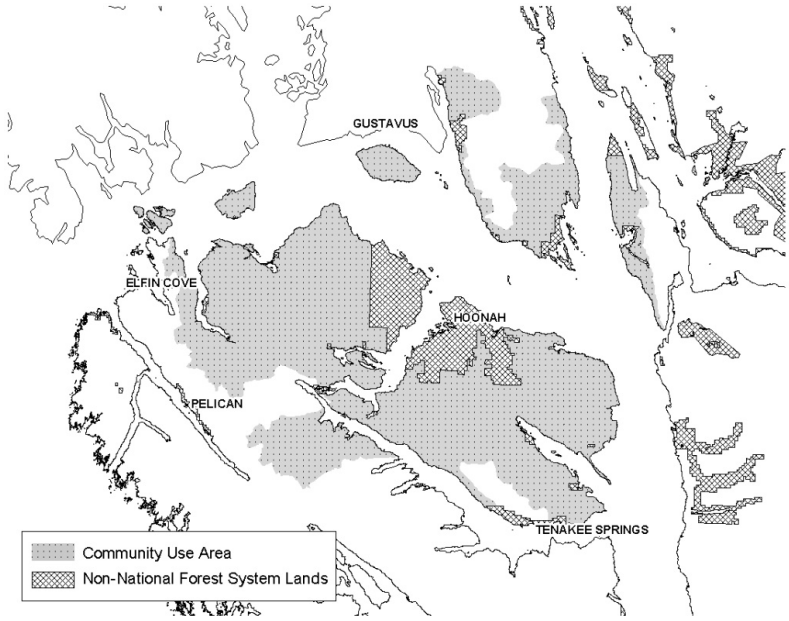

Table D-10
Roadless Areas, AKRA Management Categories, and Development Opportunity in Hoonah's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	583,825	583,825	583,825	583,825	583,825	583,825
Total Roadless Area	441,207	441,634	332,465	438,311	0	288,198
Roadless Share	76%	76%	57%	75%	0%	49%
AKRA Management Categories (acres)						
LUD II Priority	na	98,628	0	98,628	0	98,402
Roadless Priority	na	223,742	332,465	243,037	0	189,795
Watershed Priority	na	119,264	0	0	0	0
Timber Priority	na	0	0	96,646	0	0
Development Opportunity						
Development LUDs (acres)	81,581	81,666	90,855	83,873	230,747	230,747
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	24,454	25,424	28,617	43,469	44,552	44,552
Young-Growth	20,099	20,364	20,389	20,493	21,621	20,619
Estimated Harvest over 100 Years (acres)						
Old-Growth	4,519	4,359	4,085	4,762	4,774	4,774
Young-Growth	17,096	16,804	16,751	16,702	17,356	16,708

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 14 percent (81,581 acres) of the Hoonah CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 85 acres (Alternative 2) to 149,167 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 970 acres (Alternative 2) to 20,098 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from net gains of about 265 acres (Alternative 2) to 1,522 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 4,085 acres (Alternative 3) to 4,744 acres (Alternatives 5 and 6). Estimated young-growth harvest would range from about 16,702 acres (Alternative 4) to more than 17,356 acres (Alternatives 2 to 6).

Hydaburg

Hydaburg's CUA encompasses a total of 764,430 acres (Figure D-10). More than two-thirds of this area (69 percent) is presently managed as roadless (Table D-11). This share would drop to 37 percent under Alternative 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 61 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 15 percent of the AKRA areas in the Hydaburg CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-10
Hydaburg's Community Use Area

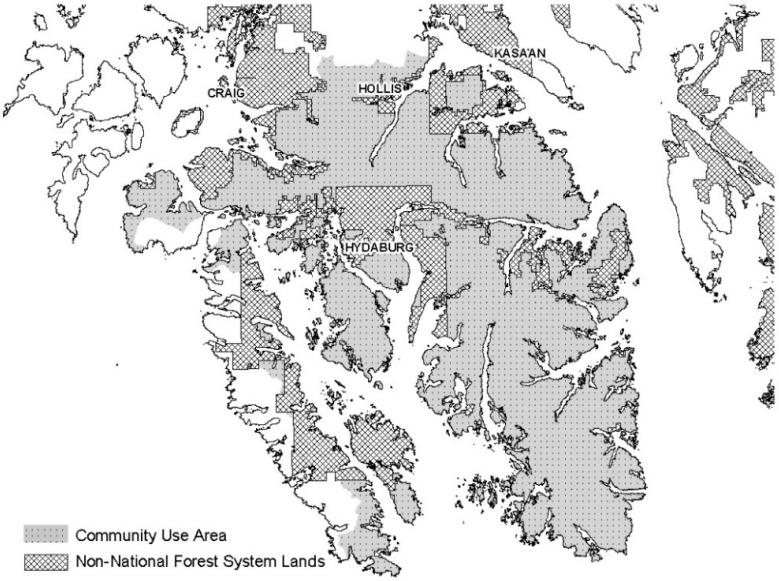

Table D-11
Roadless Areas, AKRA Management Categories, and Development Opportunity in Hydaburg's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	764,430	764,430	764,430	764,430	764,430	764,430
Total Roadless Area	531,044	525,360	447,888	501,226	0	284,469
Roadless Share	69%	69%	59%	66%	0%	37%
AKRA Management Categories (acres)						
LUD II Priority	na	55,351	0	55,351	0	50,906
Roadless Priority	na	211,312	447,888	370,086	0	233,562
Watershed Priority	na	258,697	0	0	0	0
Timber Priority	na	0	0	75,789	0	0
Development Opportunity						
Development LUDs (acres)	70,471	85,592	106,361	103,246	297,461	297,461
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	13,472	17,837	21,730	25,313	27,188	27,188
Young-Growth	16,869	19,438	20,443	20,760	21,030	20,933
Estimated Harvest over 100 Years (acres)						
Old-Growth	2,489	3,058	3,102	2,773	2,913	2,913
Young-Growth	14,348	16,040	16,796	16,919	16,882	16,962

na – not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 9 percent (70,471 acres) of the Hydaburg community use area is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 15,100 acres (Alternative 2) to 227,000 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 4,400 acres (Alternative 2) to 13,700 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from net gains of about 2,600 acres (Alternative 2) to 4,100 acres (Alternatives 5 and 6).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 2,500 acres (Alternative 1) to 2,913 acres (Alternatives 5 and 6). Estimated young-growth harvest would range from about 14,300 acres (Alternative 1) to more than 16,000 acres (Alternatives 2 to 6).

Hyder

Hyder's CUA encompasses a total of 108,809 acres (Figure D-11). Most of this area (93 percent) is presently managed as roadless (Table D-12). This share would drop to 57 percent under Alternative 6, with no acres managed as roadless under Alternative 5. No AKRA acres in the Hyder CUA under any alternative would be managed as Timber Priority, which allow timber harvest and road building. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites.

Figure D-11
Hyder's Community Use Area

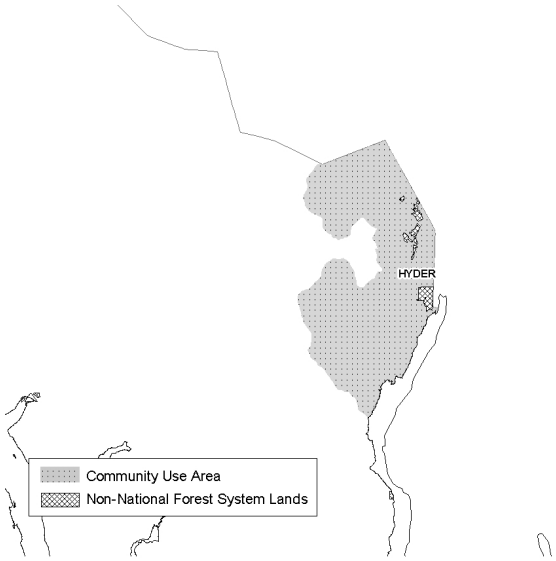

Table D-12
Roadless Areas, AKRA Management Categories, and Development Opportunity in Hyder's Community Use Area

Roadless Category (acres)	Alternative 1	2	3	4	5	6
Total Community Use Area	108,809	108,809	108,809	108,809	108,809	108,809
Total Roadless Area	101,408	0	101,408	101,408	0	62,255
Roadless Share	93%	0%	93%	93%	0%	57%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	0	101,408	101,408	0	62,255
Watershed Priority	na	0	0	0	0	0
Timber Priority	na	0	0	0	0	0
Development Opportunity						
Development LUDs (acres)	3,142	3,142	3,142	3,142	10,485	10,485
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	22	22	22	22	24	24
Young-Growth	205	205	205	205	235	235
Estimated Harvest over 100 Years (acres)						
Old-Growth	4	4	3	2	3	3
Young-Growth	174	169	168	167	189	191

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 3 percent (3,142 acres) of the Hyder CUA is presently managed in development LUDs. This total would increase under Alternatives 5 and 6 by 7,343 acres (Table D-12). Very few of the acres included in development LUDs are suitable for harvest under the current Forest Plan and timber harvest is not expected to take place in the Hyder CUA under any of the alternatives.

Juneau

Juneau's CUA encompasses a total of 2,013,397 acres (Figure D-12). Most of this area (79 percent) is presently managed as roadless (Table D-13). This share would decrease to 77 and 70 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 99 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 1 percent of the AKRA areas in the Juneau CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-12
Juneau's Community Use Area

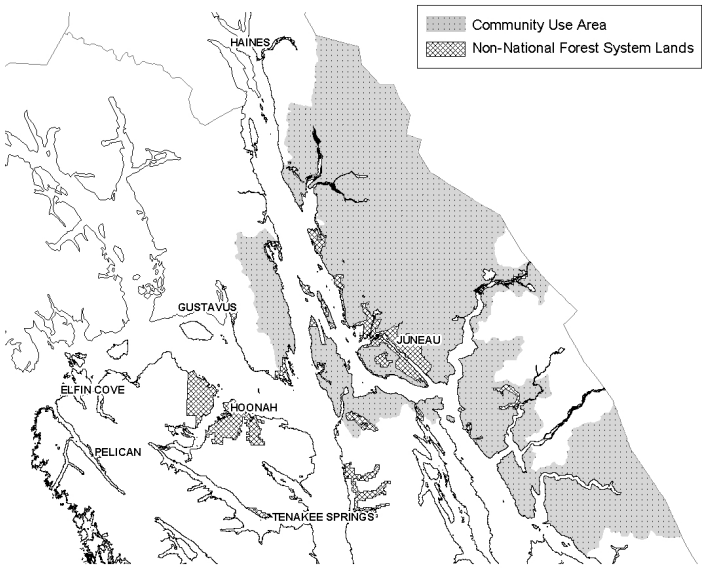

Table D-13
Roadless Areas, AKRA Management Categories, and Development Opportunity in Juneau's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	2,013,397	2,013,397	2,013,397	2,013,397	2,013,397	2,013,397
Total Roadless Area	1,593,355	1,593,471	1,552,721	1,593,449	0	1,414,037
Roadless Share	79%	79%	77%	79%	0%	70%
AKRA Management Categories (acres)						
LUD II Priority	na	40,748	0	40,748	0	40,424
Roadless Priority	na	1,088,218	1,552,721	1,538,642	0	1,373,614
Watershed Priority	na	464,504	0	0	0	0
Timber Priority	na	0	0	14,059	0	0
Development Opportunity						
Development LUDs (acres)	10,274	10,311	10,311	10,311	124,661	124,661
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	117	117	117	125	132	132
Young-Growth	740	746	746	751	1,128	944
Estimated Harvest over 100 Years (acres)						
Old-Growth	22	20	17	14	14	14
Young-Growth	629	616	613	612	905	765

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 1 percent (10,274 acres) of the Juneau CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 37 acres (Alternatives 2 to 4) to 114,387 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would stay the same or increase under all action alternatives. Net gains in suitable old-growth would range from about 7 acres (Alternative 4) to 15 acres (Alternatives 5 and 6), with no change for Alternatives 2 and 3. Increases in suitable young-growth acres would range from net gains of about 6 acres (Alternatives 2 and 3) to 388 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would decrease under all action alternatives, by about 2 acres (Alternative 2) to 8 acres (Alternative 3). Estimated young-growth harvest would decrease under Alternatives 2 to 4 (by 14 to 17 acres), and increase under Alternatives 5 and 6, by 276 and 136 acresrespectively.

~~Kake~~

~~Kake's CUA encompasses a total of 454,186~~2.3 million ~~immediate acres (Figure D-13)~~~~Replace Figure D-13 map with attached OVK Community Use Map (see attached).~~ ~~About half of this area (53 percent) is presently managed as roadless (Table D-14). This share would drop to 33 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 21 percent of the AKRA areas in the Kake CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.~~

Figure D-13
Kake's Community Use Area

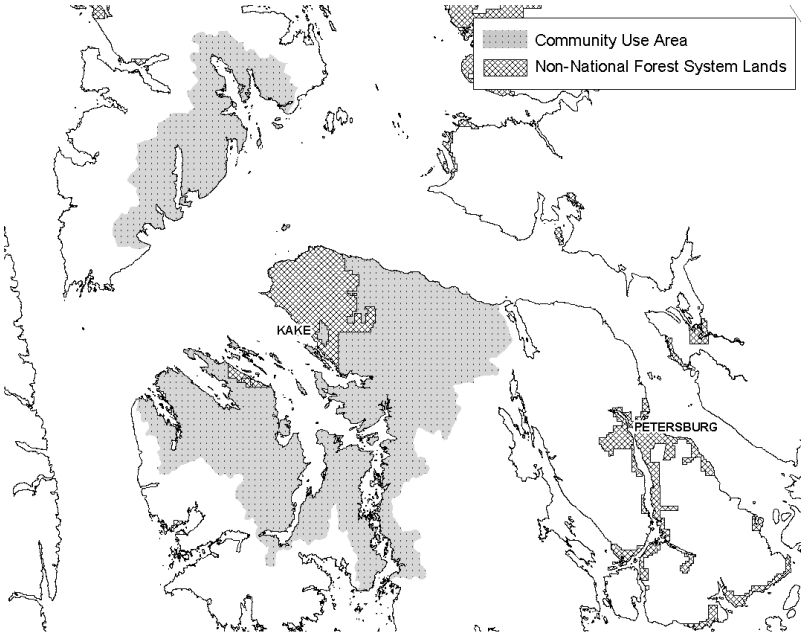

Table D-14
Roadless Areas, AKRA Management Categories, and Development Opportunity in Kake's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	454,186	454,186	454,186	454,186	454,186	454,186
Total Roadless Area	240,284	239,078	230,069	225,117	0	149,122
Roadless Share	53%	53%	51%	50%	0%	33%
AKRA Management Categories (acres)						
LUD II Priority	na	1	0	1	0	1
Roadless Priority	na	118,206	230,069	177,409	0	149,121
Watershed Priority	na	120,872	0	0	0	0
Timber Priority	na	0	0	47,707	0	0
Development Opportunity						
Development LUDs (acres)	83,550	86,174	91,215	94,201	174,163	174,163
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	13,327	14,402	15,950	23,963	23,964	23,964
Young-Growth	21,524	22,165	22,171	22,234	22,377	22,324
Estimated Harvest over 100 Years (acres)						
Old-Growth	2,463	2,469	2,277	2,625	2,568	2,568
Young-Growth	18,308	18,290	18,215	18,121	17,963	18,089

na = not applicable

~~Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 18 percent (83,550 acres) of the Kake CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 2,624 acres (Alternative 2) to 90,613 acres (Alternatives 5 and 6).~~

~~Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 1,076 acres (Alternative 2) to 10,637 acres (Alternatives 4 to 6). Increases in suitable young-growth acres would range from net gains of about 641 acres (Alternative 2) to 853 acres (Alternative 5).~~

~~Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 2,469 acres (Alternative 2) to 2,625 acres (Alternative 4), representing an increase relative to Alternative 1 under all action alternatives except Alternative 3 (186-acre decrease). Estimated young-growth harvest would decrease under all action alternatives, by about 18 acres (Alternative 2) to 345 acres (Alternative 5).~~

Kasaan

Kasaan's CUA encompasses a total of 540,324 acres (Figure D-14). About three-quarters of this area (75 percent) is presently managed as roadless (Table D-15). This share would decrease under all action alternatives, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 18 percent of the AKRA areas in the Kasaan CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-14
Kasaan's Community Use Area

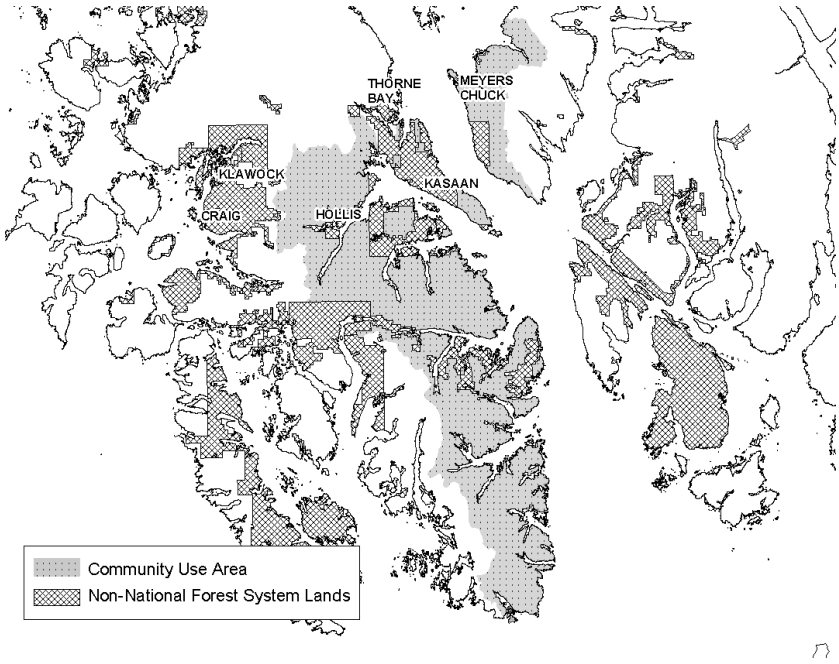

Table D-15
Roadless Areas, AKRA Management Categories, and Development Opportunity in Kasaan's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	540,324	540,324	540,324	540,324	540,324	540,324
Total Roadless Area	402,645	381,904	357,425	364,801	0	197,357
Roadless Share	75%	71%	66%	68%	0%	37%
AKRA Management Categories (acres)						
LUD II Priority	na	19	0	19	0	19
Roadless Priority	na	176,777	357,425	298,103	0	197,338
Watershed Priority	na	205,108	0	0	0	0
Timber Priority	na	0	0	66,679	0	0
Development Opportunity						
Development LUDs (acres)	55,376	74,264	97,023	86,948	233,670	233,670
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	12,706	16,861	21,359	23,342	25,214	25,214
Young-Growth	15,112	17,985	19,017	19,045	19,348	19,117
Estimated Harvest over 100 Years (acres)						
Old-Growth	2,348	2,891	3,049	2,557	2,702	2,702
Young-Growth	12,855	14,841	15,624	15,522	15,531	15,490

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 10 percent (55,376 acres) of the Kasaan CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 18,887 acres (Alternative 2) to 178,293 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 4,155 acres (Alternative 2) to 12,508 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from 2,872 acres (Alternative 2) to 4,235 acres (Alternative 5), representing a 19 to 28 percent increase relative to Alternative 1.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Kasaan CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with larger increases in estimated old-growth harvest over 100 years under Alternatives 2 and 3, and larger increases in young-growth harvest under Alternatives 3 to 6 (Table D-15).

Kake

Kake's CUA encompasses a total of 454,186 acres (Figure D-13). About half of this area (53 percent) is presently managed as roadless (Table D-14). This share would drop to 33 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 21 percent of the AKRA areas in the Kake CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Commented [U31]: Please replace Figure D-13 with the attached OVK Community Use Map (attached). 2.3 million core acres. 6 million total acres (core and shared).

Commented [U32]: Please update the remainder of this paragraph to addresse the alternatives using the attached OVK Kake Community Use Area Map.

Figure D-13
Kake's Community Use Area

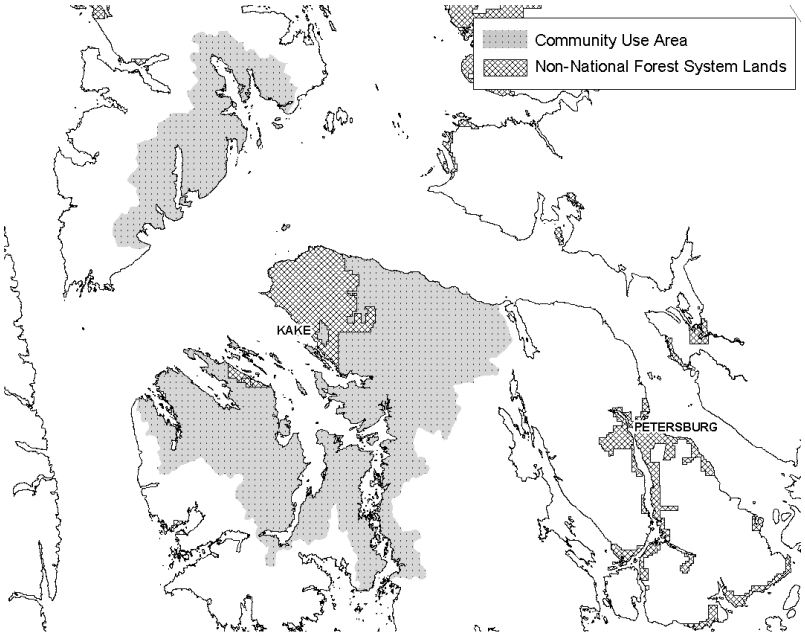

Table D-14
Roadless Areas, AKRA Management Categories, and Development Opportunity in Kake's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	454,186	454,186	454,186	454,186	454,186	454,186
Total Roadless Area	240,284	239,078	230,069	225,117	0	149,122
Roadless Share	53%	53%	51%	50%	0%	33%
AKRA Management Categories (acres)						
LUD II Priority	na	1	0	1	0	1
Roadless Priority	na	118,206	230,069	177,409	0	149,121
Watershed Priority	na	120,872	0	0	0	0
Timber Priority	na	0	0	47,707	0	0
Development Opportunity						
Development LUDs (acres)	83,550	86,174	91,215	94,201	174,163	174,163
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	13,327	14,402	15,950	23,963	23,964	23,964
Young-Growth	21,524	22,165	22,171	22,234	22,377	22,324
Estimated Harvest over 100 Years (acres)						
Old-Growth	2,463	2,469	2,277	2,625	2,568	2,568
Young-Growth	18,308	18,290	18,215	18,121	17,963	18,089

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 18 percent (83,550 acres) of the Kake CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 2,624 acres (Alternative 2) to 90,613 acres (Alternatives 5 and 6).

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Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 1,076 acres (Alternative 2) to 10,637 acres (Alternatives 4 to 6). Increases in suitable young-growth acres would range from net gains of about 641 acres (Alternative 2) to 853 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 2,469 acres (Alternative 2) to 2,625 acres (Alternative 4), representing an increase relative to Alternative 1 under all action alternatives except Alternative 3 (186-acre decrease). Estimated young-growth harvest would decrease under all action alternatives, by about 18 acres (Alternative 2) to 345 acres (Alternative 5).

Ketchikan

Ketchikan's CUA encompasses a total of 1,975,122 acres (Figure D-15). Almost half of this area (47 percent) is presently managed as roadless (Table D-16). This share would decrease to 43 and 31 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 40 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 15 percent of the AKRA areas in the Ketchikan CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-15
Ketchikan's Community Use Area

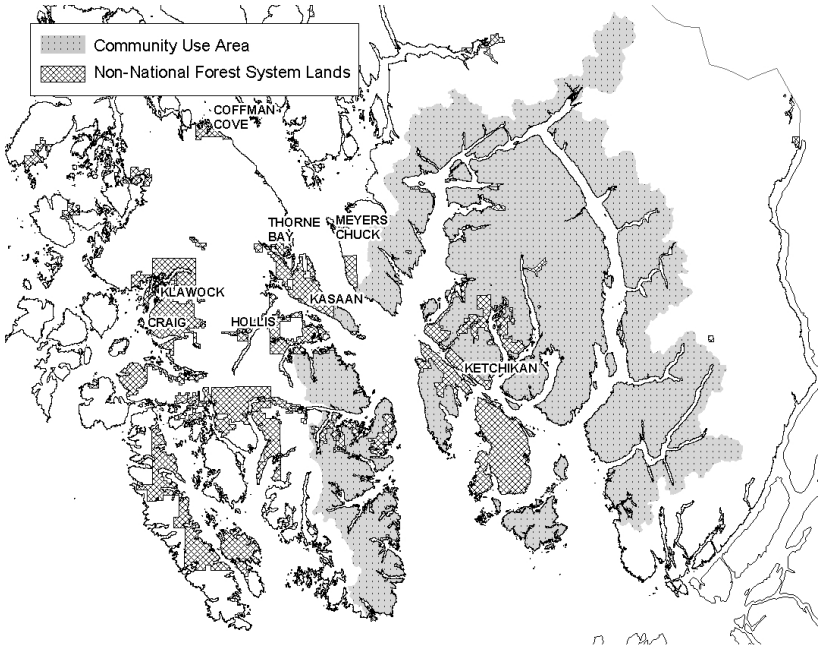

Table D-16
Roadless Areas, AKRA Management Categories, and Development Opportunity in Ketchikan's Community Use Area

Roadless Category (acres)	Alternative					
	1	2	3	4	5	6
Total Community Use Area	1,975,122	1,975,122	1,975,122	1,975,122	1,975,122	1,975,122
Total Roadless Area	923,373	915,682	850,098	902,898	0	611,948
Roadless Share	47%	46%	43%	46%	0%	31%
AKRA Management Categories (acres)						
LUD II Priority	na	29,952	0	29,952	0	29,627
Roadless Priority	na	402,354	850,098	735,272	0	582,322
Watershed Priority	na	483,376	0	0	0	0
Timber Priority	na	0	0	137,674	0	0
Development Opportunity						
Development LUDs (acres)	121,179	131,805	164,919	137,432	413,416	413,416
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	30,742	34,273	42,359	55,722	57,662	57,662
Young-Growth	32,874	34,223	34,243	34,539	35,463	35,022
Estimated Harvest over 100 Years (acres)						
Old-Growth	5,681	5,876	6,047	6,104	6,178	6,178
Young-Growth	27,962	28,240	28,134	28,150	28,468	28,379

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 6 percent (121,179 acres) of the Ketchikan CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 10,625 acres (Alternative 2) to 292,236 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 3,532 acres (Alternative 2) to 26,920 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from 4 percent (Alternatives 2 and 3) to 8 percent (Alternative 5) of the existing total.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Ketchikan CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases (Table D-16).

Klawock

Klawock's CUA encompasses a total of 767,934 acres (Figure D-16). About half of this area (54 percent) is presently managed as roadless (Table D-17). This share would drop to 31 percent under Alternatives 3 and 6, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 55 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 17 percent of the AKRA areas in the Klawock CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-16
Klawock's Community Use Area

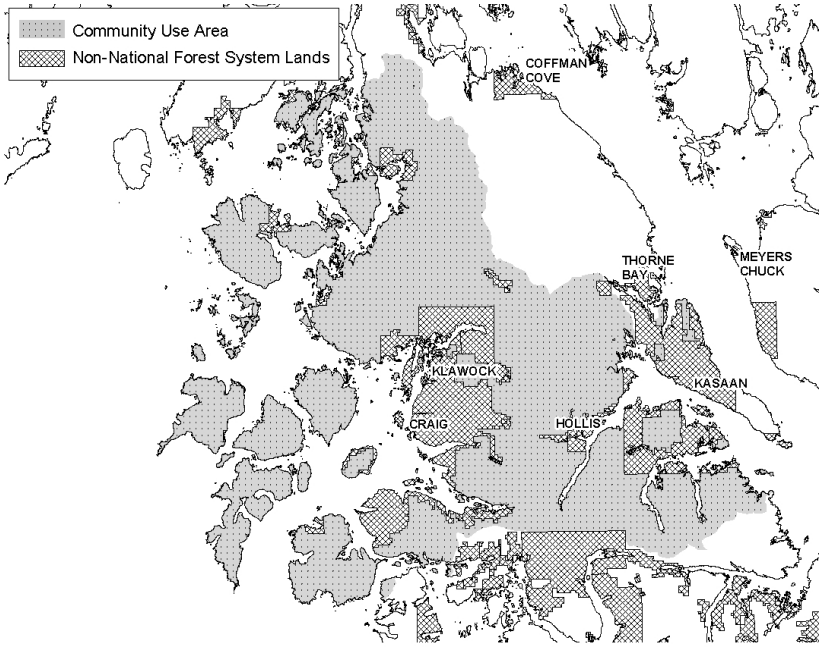

Table D-17
Roadless Areas, AKRA Management Categories, and Development Opportunity in Klawock's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	767,934	767,934	767,934	767,934	767,934	767,934
Total Roadless Area	411,230	395,075	240,033	348,930	0	236,032
Roadless Share	54%	51%	31%	45%	0%	31%
AKRA Management Categories (acres)						
LUD II Priority	na	96,486	0	96,486	0	94,952
Roadless Priority	na	167,347	240,033	191,549	0	141,080
Watershed Priority	na	131,242	0	0	0	0
Timber Priority	na	0	0	60,895	0	0
Development Opportunity						
Development LUDs (acres)	201,512	219,532	271,245	253,498	370,882	370,882
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	41,173	46,572	58,653	64,161	65,494	65,494
Young-Growth	72,387	75,808	76,842	77,012	77,186	77,067
Estimated Harvest over 100 Years (acres)						
Old-Growth	7,608	7,984	8,372	7,029	7,018	7,018
Young-Growth	61,572	62,555	63,132	62,766	61,962	62,448

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 26 percent (201,512 acres) of the Klawock CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 18,021 acres (Alternative 2) to 169,371 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 5,399 acres (Alternative 2) to 24,321 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from net gains of about 3,421 acres (Alternative 2) to 4,799 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 7,018 acres (Alternatives 5 and 6) to 8,372 acres (Alternative 3). Estimated young-growth harvest would range from about 61,572 acres (Alternative 1) to 63,132 acres (Alternative 3).

Metlakatla

Metlakatla's CUA encompasses a total of 1,975,123 acres (Figure D-17). Almost half of this area (47 percent) is presently managed as roadless (Table D-18). This share would drop to 43 and 31 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 40 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 15 percent of the AKRA areas in the Metlakatla CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-17
Metlakatla's Community Use Area

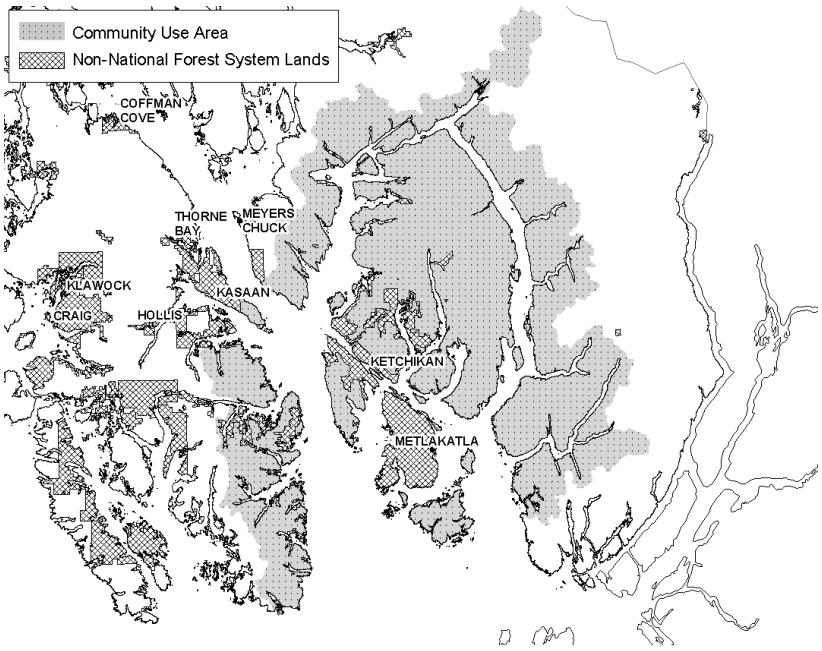

Table D-18
Roadless Areas, AKRA Management Categories, and Development Opportunity in Metlakatla's Community Use Area

Roadless Category (acres)	Alternative					
	1	2	3	4	5	6
Total Community Use Area	1,975,123	1,975,123	1,975,123	1,975,123	1,975,123	1,975,123
Total Roadless Area	923,373	915,682	850,098	902,898	0	611,948
Roadless Share	47%	46%	43%	46%	0%	31%
AKRA Management Categories (acres)						
LUD II Priority	na	29,952	0	29,952	0	29,627
Roadless Priority	na	402,354	850,098	735,272	0	582,322
Watershed Priority	na	483,376	0	0	0	0
Timber Priority	na	0	0	137,674	0	0
Development Opportunity						
Development LUDs (acres)	121,179	131,805	164,919	137,432	413,416	413,416
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	30,742	34,273	42,359	55,722	57,662	57,662
Young-Growth	32,874	34,223	34,243	34,539	35,463	35,022
Estimated Harvest over 100 Years (acres)						
Old-Growth	5,681	5,876	6,047	6,104	6,178	6,178
Young-Growth	27,962	28,240	28,134	28,150	28,468	28,379

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 6 percent (121,179 acres) of the Metlakatla CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 10,625 acres (Alternative 2) to 292,236 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 3,532 acres (Alternative 2) to 26,920 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from 4 percent (Alternatives 2 and 3) to 8 percent (Alternative 5) of the existing total.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Metlakatla CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with larger increases under Alternatives 4 to 6 (Table D-18).

Meyer's Chuck

Meyer's Chuck's CUA encompasses a total of 380,308 acres (Figure D-18). Most of this area (81 percent) is presently managed as roadless (Table D-19). This share would drop to 69 and 52 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 81 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 2 percent of the AKRA areas in the Meyer's Chuck CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-18
Meyers Chuck's Community Use Area

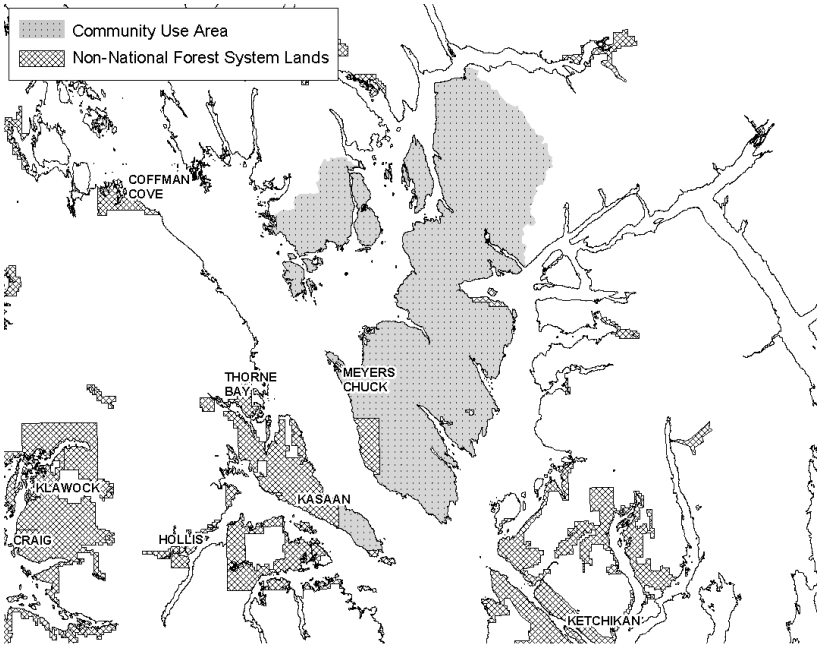

Table D-19
Roadless Areas, AKRA Management Categories, and Development Opportunity in Meyer's Chuck's Community Use Area

Roadless Category (acres)	Alternative 1	2	3	4	5	6
Total Community Use Area	380,308	380,308	380,308	380,308	380,308	380,308
Total Roadless Area	308,671	304,083	263,539	299,094	0	196,375
Roadless Share	81%	80%	69%	79%	0%	52%
AKRA Management Categories (acres)						
LUD II Priority	na	36,908	0	36,908	0	36,608
Roadless Priority	na	32,287	263,539	255,045	0	159,766
Watershed Priority	na	234,888	0	0	0	0
Timber Priority	na	0	0	7,141	0	0
Development Opportunity						
Development LUDs (acres)	10,096	14,892	16,379	16,396	117,404	117,404
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	1,544	1,645	1,885	3,253	3,355	3,355
Young-Growth	1,771	1,771	1,771	1,771	2,065	1,895
Estimated Harvest over 100 Years (acres)						
Old-Growth	285	282	269	356	359	359
Young-Growth	1,507	1,462	1,455	1,443	1,658	1,535

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 3 percent (10,096 acres) of the Meyer's Chuck CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 4,795 acres (Alternative 2) to 107,308 acres (Alternatives 5 and 6).

Suitable old-growth acres available for harvest would increase under all action alternatives, and suitable young-growth would increase under Alternatives 5 and 6. Net gains in suitable old-growth would range from about 101 acres (Alternative 2) to 1,811 acres (Alternatives 5 and 6). Suitable young-growth acres would not change under Alternatives 2 to 4, and increase by 294 acres and 123 acres under Alternatives 5 and 6, respectively.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 269 acres (Alternative 3) to 359 acres (Alternatives 5 and 6). Estimated young-growth harvest would range from about 1,443 acres (Alternative 4) to 1,658 acres (Alternative 5).

Naukati Bay

Naukati Bay's CUA encompasses a total of 1,109,349 acres (Figure D-19). Almost half of this area (47 percent) is presently managed as roadless (Table D-20). This share would drop to 25 and 33 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 74 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 13 percent of the AKRA areas in the Naukati Bay CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-19
Naukati Bay's Community Use Area

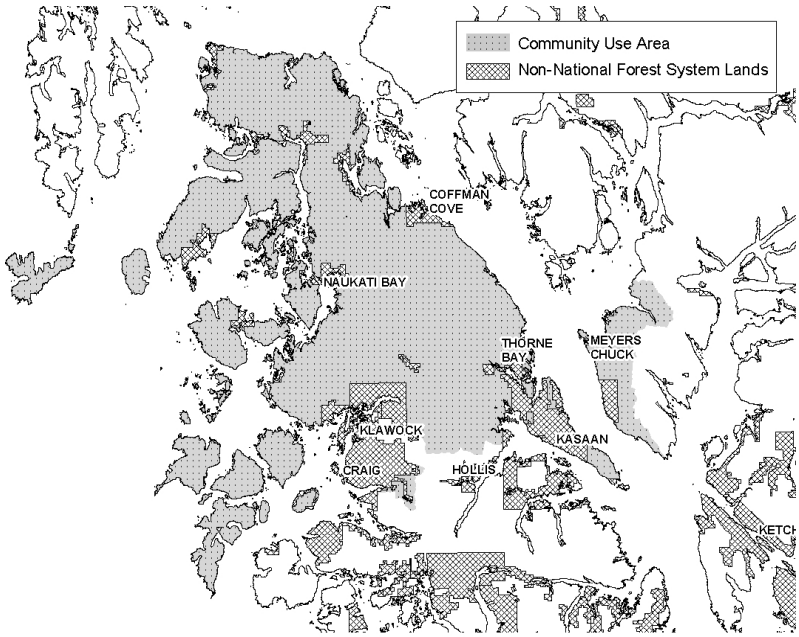

Table D-20
Roadless Areas, AKRA Management Categories, and Development Opportunity in Naukati Bay's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	1,109,349	1,109,349	1,109,349	1,109,349	1,109,349	1,109,349
Total Roadless Area	525,359	536,754	274,159	493,729	0	361,495
Roadless Share	47%	48%	25%	45%	0%	33%
AKRA Management Categories (acres)						
LUD II Priority	na	198,592	0	198,592	0	184,839
Roadless Priority	na	165,375	274,159	229,466	0	176,656
Watershed Priority	na	172,787	0	0	0	0
Timber Priority	na	0	0	65,671	0	0
Development Opportunity						
Development LUDs (acres)	328,809	333,639	383,336	359,868	484,199	484,199
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	62,854	64,981	76,802	84,581	85,553	85,553
Young-Growth	1,771	1,771	1,771	1,771	2,065	1,895
Estimated Harvest over 100 Years (acres)						
Old-Growth	11,615	11,140	10,963	9,265	9,167	9,167
Young-Growth	108,059	105,700	105,285	104,614	103,279	104,035

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 30 percent (328,809 acres) of the Naukati Bay CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 4,830 acres (Alternative 2) to 155,390 acres (Alternatives 5 and 6).

Suitable old-growth acres available for harvest would increase under all action alternatives, and suitable young-growth would increase under Alternatives 5 and 6. Net gains in suitable old-growth would range from about 2,127 acres (Alternative 2) to 22,698 acres (Alternatives 5 and 6). Suitable young-growth acres would not change under Alternatives 2 to 4, and increase by 294 acres and 123 acres under Alternatives 5 and 6, respectively.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Naukati Bay CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-20).

Pelican

Pelican's CUA encompasses a total of 488,851 acres (Figure D-20). Almost half of this area (49 percent) is presently managed as roadless (Table D-21). This share would drop to 13 percent under Alternative 3, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for the entire decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 9 percent of the AKRA areas in the Pelican CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-20
Pelican's Community Use Area

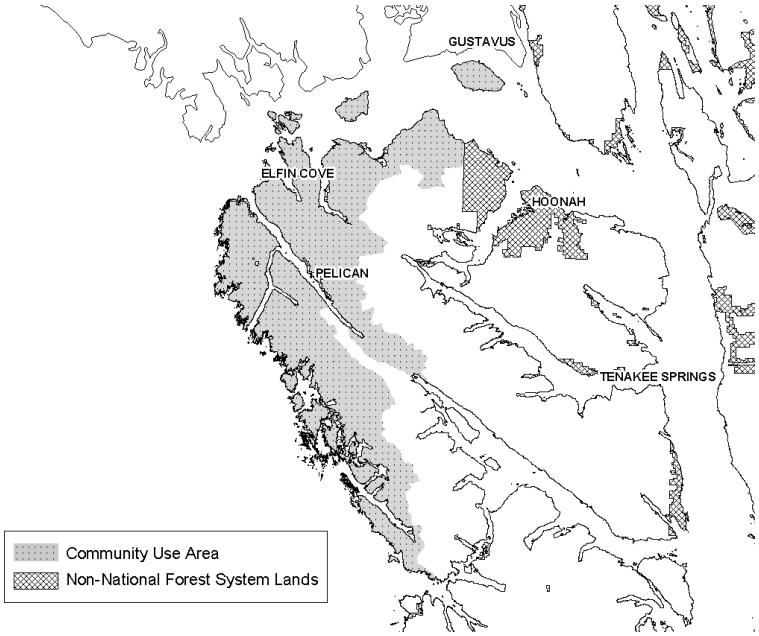

Table D-21
Roadless Areas, AKRA Management Categories, and Development Opportunity in Pelican's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	488,851	488,851	488,851	488,851	488,851	488,851
Total Roadless Area	237,750	238,183	62,488	238,183	0	230,335
Roadless Share	49%	49%	13%	49%	0%	47%
AKRA Management Categories (acres)						
LUD II Priority	na	175,032	0	175,032	0	174,719
Roadless Priority	na	42,333	62,488	42,333	0	55,617
Watershed Priority	na	20,818	0	0	0	0
Timber Priority	na	0	0	20,818	0	0
Development Opportunity						
Development LUDs (acres)	1	1	1	1	2,855	2,855
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	34	0
Estimated Harvest over 100 Years (acres)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	27	0

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Only 1 acre of the Pelican CUA is presently managed in a development LUD. This total would not change under action Alternatives 2 to 4, and would increase under Alternatives 5 and 6 by 2,854 acres (Table D-21).

There would be no suitable old-growth acres for harvest under any alternative, and no young-growth suitable acres for harvest under all alternatives except for Alternative 5, which would have less than 50 acres considered suitable under the current Forest Plan. No timber harvest is expected to occur in the Pelican CUA.

Petersburg and Kupreanof

Petersburg's CUA encompasses a total of 742,197 acres (Figure D-21). Half of this area (50 percent) is presently managed as roadless (Table D-22). This share would drop to 26 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 26 percent of the AKRA areas in the Petersburg CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-21
Petersburg's Community Use Area

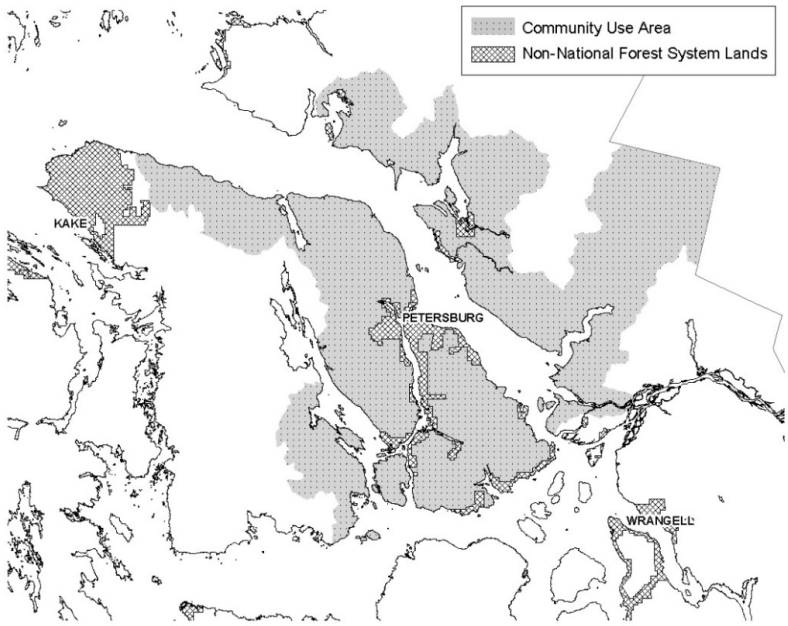

Table D-22
Roadless Areas, AKRA Management Categories, and Development Opportunity in Petersburg's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	742,197	742,197	742,197	742,197	742,197	742,197
Total Roadless Area	371,111	359,268	314,732	327,312	0	195,324
Roadless Share	50%	48%	42%	44%	0%	26%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	257,274	314,732	242,098	0	195,324
Watershed Priority	na	101,994	0	0	0	0
Timber Priority	na	0	0	85,214	0	0
Development Opportunity						
Development LUDs (acres)	111,065	124,541	161,385	145,731	285,393	285,393
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	27,065	32,247	43,104	53,050	54,424	54,424
Young-Growth	23,148	24,900	24,921	24,938	25,103	25,025
Estimated Harvest over 100 Years (acres)						
Old-Growth	5,001	5,528	6,153	5,811	5,831	5,831
Young-Growth	19,689	20,547	20,474	20,324	20,152	20,278

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 15 percent (111,065 acres) of the Petersburg CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 13,476 acres (Alternative 2) to 174,329 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 5,183 acres (Alternative 2) to 27,359 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be approximately 8 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Petersburg CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with the largest increase under Alternative 3 (Table D-22).

Point Baker

Point Baker's CUA encompasses a total of 842,636 acres (Figure D-22). Almost half of this area (48 percent) is presently managed as roadless (Table D-23). This share would drop to 25 and 36 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 87 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 11 percent of the AKRA areas in the Point Baker CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-22
Point Baker's Community Use Area

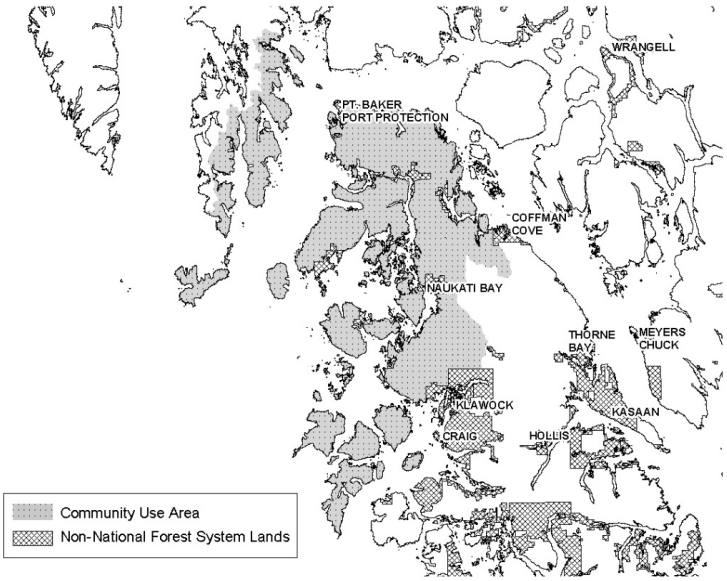

Table D-23
Roadless Areas, AKRA Management Categories, and Development Opportunity in Point Baker's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	842,636	842,636	842,636	842,636	842,636	842,636
Total Roadless Area	406,118	434,160	211,015	390,784	0	306,964
Roadless Share	48%	52%	25%	46%	0%	36%
AKRA Management Categories (acres)						
LUD II Priority	na	183,098	0	183,098	0	169,191
Roadless Priority	na	156,850	211,015	165,904	0	137,774
Watershed Priority	na	94,212	0	0	0	0
Timber Priority	na	0	0	41,782	0	0
Development Opportunity						
Development LUDs (acres)	213,586	207,436	240,143	236,018	312,448	312,447
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	38,944	40,011	48,256	54,165	54,772	54,772
Young-Growth	82,452	82,893	82,919	83,188	83,333	83,217
Estimated Harvest over 100 Years (acres)						
Old-Growth	7,196	6,859	6,888	5,934	5,869	5,869
Young-Growth	70,133	68,401	68,125	67,799	66,896	67,431

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 25 percent (213,586 acres) of the Point Baker CUA is presently managed in development LUDs. This total would increase under all action alternatives except for Alternative 2, with net gains ranging from about 22,432 acres (Alternative 4) to 98,861 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 1,067 acres (Alternative 2) to 15,828 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be less than 2 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Point Baker CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-23).

Port Alexander

Port Alexander's CUA encompasses a total of 86,828 acres (Figure D-23). About three-quarters of this area (75 percent) is presently managed as roadless (Table D-24). This share would stay the same under each alternative except for Alternative 5, where no acres would be managed as roadless. No AKRA acres in the Port Alexander CUA would be managed under any alternative as Timber Priority, which allow timber harvest and road building. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites.

Figure D-23
Port Alexander's Community Use Area

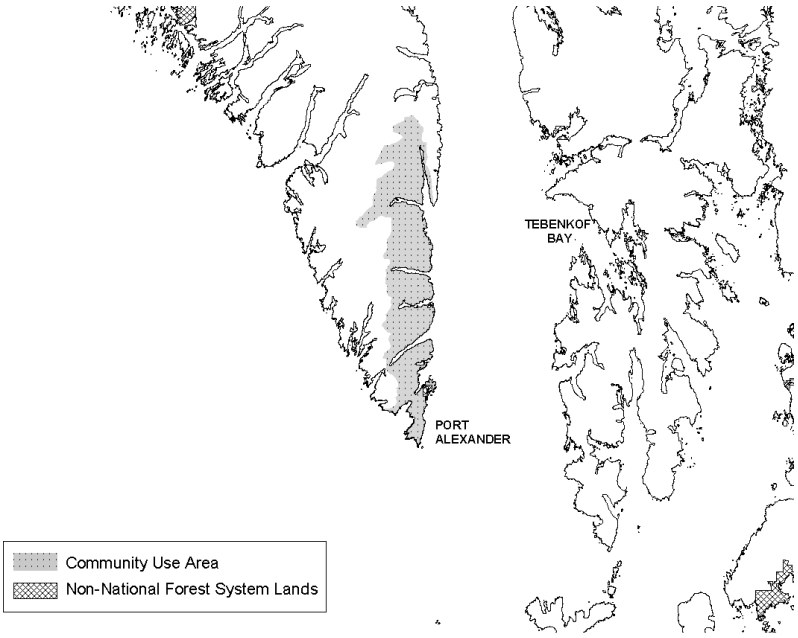

Table D-24
Roadless Areas, AKRA Management Categories, and Development Opportunity in Port Alexander's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	86,828	86,828	86,828	86,828	86,828	86,828
Total Roadless Area	64,739	64,751	64,751	64,739	0	64,739
Roadless Share	75%	75%	75%	75%	0%	75%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	64,751	64,751	64,739	0	64,739
Watershed Priority	na	0	0	0	0	0
Timber Priority	na	0	0	0	0	0
Development Opportunity						
Development LUDs (acres)	0	0	0	0	0	0
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	0	0
Estimated Harvest over 100 Years (acres)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	0	0

na = not applicable

There are no acres in development LUDs in the Port Alexander CUA under any of the alternatives and no areas suitable harvest, with no estimated harvest over the next 100 years.

Port Protection

Port Protection's CUA encompasses a total of 706,627 acres (Figure D-24). Half of this area (50 percent) is presently managed as roadless (Table D-25). This share would drop to 22 and 36 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 84 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 16 percent of the AKRA areas in the Port Protection CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-24
Port Protection's Community Use Area

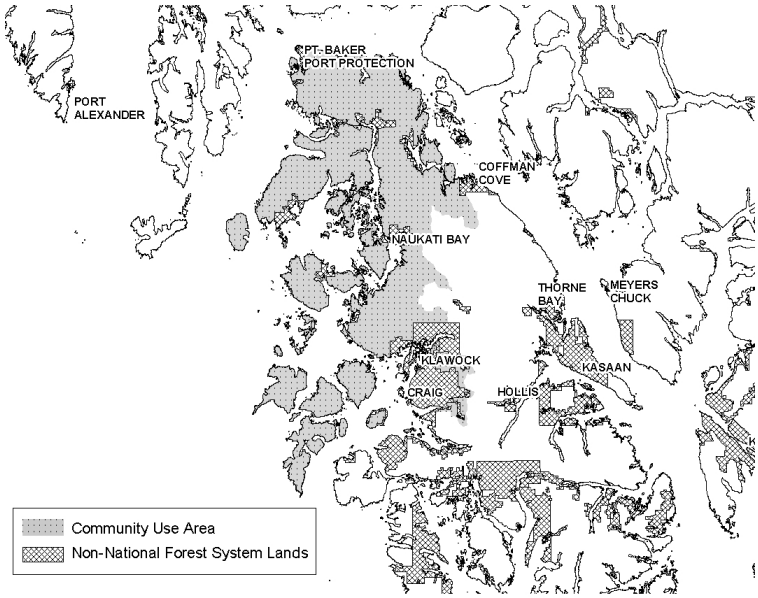

Table D-25
Roadless Areas, AKRA Management Categories, and Development Opportunity in Port Protection's Community Use Area

Roadless Category (acres)	Alternative 1	2	3	4	5	6
Total Community Use Area	706,627	706,627	706,627	706,627	706,627	706,627
Total Roadless Area	354,581	373,245	157,140	340,245	0	254,838
Roadless Share	50%	53%	22%	48%	0%	36%
AKRA Management Categories (acres)						
LUD II Priority	na	179,873	0	179,873	0	166,131
Roadless Priority	na	121,041	157,140	107,173	0	88,707
Watershed Priority	na	72,332	0	0	0	0
Timber Priority	na	0	0	53,200	0	0
Development Opportunity						
Development LUDs (acres)	199,288	200,843	229,922	220,742	298,739	298,739
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	37,709	38,985	45,962	54,132	54,738	54,738
Young-Growth	78,788	79,262	79,288	79,493	79,611	79,494
Estimated Harvest over 100 Years (acres)						
Old-Growth	6,968	6,684	6,561	5,930	5,865	5,865
Young-Growth	67,017	65,405	65,142	64,788	63,908	64,415

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 28 percent (199,288 acres) of the Port Protection CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 1,555 acres (Alternative 2) to 99,452 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 1,276 acres (Alternative 2) to 17,029 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be less than 2 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Port Protection CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-25).

Saxman

Saxman's CUA encompasses a total of 1,975,123 acres (Figure D-25). Almost half of this area (47 percent) is presently managed as roadless (Table D-26). This share would drop to 43 and 31 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 40 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 15 percent of the AKRA areas in the Saxman CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-25
Saxman's Community Use Area

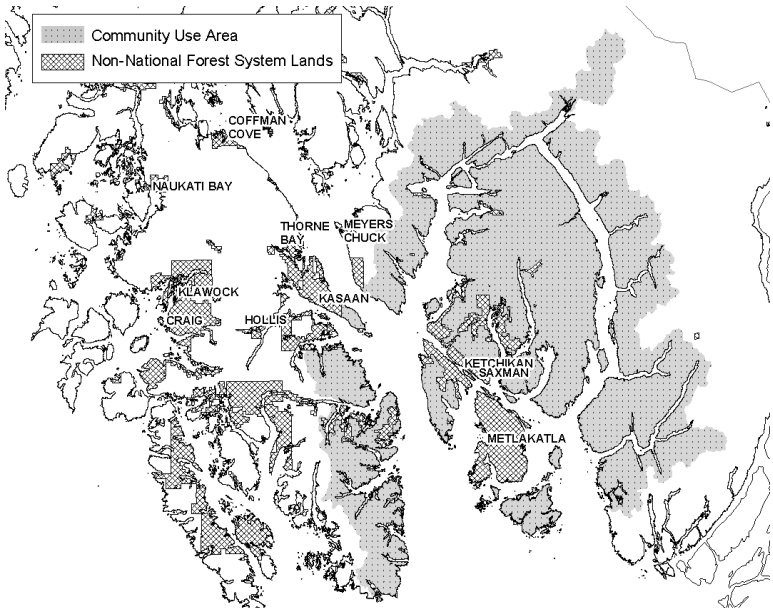

Table D-26
Roadless Areas, AKRA Management Categories, and Development Opportunity in Saxman's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	1,975,123	1,975,123	1,975,123	1,975,123	1,975,123	1,975,123
Total Roadless Area	923,373	915,682	850,098	902,898	0	611,948
Roadless Share	47%	46%	43%	46%	0%	31%
AKRA Management Categories (acres)						
LUD II Priority	na	29,952	0	29,952	0	29,627
Roadless Priority	na	402,354	850,098	735,272	0	582,322
Watershed Priority	na	483,376	0	0	0	0
Timber Priority	na	0	0	137,674	0	0
Development Opportunity						
Development LUDs (acres)	121,179	131,805	164,919	137,432	413,416	413,416
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	30,742	34,273	42,359	55,722	57,662	57,662
Young-Growth	32,874	34,223	34,243	34,539	35,463	35,022
Estimated Harvest over 100 Years (acres)						
Old-Growth	5,681	5,876	6,047	6,104	6,178	6,178
Young-Growth	27,962	28,240	28,134	28,150	28,468	28,379

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 6 percent (121,179 acres) of the Saxman CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 10,625 acres (Alternative 2) to 292,236 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 3,532 acres (Alternative 2) to 26,920 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be 4 percent (Alternatives 2 and 3) to 8 percent (Alternative 5) of the existing total.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Saxman CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with larger increases under Alternatives 4 to 6 (Table D-26).

Sitka

Sitka's CUA encompasses a total of 425,121 acres (Figure D-26). Most of this area (81 percent) is presently managed as roadless (Table D-27). This share would decrease to 70 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 9 percent of the AKRA areas in the Sitka CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-26
Sitka's Community Use Area

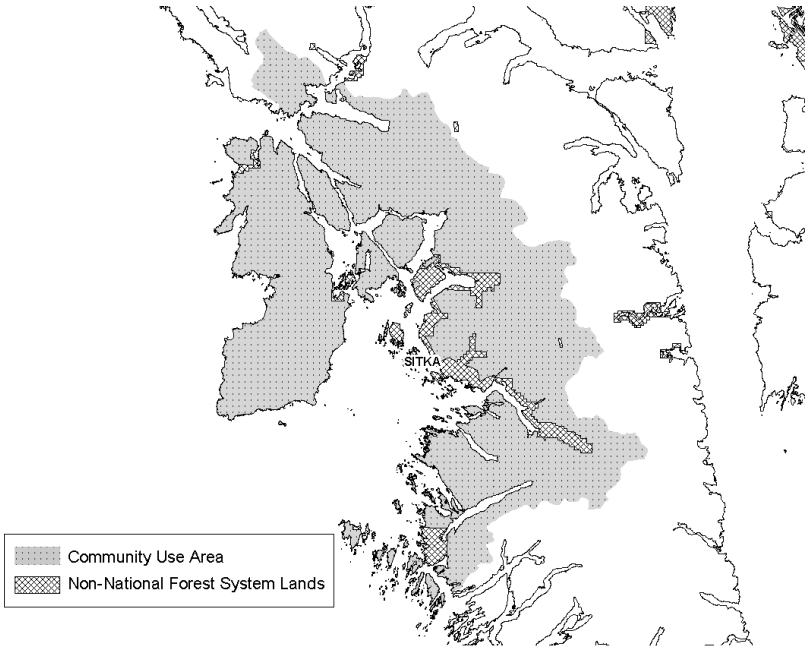

Table D-27
Roadless Areas, AKRA Management Categories, and Development Opportunity in Sitka's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	425,121	425,121	425,121	425,121	425,121	425,121
Total Roadless Area	344,040	348,391	348,391	343,398	0	299,049
Roadless Share	81%	82%	82%	81%	0%	70%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	142,891	348,391	312,908	0	299,049
Watershed Priority	na	205,499	0	0	0	0
Timber Priority	na	0	0	30,689	0	0
Development Opportunity						
Development LUDs (acres)	26,418	26,647	26,647	26,691	91,039	91,039
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	2,342	2,334	2,334	4,870	4,870	4,870
Young-Growth	10,559	10,560	10,560	10,560	10,648	10,560
Estimated Harvest over 100 Years (acres)						
Old-Growth	433	400	333	534	522	522
Young-Growth	8,982	8,714	8,676	8,607	8,547	8,557

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 6 percent (26,418 acres) of the Sitka CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 229 acres (Alternatives 2 and 3) to 64,621 acres (Alternatives 5 and 6).

Suitable old-growth available for harvest would increase under Alternatives 4 to 6, each with a net gain of 2,528 acres, and decrease by 8 acres under Alternatives 2 and 3. Increases in suitable young-growth acres would be less than 1 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth and young-growth harvest would be similar across all alternatives.

Skagway

Skagway's CUA encompasses a total of 199,938 acres (Figure D-27). Nearly all of this area (97 percent) is presently managed as roadless (Table D-28). This share would decrease somewhat under Alternative 6 to 93 percent, and drop to no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 4 percent of the AKRA areas in the Skagway CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-27
Skagway's Community Use Area

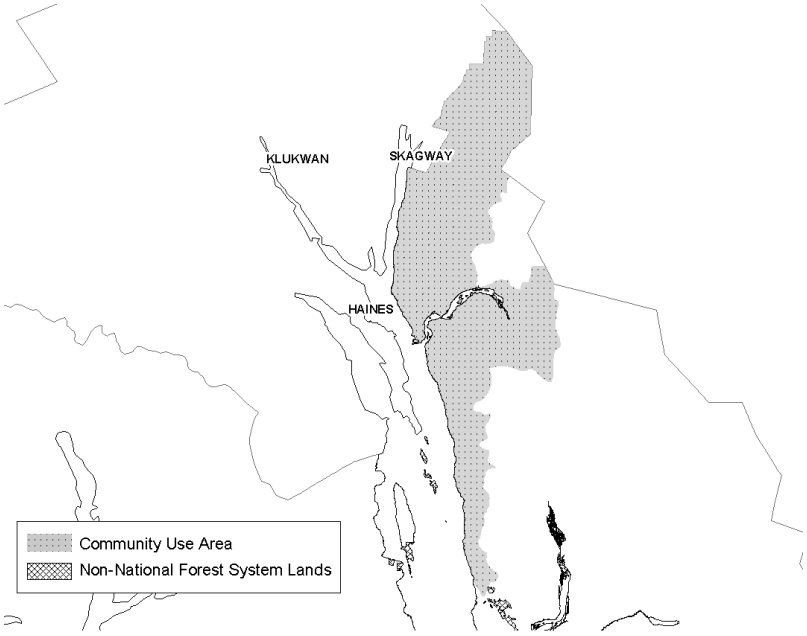

Table D-28
Roadless Areas, AKRA Management Categories, and Development Opportunity in Skagway's Community Use Area

Roadless Category (acres)	Alternative 1	2	3	4	5	6
Total Community Use Area	199,938	199,938	199,938	199,938	199,938	199,938
Total Roadless Area	194,839	194,839	194,839	194,839	0	186,751
Roadless Share	97%	97%	97%	97%	0%	93%
AKRA Management Categories (acres)						
LUD II Priority	na	0	0	0	0	0
Roadless Priority	na	132,681	194,839	187,630	0	186,751
Watershed Priority	na	62,158	0	0	0	0
Timber Priority	na	0	0	7,208	0	0
Development Opportunity						
Development LUDs (acres)	6	6	6	6	7,215	7,215
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	46	70	70
Estimated Harvest over 100 Years (acres)						
Old-Growth	0	0	0	0	0	0
Young-Growth	0	0	0	0	0	0

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Only 6 acres of the Skagway CUA is presently managed in a development LUD. This total would increase under Alternatives 5 and 6, each with a net gain of 7,208 acres. There would be no change under the remaining action alternatives.

There are no suitable old-growth acres for harvest under any of the alternatives, and very limited suitable young-growth acres (less than 100 acres in all cases). Correspondingly, no old-growth or young-growth harvest is estimated over the next 100 years in the Skagway CUA (Table D-28).

Tenakee Springs

The Tenakee Springs CUA encompasses a total of 196,031 acres (Figure D-28). Over three-quarters of this area (78 percent) is presently managed as roadless (Table D-29). This share would drop to 58 and 42 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 98 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 21 percent of the AKRA areas in the Tenakee Springs CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-28
Tenakee Springs' Community Use Area

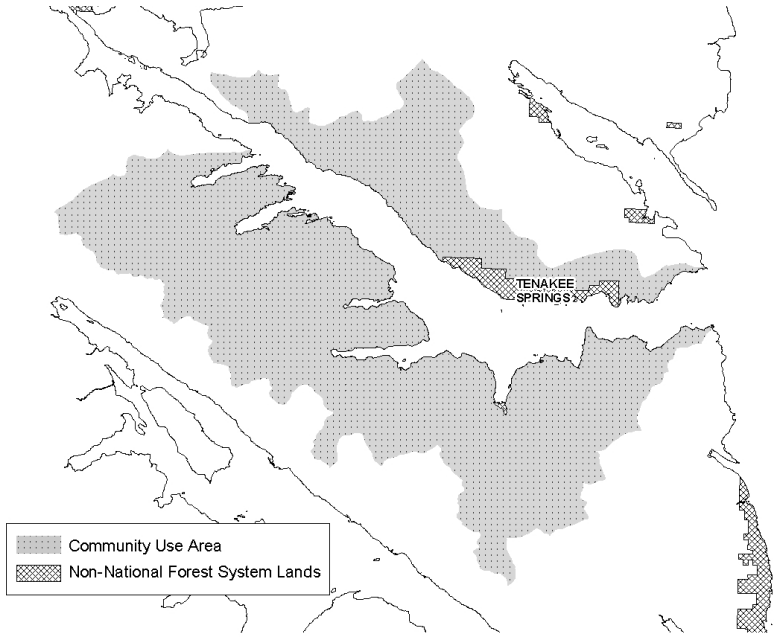

Table D-29
Roadless Areas, AKRA Management Categories, and Development Opportunity in Tenakee Springs' Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	196,031	196,031	196,031	196,031	196,031	196,031
Total Roadless Area	152,907	159,860	114,351	149,459	0	82,669
Roadless Share	78%	82%	58%	76%	0%	42%
AKRA Management Categories (acres)						
LUD II Priority	na	40,415	0	40,415	0	37,930
Roadless Priority	na	47,793	114,351	78,370	0	44,739
Watershed Priority	na	71,651	0	0	0	0
Timber Priority	na	0	0	30,674	0	0
Development Opportunity						
Development LUDs (acres)	30,969	26,606	29,447	34,581	101,137	101,137
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	8,498	8,851	10,301	18,807	18,808	18,808
Young-Growth	127,040	128,094	128,149	128,361	128,656	128,390
Estimated Harvest over 100 Years (acres)						
Old-Growth	1,570	1,517	1,470	2,060	2,015	2,015
Young-Growth	5,523	5,431	5,407	5,365	5,297	5,345

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 16 percent (30,969 acres) of the Tenakee Springs CUA is presently managed in development LUDs. This total would decrease under Alternatives 2 and 3, and increase under Alternatives 4 to 6, with net gains ranging from about 3,612 acres (Alternative 4) to 70,167 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 353 acres (Alternative 2) to 10,309 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be about 1 percent or less of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated old-growth harvest would range from about 1,470 acres (Alternative 3) to 2,060 acres (Alternatives 4). Estimated young-growth harvest would range from about 5,297 acres (Alternative 5) to 5,523 acres (Alternative 1).

Thorne Bay

Thorne Bay's CUA encompasses a total of 1,000,251 acres (Figure D-29). Almost half of this area (44 percent) is presently managed as roadless (Table D-30). This share would drop to 26 and 27 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 63 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 18 percent of the AKRA areas in the Thorne Bay CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-29
Thorne Bay's Community Use Area

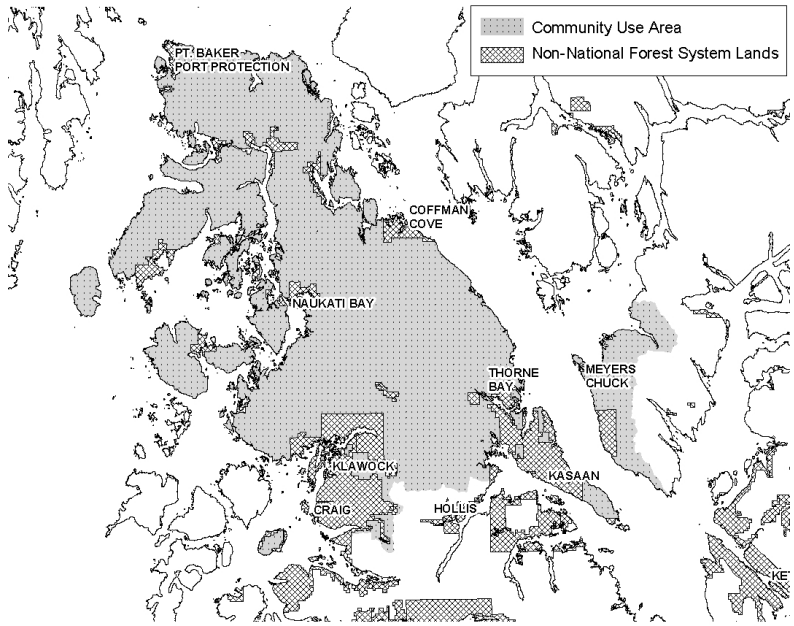

Table D-30
Roadless Areas, AKRA Management Categories, and Development Opportunity in Thorne Bay's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	1,000,251	1,000,251	1,000,251	1,000,251	1,000,251	1,000,251
Total Roadless Area	442,006	451,489	263,286	409,038	0	269,068
Roadless Share	44%	45%	26%	41%	0%	27%
AKRA Management Categories (acres)						
LUD II Priority	na	124,326	0	124,326	0	112,036
Roadless Priority	na	164,396	263,286	209,968	0	157,033
Watershed Priority	na	162,767	0	0	0	0
Timber Priority	na	0	0	74,745	0	0
Development Opportunity						
Development LUDs (acres)	329,200	334,030	383,727	360,258	493,664	493,664
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	62,960	65,087	76,908	85,761	86,732	86,732
Young-Growth	127,040	128,094	128,149	128,361	128,656	128,390
Estimated Harvest over 100 Years (acres)						
Old-Growth	11,634	11,159	10,978	9,395	9,293	9,293
Young-Growth	108,059	105,700	105,285	104,615	103,279	104,036

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 33 percent (329,200 acres) of the Thorne Bay CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 4,830 acres (Alternative 2) to 164,464 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 2,127 acres (Alternative 2) to 23,772 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be less than 2 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Thorne Bay CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-30).

Whale Pass

The Whale Pass CUA encompasses a total of 1,000,251 acres (Figure D-30). Almost half of this area (44 percent) is presently managed as roadless (Table D-31). This share would drop to 26 and 27 percent under Alternatives 3 and 6, respectively, with no acres managed as roadless under Alternative 5. The removal of LUD II acres under Alternative 3 accounts for approximately 63 percent of the decrease in roadless acres under this alternative. These areas would retain their congressional protections and continue to be managed in a roadless state. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 18 percent of the AKRA areas in the Whale Pass CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-30
Whale Pass' Community Use Area

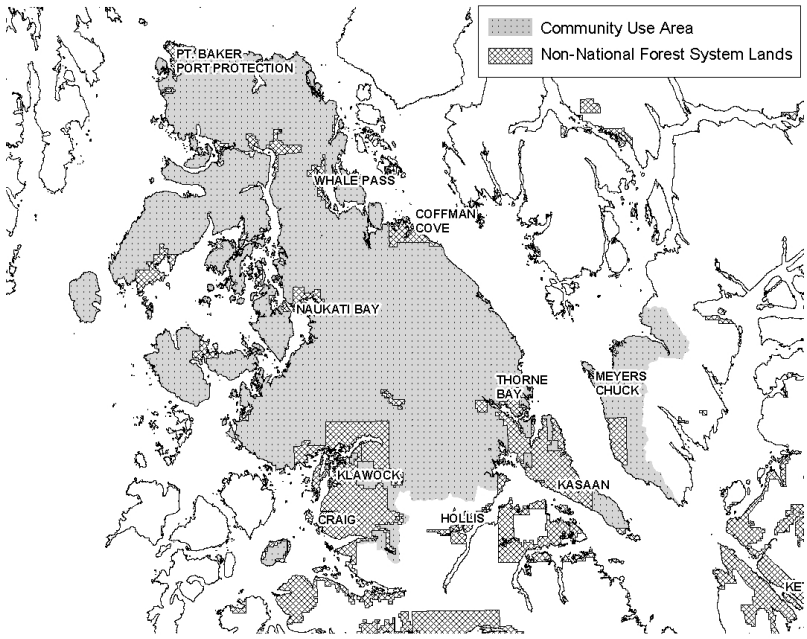

Table D-31
Roadless Areas, AKRA Management Categories, and Development Opportunity in Whale Pass' Community Use Area

Roadless Category (acres)	Alternative					
	1	2	3	4	5	6
Total Community Use Area	1,000,251	1,000,251	1,000,251	1,000,251	1,000,251	1,000,251
Total Roadless Area	442,006	451,489	263,286	409,038	0	269,068
Roadless Share	44%	45%	26%	41%	0%	27%
AKRA Management Categories (acres)						
LUD II Priority	na	124,326	0	124,326	0	112,036
Roadless Priority	na	164,396	263,286	209,968	0	157,033
Watershed Priority	na	162,767	0	0	0	0
Timber Priority	na	0	0	74,745	0	0
Development Opportunity						
Development LUDs (acres)	329,200	334,030	383,727	360,258	493,664	493,664
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	62,960	65,087	76,908	85,761	86,732	86,732
Young-Growth	127,040	128,094	128,149	128,361	128,656	128,390
Estimated Harvest over 100 Years (acres)						
Old-Growth	11,634	11,159	10,978	9,395	9,293	9,293
Young-Growth	108,059	105,700	105,285	104,615	103,279	104,036

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 33 percent (329,200 acres) of the Whale Pass CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 4,830 acres (Alternative 2) to 164,464 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 2,127 acres (Alternative 2) to 23,772 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would be less than 2 percent of the existing total under all action alternatives.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Whale Pass CUA would decrease under all five action alternatives. If harvest were distributed evenly across the landscape this would result in a decrease in potential harvest relative to Alternative 1 in all cases, with larger decreases under Alternatives 4 to 6 (Table D-31).

Wrangell

Wrangell's CUA encompasses a total of 819,240 acres (Figure D-31). Approximately 39 percent is presently managed as roadless (Table D-32). This share would drop to 15 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 24 percent of the AKRA areas in the Wrangell CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-31
Wrangell's Community Use Area

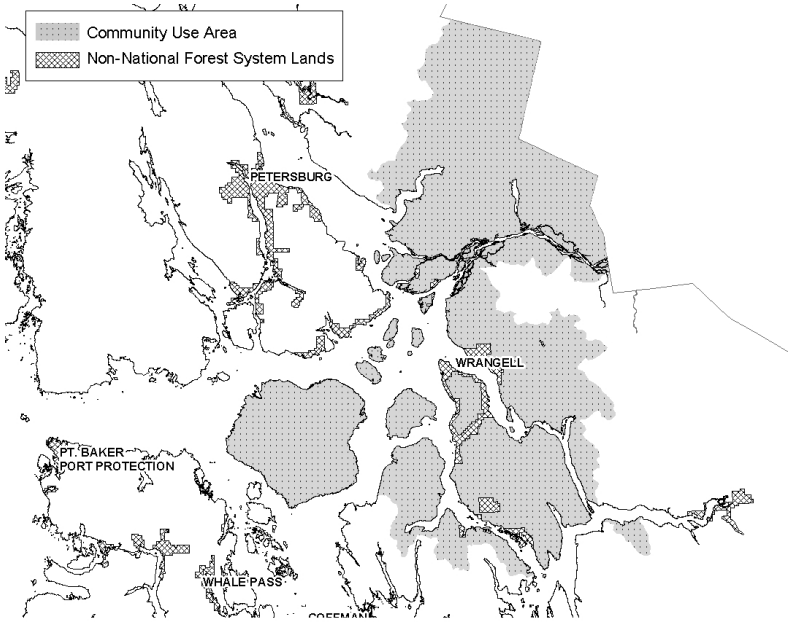

Table D-32
Roadless Areas, AKRA Management Categories, and Development Opportunity in Wrangell's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	819,240	819,240	819,240	819,240	819,240	819,240
Total Roadless Area	322,505	303,805	268,375	279,937	0	122,271
Roadless Share	39%	37%	33%	34%	0%	15%
AKRA Management Categories (acres)						
LUD II Priority	na	5	0	5	0	5
Roadless Priority	na	122,130	268,375	213,125	0	122,265
Watershed Priority	na	181,670	0	0	0	0
Timber Priority	na	0	0	66,807	0	0
Development Opportunity						
Development LUDs (acres)	103,980	120,735	148,844	137,867	294,327	294,327
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	25,651	29,050	35,180	46,598	46,698	46,698
Young-Growth	26,147	27,922	28,089	28,152	28,739	28,311
Estimated Harvest over 100 Years (acres)						
Old-Growth	4,740	4,980	5,022	5,105	5,004	5,004
Young-Growth	22,240	23,041	23,077	22,944	23,070	22,941

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 13 percent (103,980 acres) of the Wrangell CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 16,755 acres (Alternative 2) to 190,347 acres (Alternatives 5 and 6).

Suitable old-growth and young-growth acres available for harvest would increase under all action alternatives. Net gains in suitable old-growth would range from about 3,399 acres (Alternative 2) to 21,047 acres (Alternatives 5 and 6). Increases in suitable young-growth acres would range from 7 percent (Alternatives 2 and 3) to 10 percent (Alternative 5) of the existing total.

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. The share of the Forest-wide suitable land base in the Wrangell CUA would increase under all five action alternatives. If harvest were distributed evenly across the landscape this would result in an increase in potential harvest relative to Alternative 1 in all cases, with estimates increases of about 4 percent under all of the action alternatives.

Yakutat

Yakutat's CUA encompasses a total of 250,271 acres (Figure D-32). About half of this area (51 percent) is presently managed as roadless (Table D-33). This share would drop to 39 percent under Alternative 6, with no acres managed as roadless under Alternative 5. Alternative 4 includes AKRA acres that would be managed as Timber Priority and allow timber harvest and road building. Timber Priority acres account for 18 percent of the AKRA areas in the Yakutat CUA. Areas allocated to Roadless Priority would explicitly allow the cutting, utilization, customary trade, and removal of trees for the purposes of Alaska Native customary and traditional uses, as well as road construction deemed necessary by a federally recognized Tribe for access to Alaska Native cultural sites. This type of use would also be allowed in Timber Priority areas, which allow all timber harvest and road construction.

Figure D-32
Yakutat's Community Use Area

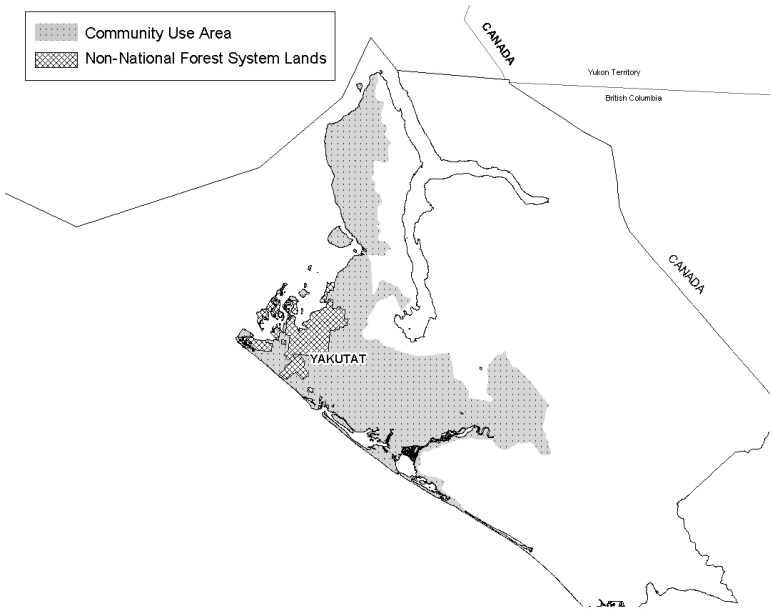

Table D-33
Roadless Areas, AKRA Management Categories, and Development Opportunity in Yakutat's Community Use Area

	Alternative					
Roadless Category (acres)	**1**	**2**	**3**	**4**	**5**	**6**
Total Community Use Area	250,271	250,271	250,271	250,271	250,271	250,271
Total Roadless Area	127,032	123,295	108,401	107,983	0	96,715
Roadless Share	51%	49%	43%	43%	0%	39%
AKRA Management Categories (acres)						
LUD II Priority	na	33	0	33	0	33
Roadless Priority	na	43,797	108,401	88,041	0	96,682
Watershed Priority	na	79,465	0	0	0	0
Timber Priority	na	0	0	19,909	0	0
Development Opportunity						
Development LUDs (acres)	16,269	16,879	16,879	16,879	37,166	37,166
Timber Opportunity (Acres Suitable for Harvest)						
Old-Growth	63	63	63	63	63	63
Young-Growth	3,889	3,891	4,096	5,527	5,822	5,383
Estimated Harvest over 100 Years (acres)						
Old-Growth	12	11	9	7	7	7
Young-Growth	3,308	3,211	3,365	4,504	4,674	4,362

na = not applicable

Not all acres dropped from roadless management would be available for development. The change in acres in development LUDs serves as a measure of development potential as it presently exists by alternative. Approximately 7 percent (16,269 acres) of the Yakutat CUA is presently managed in development LUDs. This total would increase under all action alternatives, with net gains ranging from about 609 acres (Alternatives 2 through 4) to 20,896 acres (Alternatives 5 and 6).

Suitable old-growth acres available for harvest would remain at current negligible levels (63 acres) under all alternatives. Increases in suitable young-growth acres would range from net gains of about 2 acres (Alternative 2) to 1,933 acres (Alternative 5).

Total acres harvested are assumed to remain constant across all alternatives. Estimated harvest totals over 100 years show the amount of harvest likely to occur by alternative if the estimated harvest level is evenly distributed across the Forest-wide suitable land base. Estimated young-growth harvest would range from about 3,211 acres (Alternative 2) to 4,674 acres (Alternative 5).

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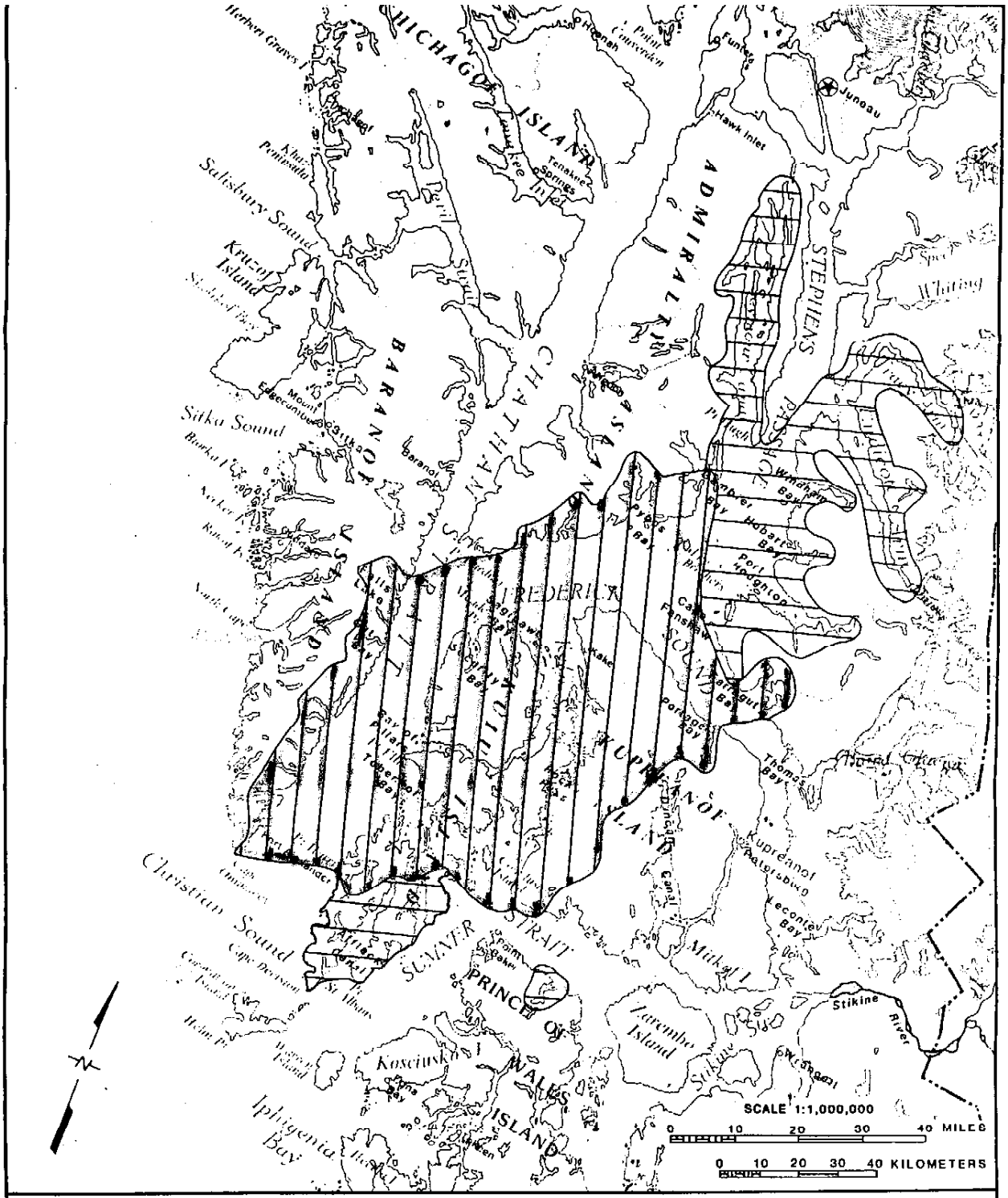
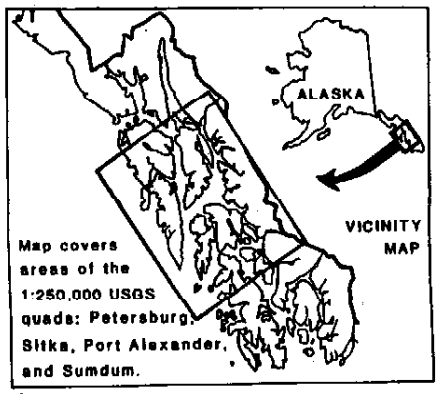


Figure 15. Traditional Territory of the Kake Tlingit, circa 1943.



Exclusive Claim Area

Joint Claim Area

SOURCE: Goldschmidt, W.A., and T.H. Haas 1946, Possessory Rights of the Natives of Southeast Alaska and Department of Interior 1944, Hearings on Claims of the Towns of Hydaburg, Klawock, and Kake, Alaska

STATE OF ALASKA
Department of Fish and Game
Subsistence Division

ALASKA ROADLESS RULEMAKING: SUMMARY OF PUBLIC SCOPING MEETINGS

CONTEXT

USDA Forest Service published a Notice of Intent to prepare an environmental impact statement (EIS) for the Alaska Roadless Rule in the *Federal Register* on August 30, 2018. The Notice of Intent initiated a 45-day scoping period which ended on October 15, 2018. During this timeframe, the Forest Service and State of Alaska collaboratively conducted 17 public meetings (i.e., scoping meetings) including Anchorage, AK; Washington, DC; and 14 communities across Southeast Alaska – Angoon, Craig, Gustavus, Hoonah, Kake, Ketchikan, Petersburg, Point Baker, Sitka, Tenakee Springs, Thorne Bay, Wrangell, Yakutat, and two meetings in Juneau.

SCOPING MEETING OVERVIEW

Public scoping meetings included presentations by both the Forest Service and State of Alaska followed by question and answer session and open discussion via open house format. The Forest Service presentation included an overview of the 2001 Roadless Area Conservation Rule, roadless rulemaking regulatory process, rationale for state-specific roadless rule, proposed Alaska Roadless Rule (in concept only), public participation, public participation venues, federal-state partnership, and next steps. The State of Alaska presentation addressed the State of Alaska's petition, the State of Alaska-Forest Service agreement, cooperating agency status, and the governor-appointed Citizen Advisory Committee. All scoping public meetings included an array of reference materials including multiple Tongass National Forest maps, Notice of Intent hardcopies, 2001 Roadless Rule reference guide, roadless area characteristics summary document, public participation guide, and question and answer fact sheet.

Public scoping meetings generally occurred at common places for community meetings – primarily recommended by community leaders. Total participation varied by community. Of noteworthy importance, Juneau (Meeting 2), Gustavus, and Thorne Bay were added to the schedule by either community request, senior Forest Service staff recommendation, or stakeholder group special request. In total, public scoping meetings were conducted in 44 percent of Southeast Alaska communities (14) including rural and urban communities, indigenous villages, and lifestyle communities (Table 1). An additional two meetings were conducted in Anchorage, AK and Washington, DC.

Table 1.
Public Scoping Meetings*

Southeast Alaska
Juneau, Meeting 1
Juneau, Meeting 2
Ketchikan
Sitka
Wrangell
Petersburg
Yakutat
Hoonah
Angoon
Kake
Thorne Bay
Tenakee Springs
Gustavus
Point Baker
14 Communities

*Meetings also conducted in Washington, DC and Anchorage, AK

PREPARED BY: INTERDISCIPLINARY TEAM MEMBERS
USDA FOREST SERVICE, WASHINGTON OFFICE AND ALASKA REGION
FEBRUARY 7, 2019

SCOPING MEETING SUMMARY

In total, 17 public scoping meetings were conducted in 16 locations with nearly half (44%) of all Southeast Alaska communities serving as venue for a public scoping meeting. Public meetings were also conducted in Anchorage, Alaska and Washington, District of Columbia. While key issues, specific concerns, and questions varied by community based on local geography and current local issues, the majority of public meetings affirmed support for the 2001 Roadless Area Conservation Rule, highlighted mistrust for the State of Alaska, questioned the relationship between the State of Alaska and Forest Service, and reinforced the *2016 Tongass Land and Resource Management Plan* and the collaborative effort that guided the 2016 forest plan amendment. Table 2 includes additional information, by community, related to public meeting substantive discussion, questions, and local concerns. In Southeast Alaska, only two of fourteen communities (e.g., Thorne Bay, Wrangell) were largely receptive to Alaska roadless rulemaking – both of which seemingly preferred a full exemption of the 2001 Roadless Rule. Of noteworthy importance, sentiment expressed at public meetings represent the opinions of perspectives of meeting participants and is not generalizable to the full local population.

Table 2. Public Scoping Meeting Summary (N = 17)

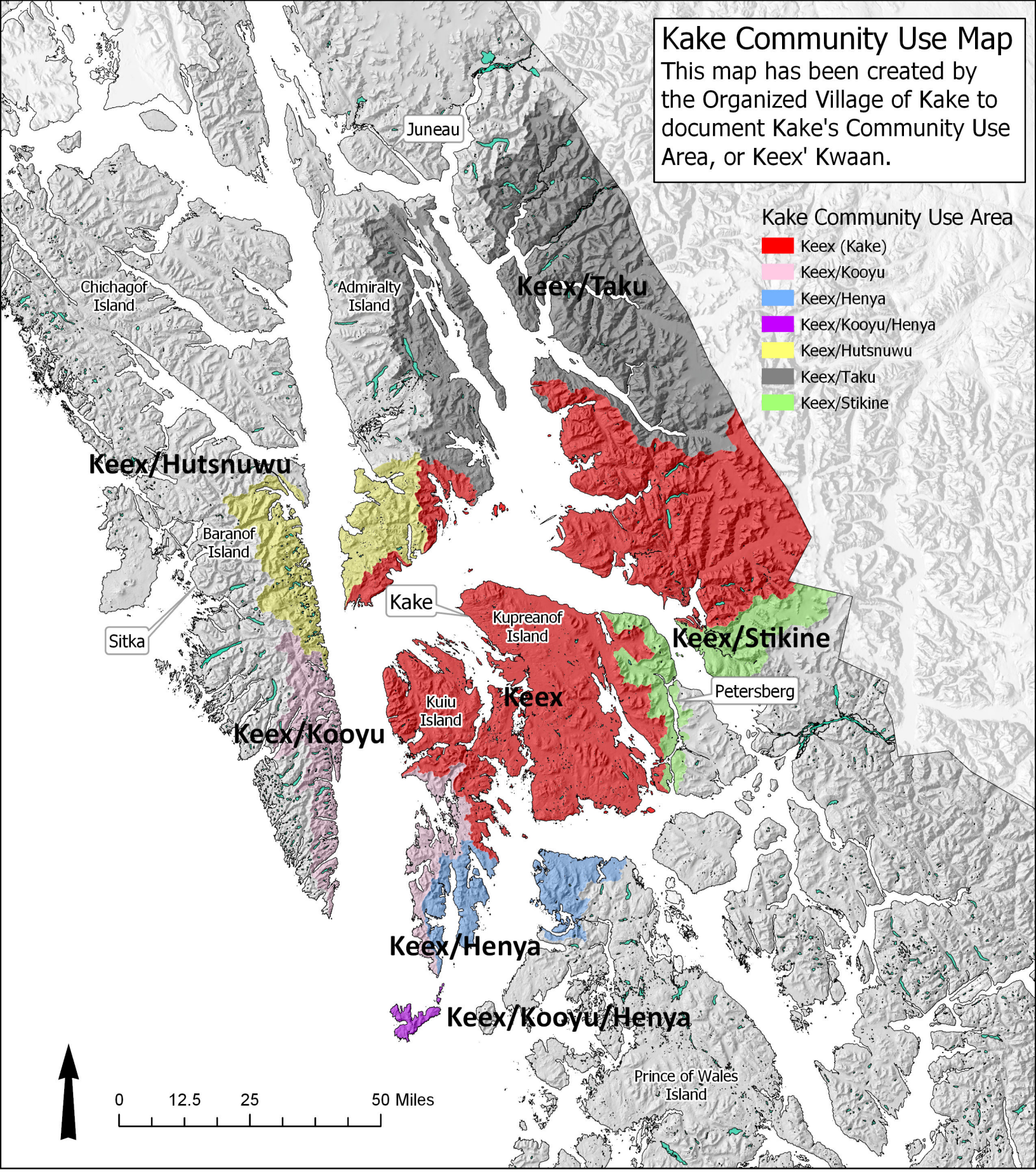
Meeting	Date	Location	Attendance Estimate	Discussion Summary: Key Issues, Concerns, and Questions
1	9/13/18	Juneau Meeting 1	75	Opening presentations completed with minimal questioning of presentation content. Overall, this was the first of seventeen meetings and warmup for the Alaska Roadless Rule interdisciplinary team. The crowd was primarily comprised of recreation and tourism interests and conservation group members – especially Southeast Alaska Conservation Council. The overall tone of the meeting was critical of roadless rulemaking and the proposed Alaska Roadless Rule. Attendees were also critical of the State of Alaska's rationale behind the petition and underlying motivation for the petition. While a few timber industry members were present at the meeting, they remained silent. There were a variety of comments and questions related to the level or depth of analysis that would be conducted, especially on wildlife and tourism effects. There were also questions regarding miles of existing roads and maintenance needed and the cost of maintenance.

2	9/17/18	Ketchikan	45	It was difficult to complete presentations, both State of Alaska and Forest Service, due to ongoing questioning. The general tone of the meeting was significant cynicism regarding Alaska Roadless Rulemaking project and the State of Alaska's underlying motivation. Lengthy discussion occurred regarding mistrust of the State of Alaska and now the Forest Service. Some attendees highlighted basis for mistrust – stating the Forest Service was now in collusion with the State of Alaska. Several attendees were very critical of timber export and dominated the discussion portion of the meeting. Other attendees were very critical of tribal outreach and consultation efforts citing expedited timelines, untenable timeframes, and little to no prior tribal consultation prior to the publishing of the Notice of Intent. Few timber industry representatives attended the meeting, but remained silent. Sharing Idaho as an example seemed to help explain some options during small group discussion. It was also helpful to observe the state forester combat the notion the Forest Service is "in collusion" with the State of Alaska by indicating the state has pursued a full exemption since the promulgation of the 2001 Roadless Rule using three methods – litigation, legislation, and now administrative rulemaking. This talking point was used frequently in the public meetings that followed by both the State of Alaska and Forest Service. It placed, into perspective, the State of Alaska has long-believed (and acted upon) the belief the 2001 Roadless Rule creates undue hardship for the timber industry, rural jobs, and Southeast Alaska communities. Several attendees expected to give oral public comments. IDT members recommended adjusting the introduction to ensure attendees understand objectives of scoping meeting and appropriate method for submitting comment. PPTX presentation adjusted to highlight email address in the "How to Comment" slide.
3	9/17/18	Hoonah	12	The majority of the public meeting was dominated by discussion regarding access, roads associated with powerlines, and geothermal resources. Meeting participants expressed a desire to have multiple communities connected and cited the social value of connecting communities for schools and businesses. There was also discussion regarding utilizing a coordinator for a power line running from Hoonah to Pelican.
4	9/18/18	Craig	24	Critical crowd with significant concern regarding tribal consultation and overall timeline. Additional concerns related to State of Alaska's Forest Management Practices Act, prior Alaska Native Corporation harvest, and effects on the future of tribal communities. One timber industry representative attended the meeting and indicated the region needs a solution, driven by local needs and input, instead of having the future decided by courts. This individual spoke out, as a minority voice in the room, noting that he would rather have a solution that is driven by local needs and perspectives rather than a solution delivered by outsiders – despite the discussion being fraught with difficulty at local level. Overall, the meeting contained representatives from three tribes and multiple rural communities. There was significant mistrust and trepidation regarding roadless rulemaking on the heels of the 2016 forest plan amendment. Many attending had participated in the 2016 forest plan amendment or more recent Prince of Wales Landscape Level Analysis (POWLAT) and were simply weary of forest planning efforts, NEPA project participation, and monitoring agency public land management. The three attending tribal representatives were unified in their criticism of the overall timeline, State of Alaska motivation, and the Forest Service not honoring government-to-government relationships and prior notice requirements. Their concerns largely overshadowed other discussion of the Alaska Roadless Rulemaking project. There was significant discussion around Tongass National Forest maps that highlighted some concerns regarding effects of roadless rulemaking being concentrated at Prince of Wales Island instead of spreading across the region – and that the island needs to continue its recovery from industrial scale logging.
5	9/18/18	Angoon	10	Attendees questioned the rationale and motivation behind the State of Alaska's petition. What are other Tribes asking about this? Issues around subsistence rights. How is this effected by Title 29 annexation issues (state statute)? Why is the 2001 Roadless Rule not sufficient, concern about targeting timber harvest in old growth areas. Tongass 77 areas should not be impacted. Timeline is too short for the state committee. Why is the Tongass Advisory Committee work not sufficient?

6	9/19/18	Point Baker	16	Less than 30 people reside in Point Baker and it is likely all those present in the community that particular day attended the meeting. Extremely critical crowd with consensus opposition to roadless rulemaking. Several Port Protection community members also attended – arriving via small boat. Very critical of State of Alaska's roadless rulemaking motivation and the state's Citizen Advisory Committee process. Sentiment also expressed regarding prior lack of accommodation, for Point Baker, by both the Forest Service and State of Alaska in their respective forest planning and project efforts. Very knowledgeable regarding the 2001 Roadless Rule and National Forest Management Act and do not feel roadless rulemaking should be pursued. Furthermore, that roadless rulemaking threatens the recent 2016 forest plan amendment and is disrespectful of the collaborative effort that informed the amendment. Highly concerned regarding the impacts of timber harvest and road construction and what it means for their community, especially the lands north of road 20. Due to the small group and informal nature of the community, the Forest Service and State of Alaska opted to deviate from formal presentations and deliver information via structured group discussion. Questions were ongoing and allowed the majority of content to be covered. The majority of time was spent criticizing the State of Alaska's underlying motivation for Alaska roadless rulemaking, compiling the Citizen Advisory Committee on short notice, and taking advantage of changing administrations to undermine a conservation rule that has worked in Southeast Alaska.
7	9/19/18	Tenakee Springs	29	Meeting attendees were generally skeptical to open opposition to the Alaska Roadless Rulemaking project. Questions arose regarding the State of Alaska's underlying motivation behind the petition. There was also inquiry regarding the tribal government perspective on Alaska roadless rulemaking. Significant concern arose regarding subsistence rights and the potential impact to subsistence resources. There was also concern regarding any impact, or interference, of Alaska Statute Title 29 (municipal government statutes annexation rights. There were also many comments regarding the potential impact to salmon and the value of salmon for local working communities. In summary, meeting participants generally questioned why the 2001 Roadless Rule was not sufficient, expressed concern about targeting timber harvest in old growth areas, requested Tongass 77 areas not be impacted, indicated the timeline is too short for the state's Citizen Advisory Committee, and advocated that the Tongass Advisory Committee's prior work should be sufficient. Notably, Tenakee Springs was not an original meeting location as planned by the Forest Service, but was later added by recommendation of a local logging and milling company and follow-up request by the city government.
8	9/20/18	Juneau Meeting 2	55	This meeting was a requested addition to the meeting schedule by Southeast Conference due to prior scheduling conflict with their annual meeting – a second meeting was not originally planned for Juneau, but was easily accommodated due to overall timing. Meeting participants were generally a critical crowd where the majority of people who asked questions or provided input opposed the Alaska Roadless Rulemaking project. Recreation/tourism industry comprised wide majority of attendees and were very critical of State of Alaska motivation and Forest Service actions regarding roadless rulemaking. Only one observed timber industry advocate attended, but largely remained silent. Significant technical questions arose regarding how rulemaking would affect transition to young growth and why rulemaking was needed to implement the 2016 forest plan amendment and the associated transition from old to young growth timber harvest.

9	9/21/18	Gustavus	40	Critical crowd with large majority, likely full consensus, in opposition to the Alaska Roadless Rulemaking project. Highly-suspicious of the underlying motivation behind the State of Alaska's petition and why other interests are being ignored including tourism, climate change, recreation, and subsistence resources. Several concerns raised about whether LUD II areas would be affected. Lengthy discussion regarding the limited value of the timber industry in Southeast Alaska and the export of timber overseas. Notably, Gustavus was not an original meeting location as planned by the Forest Service, but was later added by request of the city government.
10	9/24/18	Wrangell	20	A friendlier crowd in the sense the majority participating in the discussion indicated the Forest Service is not doing enough to support the timber industry. Former Government Murkowski provided a "statement" and submitted it for the record. Others were supportive of the exemption from the 2001 Roadless Rule and revision of forest plan to allow for timber industry growth. Perspectives discussed during later small group discussion were more tempered, indicated the community could not support a timber industry and the economic drivers for the community now the shipyard, hospital, wilderness camp, and tourism. Notably, the last sawmill in Wrangell was dismantled and shipped to China for scrap metal during 2017.
11	9/24/18	Sitka	80	This was an informed crowd. Meeting attendees asked good and informed questions. Most comments focused on increased protection for the Tongass National Forest and that the Alaska Roadless Rulemaking project was "rigged" as evidenced by the short timeline – and, that the driver is NOT economics as evidenced by small timber industry, vibrant seafood industry, and exploding tourism industry growth. Participants recommended analysis needs to include climate change differences between now and 2001, stream temperature changes, and overall fish habitat quality. Economics was a focal point of the meeting and questions arose regarding whether there would be an economics report – not just timber economics. Trade off questions for economic effects were presented. Greenpeace attended the meeting, recorded the presentation, and raised issues regarding the cumulative effects of climate change and the value of intact forests in mediating the impacts of climate change. There was discussion around ensuring the value of intact forests is fully accounted for in the effects analysis – a full accounting of the value of trees beyond a timber sale value. Small group discussion occurred afterwards with one conversation related to hydropower sources and the related development permits that may be needed at a later date.
12	9/25/18	Petersburg	30	Critical crowd that questioned the intent behind the State of Alaska's petition and roadless rulemaking, timber export, timber economics, and undervaluation of tourism economic impacts. Meeting participants questioned whether there can be a compromise solution if the State of Alaska does not get the full exemption it seeks. A significant amount of time was used by the State of Alaska to provide an overview of the justification for the petition and also ongoing concern regarding the economic well-being of Southeast Alaska – primarily overarching themes related to ongoing efforts to limit perceived federal overreach and empowering Alaskans to design a solution that works for Southeast Alaska. Several questions arose that were outside the scope of roadless rulemaking and were effectively postponed for further conversation in small groups during the open house session of the meeting.
13	9/25/18	Yakutat	15	Meeting participant input centered on access challenges, especially to geographic areas adjacent to wilderness areas and the need for trail and other access to beachfront areas. A couple of comments supported access to more timber.
14	9/27/18	Anchorage, AK	35	Meeting participants at the Anchorage meeting echoed the same sentiments and concerns heard elsewhere – mainly, suspicions regarding the State of Alaska's underlying motivation for the petition and their expected public process. Unlike other prior scoping meetings, there were mining interests in attendance, but they did not engage in public discussion. Appeared to be a "sub-group" of individuals that had similar talking points, likely developed by an environmental group, that was used for many comments and questions.

15	10/3/18	Washington, DC	100	Larger and different group that the Forest Service originally anticipated. Instead of just local lobbyist types, there was also a fairly large number of protestors (outside and inside) with signs; not all could enter the room at the same time due to overall room capacity limited to approximately 75 individuals. Notably, some Alaska residents traveled to DC to attend the meeting and provide comments – in opposition of Alaska roadless rulemaking and in support of the 2001 Roadless Rule. In total, it is estimated 100 individuals attended the meeting with the room capacity at 75 individuals with another 25 attendees rotating in and out of the room, as capacity space allowed.
16	10/9/18	Thorne Bay	12	This was a friendlier crowd that was generally amenable to Alaska roadless rulemaking. The presentations were well-received and attendees appeared to be appreciative of introductory materials related to Alaska roadless rulemaking. Several were opposed to federal public land management, in general, while others had more specific input regarding surrounding Forest Service lands.
17	10/10/18	Kake	15	The large majority of attendees, likely full consensus, were opposed to the Alaska Roadless Rulemaking project. Due to the opening tone of the meeting and the desire of tribal members to share their experiences and history in public land management, the formal presentations were quickly abandoned in favor of more informal discussion regarding salient points – by both the State of Alaska and the Forest Service. While Kake is interested in road access connecting Portage Bay, they reinforced the expanse of their traditional and ancestral lands and the protection the 2001 Roadless Rule provides them. They were highly suspect of the State of Alaska and the agreement between the State of Alaska and the Forest Service. They reiterated their perspective that the Forest Service has not fulfilled government-to-government consultation as evidenced by overall timeline, limited outreach, and insufficient tribal input prior to publishing of Notice of Intent in the Federal Register. Tribal members also provided reminder of the past objectives and litigation originated by the Organized Village of Kake.



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Kake, Alaska 99830-0316
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Federally Recognized Tribal Government
serving the Kake, Alaska area

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September 7, 2018

Forest Supervisor Earl Stewart
U.S. Forest Service
Tongass National Forest
648 Mission Street
Federal Building
Ketchikan, AK 99901-6591

RE: Scoping Period for the Roadless Rule

Dear Mr. Stewart,

The Organized Village of Kake (OVK) is the federally recognized Indian Tribe organized under the authority of the Indian Reogranization Acts of 1934 and 1936. OVK is empowered under its Constitution and By-Laws "to aid needy citizens and protect the general welfare and security of the village." One of OVK's highest priorities is to protect the Village's customary and traditional hunting, fishing and gathering areas and uses within the Keex' Kwaan's (Children of Kake) traditional territory.[1] These lands include national forest lands on Kuiu and Kupreanof Islands, as well as portions of the mainland.

On August 2, 2018, in response to the State of Alaska's petition for a full exemption from the 2001 Roadless Area Conservation Rule (Roadless Rule), the Forest Service signed a Memorandum of Understanding with the State of Alaska to develop an Alaska state-specific roadless rule to address the management of inventoried roadless areas on the Tongass National Forest in Southeast Alaska. The U.S. Department of Agriculure announced on August 30, 2018 its intent to prepare an environmental impact statement (EIS) and public rulemaking process to According to the Notice of Intent, the State of Alaska will participate as a cooperating agency in the preparation of the EIS and "Federally recognized Tribes within the Tongass National Forest have been invited to particpate as a cooperating agency." The notice further gave notice of eleven public meetings planned in Southeast Alaska, incuding Kake on September 26, 2018.

Pursuant to Executive Order 13175, Departmental Regulation No. 1350-002, and Forest Service Manual (FSM), the United States Forest Service has adopted official policy regarding American Indian and Alaska Native relations. Pursuant to FSM 1563.02, paragraph 4, agency officials are to "[s]upport the aspirations of the UN Declaration on the Rights of Indigenous Peoples." Specifically, this means "that agency officials should consult with indigenous people – the duly elected officials of federally recognized tribes and the traditional holders of Indian religions, knowledge, and practices – early in their decision-making processes." To further this

[1] Goldschmidt & Haas (1946). A map of the traditional territory of the Kake Tlingit prepared by Goldschmidt and Haas is attached, for your information.

objective, it is the policy of the Forest Service that "Indian tribes will be provided the opportunity for timely and meaningful government-to-government consultation regarding actions which may have tribal implications." *See* FSM 1563.03. Such consultation requires the agency to "[c]ollaboratively involve Indian tribes, as early as possible, in the development of regulatory and management policies, resource and land management plans, study plans and actions, and Federal undertakings that may have tribal implications." *Id.* at 3.b.

The U.S.D.A. and Forest Service entered into the MOU with the State of Alaska and issued the NOI for preparation of an EIS for an Alaska-specific roadless rule without any consulting or collaboration with OVK, in violation of policies under Executive Order 13175, Departmental Regulation No. 1350-002, and the Forest Service Manual. OVK strongly object to the agency's utter failure to consult with OVK prior to responding to the State of Alaska's petition and initiating preparation of an EIS to support the rulemaking process. The belated invitation to the Tribe to participate as a cooperating agency, and holding a scoping hearing in Kake, cannot compensate for the agency's abject failure to consult and collaborate with the Tribe before proceeding with this Alaska-specific rulemaking – particularly when the proposed rulemaking has such grave and drastic tribal implications for the many tribal citizens who rely on these lands. Likewise, the State of Alaska's establishment the Alaska Roadless Rule Citizen Advisory Committee, which will include at least one member representing a federally recognized Tribe, will not address our concerns. First, it appears that this committee by design will not assure fair and balanced representation of both development and non-development interests. Secondly, the proposed schedule for the committee providing recommendations to the Governor and State Forester elevates satisfying the State's hurried and arbitrary timeline above the interests of any other stakeholders in this process.

In a recent fact sheet put on the agency's Alaska Roadless Rule web site, the agency clarifies what this rulemaking process will affect the 2016 Tongass Plan Amendment by stating:

> The Alaska Roadless Rule will not make any changes to the 2016 Tongass Land Management Plan or projects currently being implemented or proposed to implement the transition to a primarily young-growth timber program. Following a final decision on a state-specific roadless rule, the Tongass National Forest Land Management Plan could be amended or revised to reflect any management designations established by the state-specific rule.

We disagree. Since the Plan incorporated the recommendation from the Tongass Advisory Committee to exclude roadless areas from the timber base, clearly adoption of a rule that weakens or eliminates Roadless Area protections on the Tongass will have a substantial effect on the existing plan. We are particularly concerned that the Forest Service will delay revising the Plan and amend it to authorize logging in roadless areas on a project-by-project basis. In such circumstances, it is likely the agency will tier to the analysis contained in any EIS prepared for this rulemaking. Given the agency must consult and coordinate forest planning on the Tongass with Alaska Native Tribes (36 C.F.R. 291.4), we are gravely concerned that the agency's failure to consult and collaborate adequately with the Tribe on this Alaska-specific rule will impair the agency's performance of its responsibility to consult and coordinate with the Tribe regarding forest planning. Both outcomes impair the Tribe's responsibility to "protect the general welfare and security of the village."

Given where we are at this process, we recommend the Forest Service withdraw the August 30th notice and immediately comply with its responsibilities to consult and collaborate with the Tribes. Another, less preferable option, would be to extend the deadline for submitting scoping comments from October 15th until at least December 3rd. Such an extension would help ensure that OVK has at least 90 days to engage with its citizens and the Forest Service on this issue of such enormous controversy.

Gunalcheesh,

Joel Jackson pres.

Joel Jackson
President

Cc: Petersburg District Ranger David Zimmerman, dlzimmerman@fs.fed.us
Acting Alaska Regional Forester David E. Schmid, dschmid@fs.fed.us
USDA Forest Service Interim Chief Vicki Christiansen, vcchristiansen@fs.fed.us

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October 10, 2018

Alaska Roadless Rule
U.S.D.A. Forest Service
Alaska Region
Ecosystem Planning and Budget Staff
P.O. Box 21628
Juneau, AK 99802-1628

RE: Organized Village of Kake Comments for Roadless Rule in Alaska

To Whom it may concern,

The Organized Village of Kake (OVK) is the federally recognized Indian Tribe organized under the authority of the Indian Reogranization Acts of 1934 and 1936. OVK is empowered under its Constitution and By-Laws "to aid needy citizens and protect the general welfare and security of the village." One of OVK's highest priorities is to protect the Village's customary and traditional hunting, fishing and gathering areas and uses within the Keex' Kwaan's traditional territory.[1] These lands include national forest lands on Kuiu, Kupreanof, and portions of Baranof & Admiralty Islands, as well as portions of the mainland. OVK would like to engage with the USFS and State of Alaska as a co-manager/cooperater of resources in the traditional Kake, AK area. Many of OVK's citizens are on the ground utlizing all of the areas around Kake and are the first impacted by decision makers 100 miles away in Juneau and 3,000+ miles away in Washington D.C.

On August 2, 2018, in response to the State of Alaska's petition for a full exemption from the 2001 Roadless Area Conservation Rule (Roadless Rule), the Forest Service signed a Memorandum of Understanding with the State of Alaska to develop an Alaska state-specific roadless rule to address the management of inventoried roadless areas on the Tongass National Forest in Southeast Alaska. The U.S. Department of Agriculure announced on August 30, 2018 its intent to prepare an environmental impact statement (EIS) and public rulemaking process to According to the Notice of Intent, the State of Alaska will participate as a cooperating agency in the preparation of the EIS and "Federally recognized Tribes within the Tongass National Forest have been invited to particpate as a cooperating agency." The notice further gave notice of eleven public meetings planned in Southeast Alaska, incuding Kake on September 26, 2018 (Postponed to Oct. 10, 2018).

Pursuant to Executive Order 13175, Departmental Regulation No. 1350-002, and Forest Service Manual (FSM), the United States Forest Service has adopted official policy regarding American Indian and Alaska Native relations. Pursuant to FSM 1563.02, paragraph 4, agency

[1] Goldschmidt & Haas (1946). A map of the traditional territory of the Kake Tlingit prepared by Goldschmidt and Haas is attached, for your information.

American Indian and Alaska Native relations. Pursuant to FSM 1563.02, paragraph 4, agency officials are to "[s]upport the aspirations of the UN Declaration on the Rights of Indigenous Peoples." Specifically, this means "that agency officials should consult with indigenous people – the duly elected officials of federally recognized tribes and the traditional holders of Indian religions, knowledge, and practices – early in their decision-making processes." To further this objective, it is the policy of the Forest Service that "Indian tribes will be provided the opportunity for timely and meaningful government-to-government consultation regarding actions which may have tribal implications." *See* FSM 1563.03. Such consultation requires the agency to "[c]ollaboratively involve Indian tribes, as early as possible, in the development of regulatory and management policies, resource and land management plans, study plans and actions, and Federal undertakings that may have tribal implications." *Id.* at 3.b.

The U.S.D.A. and Forest Service entered into the MOU with the State of Alaska and issued the NOI for preparation of an EIS for an Alaska-specific roadless rule without any consulting or collaboration with OVK, in violation of policies under Executive Order 13175, Departmental Regulation No. 1350-002, and the Forest Service Manual. OVK strongly objects to the agency's utter failure to consult with OVK prior to responding to the State of Alaska's petition and initiating preparation of an EIS to support the rulemaking process. The belated invitation to the Tribe to participate as a cooperating agency, and holding a scoping hearing in Kake, cannot compensate for the agency's abject failure to consult and collaborate with the Tribe before proceeding with this Alaska-specific rulemaking – particularly when the proposed rulemaking has such grave and drastic tribal implications for the many tribal citizens who rely on these lands. Likewise, the State of Alaska's establishment the Alaska Roadless Rule Citizen Advisory Committee, which will include at least one member representing a federally recognized Tribe, will not address our concerns; every tribe should be represented on the committee. First, it appears that this committee by design will not assure fair and balanced representation of both development and non-development interests. Secondly, the proposed schedule for the committee providing recommendations to the Governor and State Forester elevates satisfying the State's hurried and arbitrary timeline above the interests of any other stakeholders in this process.

OVK is concerned that the Forest Service will delay revising the Tongass Land Management Plan, (TLMP) and amend it to authorize logging in roadless areas on a project-by-project basis. In such circumstances, it is likely the agency will tier to the analysis contained in any EIS prepared for this rulemaking. Given the agency must consult and coordinate forest planning on the Tongass with Alaska Native Tribes (36 C.F.R. 291.4), we are gravely concerned that the agency's failure to consult and collaborate adequately with the Tribe on this Alaska-specific rule will impair the agency's performance of its responsibility to consult and coordinate with the Tribe regarding forest planning. Both outcomes impair the Tribe's responsibility to "protect the general welfare and security of the village." As OVK listens to the public comment at other community meetings a large majority of the Alaska citizens are wanting the roadless rule intact and not changed; in fact, more protections are being asked for. In this world of changing climate, the State of Alaska should preserve what is left rather than loosening the regulations to have more development on pristine Tongass roadless areas.

---

is attached, for your information.

In conclusion, OVK would like to be at the table while decisions are being made on an Alaska-specific Roadless Rule. OVK would like to engage with the USFS and State of Alaska to guide the projects and activity in the traditional Kake area, from increasing some protections in important cultural areas, to lessening regulations in other areas to promote a sustainable economy. All of the aforementioned decisions should be driven by the communities that utilize that area.

Gunalcheesh,

Joel Jackson pres.

Joel Jackson
President

Cc: Petersburg District Ranger David Zimmerman, dlzimmerman@fs.fed.us
Acting Alaska Regional Forester David E. Schmid, dschmid@fs.fed.us
USDA Forest Service Interim Chief Vicki Christiansen, vcchristiansen@fs.fed.us

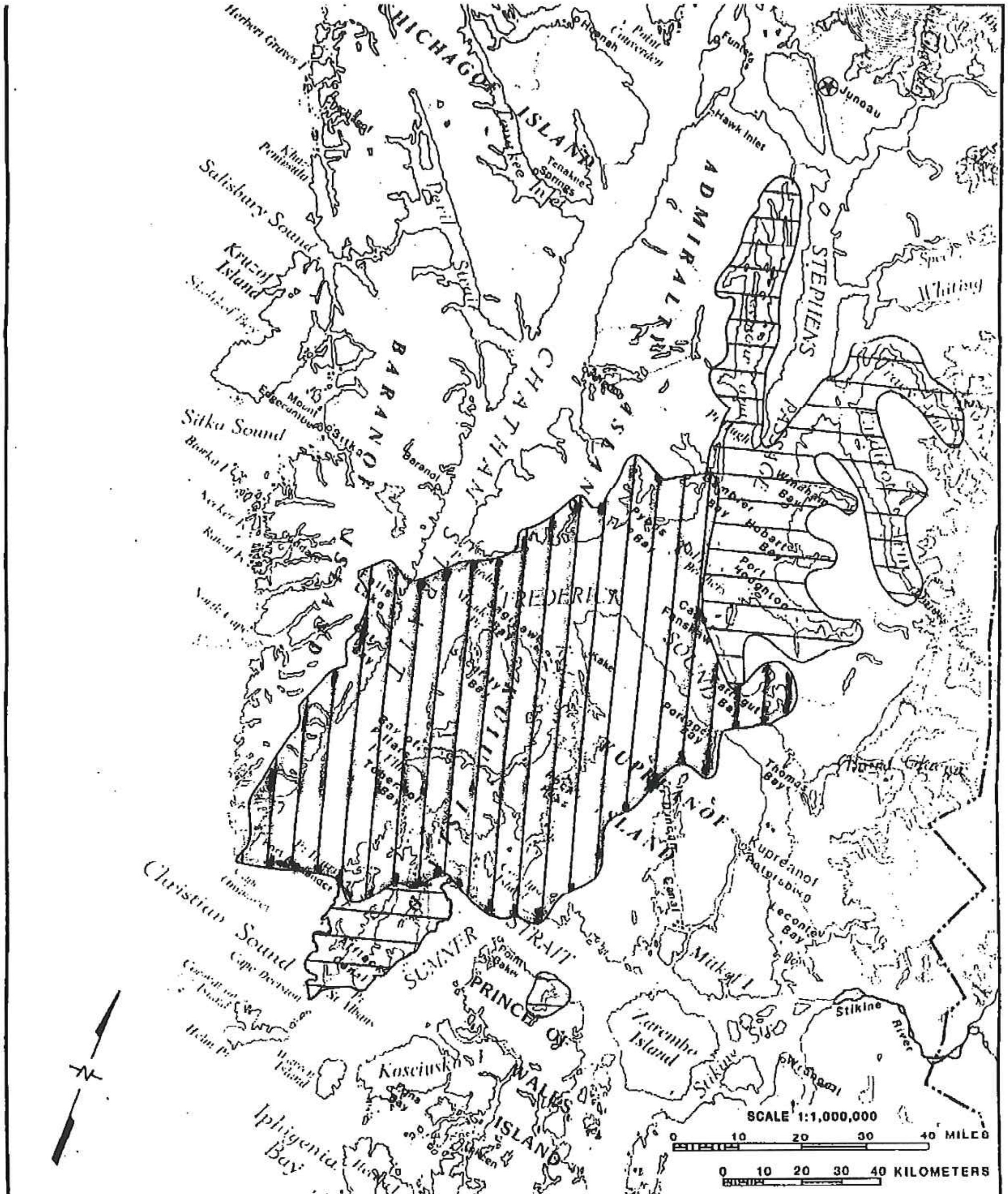
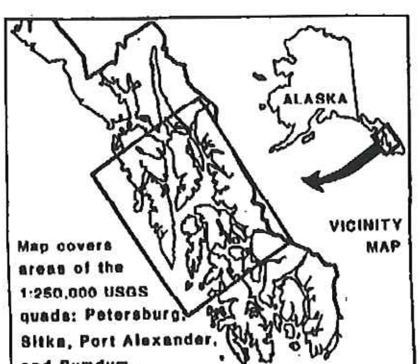


Figure 15. Traditional Territory of the Kake Tlingit, circa 1943.

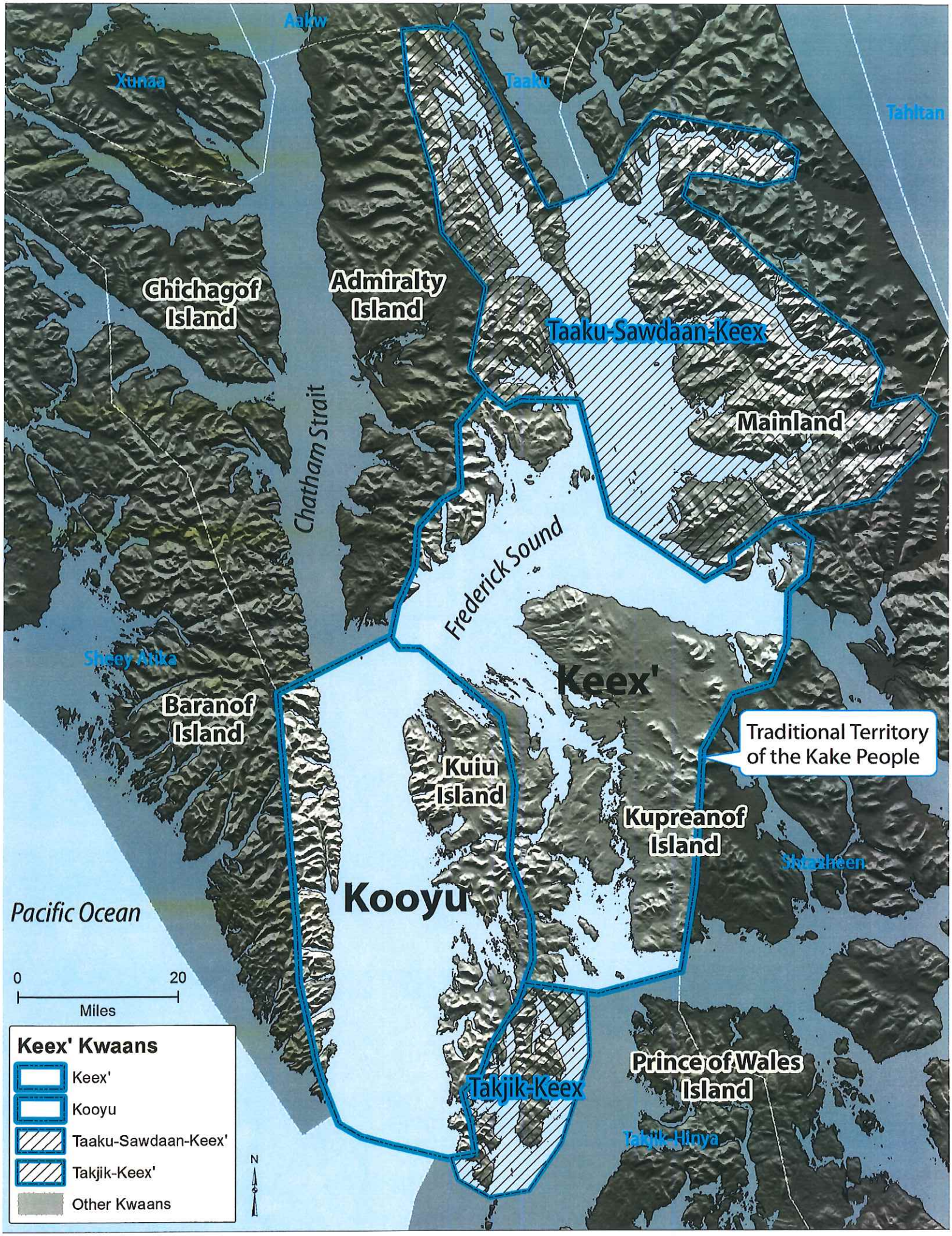


Exclusive Claim Area

Joint Claim Area

SOURCE: Goldschmidt, W.A., and T.H. Haas 1946, Possessory Rights of the Natives of Southeast Alaska and Department of Interior 1944, Hearings on Claims of the Towns of Hydaburg, Klawock, and Kake, Alaska

STATE OF ALASKA
Department of Fish and Game
Subsistence Division


Aakw
Xunaa
Taaku
Tahltan
Chichagof Island
Admiralty Island
Taaku-Sawdaan-Keex
Mainland
Chatham Strait
Frederick Sound
Sheey-Atika
Keex'
Baranof Island
Traditional Territory of the Kake People
Kuiu Island
Kupreanof Island
Shtashheen
Kooyu
Pacific Ocean
0
20
Miles
Keex' Kwaans
Keex'
Kooyu
Taaku-Sawdaan-Keex'
Takjik-Keex'
Other Kwaans
Takjik-Keex
Prince of Wales Island
Takjik-Hinya
N

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Resolution No. 2018-24: Continued Tribal Support for Application of National Roadless Rule on the Tongass National Forest

WHEREAS, the Organized Village of Kake (hereinafter OVK) is a federally recognized Indian Tribe under federal law and is empowered under its *Constitution & By-Laws* to execute agreements and contracts with the United States to benefit its members; and,

WHEREAS, OVK is further defined as an Indian Tribe in the Indian Self-determination and Education Assistance Act, PL 93-638 and as such is entitled to contract with the Federal Government for the operation of any federal programs, services, activities or functions serving its member; and,

WHEREAS, our traditional territory includes lands on Kupreanof, Kuiu, Eastern Baranof, and southern Admiralty Islands, and along the mainland, including Port Houghton and as far as Taku River south to Port Houghton; and

WHEREAS, protection of our inherent right to harvest and use our traditional and customary foods requires careful cultural stewardship and protection of our environmental and natural resources; and

WHEREAS, our care of the lands now classified as "inventoried roadless areas" (IRA) and within the Tongass National Forest stretches for millennia; and

WHEREAS, these lands not only provide our people with food, they essentially define who we are and where we come from; and

WHEREAS, inventoried roadless areas protect healthy watersheds that ensure a clean drinking water supply for our Tribal citizens

WHEREAS, inventoried roadless areas contain many sites sacred to Tribal citizens and other Alaska Natives who use these roadless areas for spiritual and religious practices and other customary uses and activities; and

WHEREAS, inventoried roadless areas conserve natural diversity, serve as a bulwark against the spread of invasive species; and

WHEREAS, inventoried roadless areas help ensure the continued protection of indigenous fish and wildlife habitat as it relates to our spiritual, social, nutritional, and ecological values; and

WHEREAS, given Southeast Alaska's cool wet weather, the amount of stored carbon in our intact old-growth forest and soils, the Tongass National Forest represents one of the highest carbon stores in the world and the conservation of intact inventoried roadless areas

on the Tongass is essential for maintaining America's resilience and slowing down climate change throughout the world; and

WHEREAS, the Roadless Rule prevents the disturbance of soils and wasteful construction of damaging roads in inventoried roadless areas; and

WHEREAS, according to the State of Alaska's own economic experts, Tongass timber is uncompetitive because of permanent and fundamental changes in global timber markets, high labor costs, distance from markets, and less expensive substitutes; and

WHEREAS, the Tongass timber industry represents less than one percent of today's jobs and earnings in Southeast Alaska; and

WHEREAS, there are over 5,000 miles of roads already crisscrossing the Tongass National Forest, fragmenting valuable wildlife habitat, threatening salmon by blocking fish passage, and serving as the primary source of sediment into fish streams; and

WHEREAS, spending millions of taxpayer dollars to build roads in inventoried Tongass roadless areas makes no economic sense, particularly given the agency's enormous road maintenance backlog; and

WHEREAS, at hearings held across Southeast Alaska in 2000 on the proposed roadless rule, nearly 60 percent of the Southeast Alaskans who spoke at the hearings supported including the Tongass National Forest in the final roadless rule, and has only grown to upward of 80 percent to date; and

WHEREAS, after the hearing held in Ketchikan during the summer of 2002 on the draft supplemental environmental impact prepared to evaluate recommendations for designating additional inventoried roadless areas on the Tongass as Wilderness, the Ketchikan Daily News reported that roughly 85 percent of the public who testified supported more Wilderness;

WHEREAS, the State of Alaska petitioned the United States Department of Agriculture (USDA) to exempt Tongass inventoried roadless areas from the Roadless Rule on January 19, 2018;

WHEREAS, for all the above reasons, the State's petition severely mischaracterizes the actual extent and impacts of the Roadless Rule on Southeast Alaska; and

WHEREAS, the State's petition ignores the fact that the USDA narrowly tailored the Roadless Rule to limit only two activities in roadless areas, road construction and commercial logging; and

WHEREAS, the State of Alaska's petition ignores the Rule's established exceptions, including Federal Aid Highway projects connecting communities, access to mining claims, and logging incidental to otherwise permitted activities, including utility corridors and hydropower projects; and

WHEREAS, on August 2, 2018, the Forest Service signed a Memorandum of Understanding (MOU) with the State of Alaska to develop an Alaska-specific roadless rule that addresses management of inventoried roadless areas on the Tongass National Forest; and

WHEREAS, three days before the MOU was signed and six months after the State filed its petition, the Forest Service informed OVK by a letter dated 30 July 2018 that the U.S. Secretary of Agriculture Perdue and State of Alaska Governor Walker had reached an agreement to prepare an Alaska-specific rule that would replace the Roadless Rule and "provid[e] for activities needed to further the State of Alaska's economic development while conserving roadless areas for future generations;" and

WHEREAS, the July 30th letter served as an invitation from Acting Regional Forester David E. Schmid to a "Tribal Leader" inviting "government-to-government consultation in advance of a formal public comment period and an opportunity for your Tribe to participate as a cooperating agency" because of our "expertise on subsistence and potential impacts to specific communities within Alaska" during preparation of an environmental impact statement (EIS) to evaluate the proposed Alaska-specific roadless rule for the Tongass National Forest, and other alternative; and.

WHEREAS, the U.S. Department of Agriculture, which includes the Forest Service, published a Notice of Intent (NOI) published on August 30, 2018 announcing its intent to prepare an environmental impact statement (EIS) and initiate a public rulemaking process; and

WHEREAS, the joint announcement issued by the Forest Service when the MOU was signed promises to leave unaffected Tongass lands designated Wilderness by Congress, no mention is made of the fate of nearly 900,000 acres of Legislated LUD II lands designated for perpetual protection from logging and roadbuilding by Congress in the 1990 Tongass Timber Reform Act and the 2014 Sealaska Lands Bill; and

WHEREAS, Kuiu Island and the surrounding smaller islands are important to the residents of Kake, especially the coastal areas near Kake. Areas most often associated with higher values include the Keku Islands, Kadake Bay and Creek, Port Camden, Rocky Pass, and the East Kuiu Roadless Area on the south and east side of Kuiu Island in addition to all of Kupreanof;

WHEREAS, any rule that weakens or eliminates Roadless Rule protections within our traditional territory in what became Inventoried Roadless Areas of the Tongass National Forest will substantially affect the existing 2016 Tongass Land Management Plan Amendment; and

WHEREAS, the 2016 Plan Amendment excluded all roadless areas from the available timber base, the agency's failure to consult and coordinate forest planning with OVK will impair the Tribe's ability to fulfill its responsibility to "protect the general welfare and security" of Tribal citizens; and.

WHEREAS, pursuant to Executive Order 13175, Departmental Regulation No. 1350-002, and Forest Service Manual (FSM), the United States Forest Service adopted an official policy (FSM 1563.02, paragraph 4) to "[s]upport the aspirations of the UN Declaration on the Rights of Indigenous Peoples." Specifically, this means "that agency officials should consult with indigenous people – the duly elected officials of federally recognized tribes and the traditional holders of Indian religions, knowledge, and practices – early in their decision-making processes;" and

WHEREAS, as provided in FSM 1563.03, it is the policy of the Forest Service that "Indian tribes will be provided the opportunity for timely and meaningful government-to-government consultation regarding actions which may have tribal implications" and such consultation requires the agency to "[c]ollaboratively involve Indian tribes, as early as possible, in the development of regulatory and management policies, resource and land management plans, study plans and actions, and Federal undertakings that may have tribal implications;" and

WHEREAS, the USDA and Forest Service entered into an MOU with the State of Alaska and issued the NOI for preparation of an EIS for an Alaska-specific roadless rule without prior consultation or collaboration with OVK; and

WHEREAS, the Forest Service has not explained adequately why it failed to fulfill its responsibilities to consult with the Tribe; and

WHEREAS, the State of Alaska continues to resist all efforts to develop and work in a government to government relationship with the Tribes and never consulted with the OVS before filing its petition with the USDA; and

WHEREAS, Governor Walker issued Administrative Order 299, establishing the Alaska Roadless Rule Citizen Advisory Committee (CAC) on September 5, 2018; and

WHEREAS, Alaska Governor Walker appointed 13 Alaskans to the CAC, including the Alaska State Forester, to advise the State of Alaska on the future management of inventoried roadless area in the Tongass National Forest; and

WHEREAS, the Governor appointed a single Alaska Native to represent all Tribal perspectives for the seventeen federally-recognized Tribes of Alaska Natives in Southeast Alaska on the CAC, a gigantic and unrealistic burden for one person; and

WHEREAS, the only other Alaska Native on the CAC represents Sealaska Corporation; and

WHEREAS, Sealaska is an Alaska Native for-profit Corporation established under the Alaska Native Claims Settlement Act -- not a Tribe; and

THEREFORE BE IT RESOLVED, OVK strongly supports lasting protection for all inventoried roadless areas within OVK's traditional territory now within the Tongass National Forest as provided for in the Roadless Rule; and

THEREFORE BE IT FURTHER RESOLVED, given the serious and long lasting Tribal implications from any reduction in current Roadless Rule protections, we strongly object to the Forest Service's failure to consult with OVK before deciding to grant the State of Alaska's petition and begin a review under the National Environmental Policy Act and public rulemaking process;

THEREFORE BE IT FURTHER RESOLVED, the only changes to the Roadless Rule that OVK can support is an update to the inventory used to define inventoried roadless areas subject to the Rule on the Tongass to include approximately 350,000 acres excluded from the 1995 inventory used for developing the 2001 Roadless Rule because the agency assumed approved logging development would occur – when it did not;

BE IT FINALLY RESOLVED, the Forest Service must also initiate consultation, coordination, and accommodation of Tribal interests in any changes to TLMP connected with this rulemaking process.

CERTIFICATION

This resolution was duly adopted at an IRA Council meeting held this _____ day of _____, 2018 by a quorum of _____ (includes president as non-voting chairperson except in case of tie vote) with _____ yes votes, _____ no votes, and _____ abstaining.

Joel Jackson pres.
Joel Jackson, President

Patti Handy vice
Attested by

Organized Village of Kake
PO Box 316
Kake, Alaska 99830
Telephone: 907.785.6471
Fax: 907.785.4902

February 5, 2019

Sonny Perdue, Secretary of Agriculture
U.S. Department of Agriculture
1400 Independence Avenue, SW
Washington, DC 20250

Dear Honorable Secretary Perdue:

On behalf of the Organized Village of Kake and the Organized Village of Saxman, we request an official government to government consultation with you regarding the proposed Alaska-specific roadless rule. As federally recognized Indian Tribes organized under the Indian Reorganization Acts of 1934 and 1936, our citizens share a deep connection with the incredible waters, lands, and resources of Southeast Alaska; a connection forged by our ancestors over the past 10,000 years --- since time immemorial.

On August 30, 2018, you announced the U.S. Department of Agriculture's intent to initiate an environmental impact statement (EIS) and public rulemaking process to address an Alaska-specific roadless rule for management of inventoried roadless areas on the Tongass National Forest in Southeast Alaska. Before that announcement, neither your office, the Forest Service, nor State of Alaska attempted to consult or collaborate with our Tribes.

Alaska Governor Walker convened a Citizen Advisory Committee (CAC) last fall to advise the State of Alaska on this important topic; however, only one Alaska Native was appointed to represent the interests of all seventeen federally recognized Indian Tribes from Southeast Alaska. This was a gigantic and unrealistic burden for one individual. The other Alaska Native appointed to the CAC represented Sealaska Corporation, the for-profit Alaska Native Regional Corporation established under the Alaska Native Claims Settlement Act and state law for Southeast Alaska –is not an Indian Tribe.

While the Forest Service has included some Southeast Alaska Indian Tribes as "cooperating agencies" during preparation of this EIS, the frantic pace necessary to satisfy some preordained timeline imposes substantial burdens on those Tribes hoping to be at the table when decisions are made on an Alaska-specific roadless rule. Given the harms and delays caused by President Trump's shutdown, we are further concerned that careful and informed consultation between our Tribes, your office, and the Forest Service may become little more than an afterthought.

Consequently, as elected leaders of our Tribes, we respectfully request to consult with you directly about the Alaska-specific roadless rule this spring. Since the decision to proceed with this rulemaking, and the ultimate decision, is yours, we believe speaking directly with you is the most effective way of assuring you hear what we need to say. It takes effort, resources, and coordination to travel all the way to Washington D.C., but we hope our willingness indicates how important this issue is to our Tribe's citizens. Please let us know, as soon as possible, when we could meet directly with you. Thank you.

Respectfully,

Joel Jackson, President
Organized Village of Kake
P.O. Box 316
Kake, Alaska 99830
Ph: 907-785-6471

Lee Wallace, President
Organized Village of Saxman
Rt. 2, Box 2 (Saxman)
Ketchikan, Alaska 99901
Ph: 907-247-2502

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(Federally Recognized Tribal Government serving the Kake, Alaska area)

January 31, 2019

David Schmid
Regional Forester
U.S. Forest Service
Alaska Region
709 West 9th Street
Juneau, AK 99801
(907) 586-8775
David.schmid@fs.fed.us

RE: Timeline for Alaska Roadless Rule Process

Dear Mr. Schmid,

The Organized Village of Kake (OVK), a cooperating agency in the Alaska Roadless Rule process, would like to formally object to the pace at which Alaska Roadless Rule Process is being pursued and advocate for a delay in the proposed timeline to allow for a more thorough analysis of the concerns identified in the scoping process. OVK does not believe that it is possible to sufficiently analyze the issues inherent in the creation of an Alaska-specific Roadless Rule in a four-month period which includes a 35-day government shutdown that affected not only agency staff, but tribal entities in Alaska which had their operations severely impacted by the shutdown. We request that the U.S. Forest Service delay the extremely expedited timeline with which they have been pursuing the creation of the Alaska Roadless Rule, and create a timeline that is more appropriate to analyze the complex issues and concerns brought forth by the federally-recognized sovereign nations and communities in Southeast Alaska.

The Tongass is the largest National Forest and contains the most Inventoried Roadless Area acreage in the nation. It has historically been subject to extreme controversy as the U.S. Forest Service was overwhelming focused on supplying pulp and timber mills with Tongass timber, while trampling and ignoring the rights and concerns of the Native Alaskans who have lived in this place since time immemorial. In Kake, we have endured the pillaging of our land for the profits of overseas corporations at the economic, environmental, cultural, and social expense of our people for over 50 years. Now, the U.S. Forest Service is rushing through a process that could significantly alter the ecological integrity of the land and watersheds that we depend on for our cultural traditions, our food security, and our economic livelihoods.

Idaho filed a petition for a state-specific rule on October 5th, 2006; the DEIS for the Idaho rule was released on December 21th, 2007 – over a year after the original petition had been filed. The final rule was not codified into law until October 16th, 2008 – over two years after the process began. Colorado filed a petition for a state-specific rule on November 13th, 2006; their DEIS was a year and a half later, on July 25th, 2008. Their final rule took effect four years later, in 2012. Both states contain less Inventoried Roadless acreage than the Tongass, and their national forests are substantially less controversial, at least on a national level. It is ludicrous to assume that the complex issues that characterize the Tongass, which contains the most Inventoried Roadless Acreage and the health and future of which is critical to the thirty-two communities that live within it, can be sufficiently analyzed and satisfactorily addressed in a DEIS conducted in just three and a half months.

This time period is especially insufficient since the government has been shut down for 35 days during this aforementioned period, during which the Alaska Roadless Rule team was not operating at full capacity. Furthermore, OVK was also affected by this shutdown, as 98% of our funding comes from the federal government. The result of this funding lapse has made it extremely difficult to provide services to our tribal citizens, as well as do the necessary preparation for us to be able to assess the impact of the draft environmental impact statement on our island and locations of community use.

For OVK, cooperating agency status is meant to build relationships of trust and cooperation between the Forest Service and us, as well as facilitating the use of our local knowledge of economic, environmental, and social conditions. Thus, we request that the Forest Service do their due diligence in making wide-ranging decisions for this Forest by taking the time to consider the concerns of OVK with the pace of this process and reducing the pace accordingly. We would like to see an extended deadline of at least two months for reviewing and commenting on the draft environmental impact statement that we are expecting to see on February 14th, 2019. We are overwhelmed by the two-week deadline for us to analyze this complex document and its undoubtedly wide-ranging effects. We request a justification for the Forest Service's imposition of a seemingly arbitrary and unsensitive deadline on a project with such controversial and far-reaching implications. We also request a full report on the scoping comments received by the agency with an attached analysis of the number of comments made in support of/in opposition against changes to the Roadless Rule. Furthermore, so that we may appropriately plan for the year ahead, we request a detailed timeline of future actions that are in planning, especially those done in conjunction with and necessitating the support of the cooperating agencies. We require a timeline to plan for these expedited requests of analysis and feedback on critical project documents, so that we may solicit insights from our Tribal Council regarding this extensive rulemaking process and its effects.

We appreciate our involvement in this process and look forward to your timely response.

Gunalcheesh,

Joel Jackson pres

Joel Jackson
President

Cc: Ken Tu
Cooperating Agencies

Natalie Gwen Dawson

Candidate

Biology

Department

This dissertation is approved, and it is acceptable in quality and form for publication on microfilm:

Approved by the Dissertation Committee:

, Chairperson

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Dean, Graduate School

NOV 17 2008

Date

PREVIEW

PREVIEW

VISTA NORTEÑA: TRACKING HISTORICAL DIVERSIFICATION AND CONTEMPORARY STRUCTURE IN HIGH LATITUDE MESOCARNIVORES

BY

NATALIE GWEN DAWSON

B.S. Biology, Environmental Science
Central Michigan University, 2002

PREVIEW

DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Doctor of Philosophy

Biology

The University of New Mexico
Albuquerque, New Mexico

December, 2008

UMI Number: 3346591

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ACKNOWLEDGMENTS

I would like to acknowledge Dr. Joseph Cook, my advisor, dissertation chair, and mentor for encouraging me to pursue a Ph.D., providing me insight, guidance, and friendship, and giving me the opportunity to pursue this adventure across a landscape and people that I love.

I also thank my committee members, Dr. Timothy Lowrey, Dr. Peter Fawcett, and Dr. Kimberly Hastings, for their valuable time assisting me in sculpting the final dissertation, as well as providing me with professional guidance throughout my experiences as a graduate student. Thank you to Dr. Hastings for providing me with invaluable assistance with field logistics and coordination. I extend my gratitude to the Cook Laboratory at UNM and formerly, Idaho State University, for friendship, guidance, hikes, bike rides, and dancing. I thank Dr. Melissa Fleming and Dr. Karen Stone for sharing their expertise and datasets with me over the years.

I would like to thank the members of the US Geologic Survey Molecular Ecology Laboratory in Anchorage, Alaska for laboratory assistance and analytical assistance. I especially thank Kevin Sage for many laborious hours of working on marten microsatellites and helping to keep me organized. I extend my gratitude to Dr. Sandra Talbot, who has not only been instrumental in aspects of my dissertation research, but has also played a role as a mentor for me in graduate life in general. Thank you for the inspiration, creative conversations, and wonderful friendship.

Thank you to all the agency personnel (US Forest Service, Alaska Department of Fish and Game, US Fish and Wildlife Service) who have assisted in sample collection

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and provided professional guidance over the years especially Bill Hanson, Ed Grossman, Lance Lerum, Rich Lowell, Doug Larsen, Kim Titus, Boyd Porter, Neil Barton, and Neil Anderson (Montana Department of Fish, Wildlife and Parks). I would like to thank Rod Flynn for all his guidance and knowledge regarding marten in Southeast Alaska, as well as giving me the opportunity to work in the field for a few field seasons. I would like to particularly thank Glen Ith for being an inspiring mentor and friend. You will be missed by so many of us on the Tongass.

To my friends and family who have helped me over the years with consistent encouragement, laughter, and smiles. Especially, I would like to thank Teri Orr, Anson Koehler, Martina Stursova, Jason Malaney, UNM Wildfriends, Ruth Carraway, and Clay and Dina Mosley for irreplaceable friendship. I thank Huck for guidance, love, support, friendship, and partnership during a dynamic fragment of my life. I thank Lance for being a supportive sibling, and being one of the only people to come visit me and play with me in the desert. I thank my parents, for their unwavering love and support, along with an unending encouragement to seek out adventure and seize every day with passion and excitement.

I thank the deserts of the southwest, for providing me home and inspiration during the years of my dissertation research. The smell of roasted chile, desert sage, and spring-rich mesas after the rains will remain in my memory fondly.

Lastly, I thank the Tongass, a place of magnificent beauty, incomprehensible richness and incomparable spirit, for maintaining my motivation for this project at times when it was difficult. The moments of solitude and togetherness in the rainforest, the storytelling, the campfires, the cabins on rainy days, the August sunlight magnified by a

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million huckleberries dripping off branches, are images that will remain in my heart always. I hope my work will assist in providing future experiences such as these for many more generations to come.

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NATALIE G DAWSON

PREVIEW

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Natalie Gwen Dawson

B.S. BIOLOGY, ENVIRONMENTAL SCIENCE, CENTRAL MICHIGAN UNIVERSITY, 2002
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ABSTRACT

Contemporary high latitude diversity may be largely structured due to vicariant events during major glaciations and subsequent species radiations during the Pleistocene. Little is known about how diversity was produced at high latitudes, although recent studies suggest that these regions may have increased rates of both speciation and extinction because of large scale climatic changes. In this study, I focus on the high latitude islands of the North Pacific Coast and track the historical processes responsible for contemporary diversification of multiple species. I characterize the holarctic distribution for *Mustela erminea* in light of three previously described monophyletic clades. Using a suite of molecular markers, I provide evidence for a mid-Pleistocene divergence of the species into the three distinct clades currently found in North America. I also use a comparative approach based on studies in Europe to draw parallels between the hypothesized diversification events. Finally, I hypothesize the location of potential refugia from which each clade may have arisen.

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I examine the historical biogeography of two forest-associated mammals, the Pacific marten (*Martes caurina*) and the pine marten (*Martes americana*). Although they are sister species and have similar ecologies, these species represent independent evolutionary trajectories within the region. *M. caurina* is a relictual species of late-Pleistocene colonization, while *M. americana* is a recent colonizer into the region.

Using information gleaned from previous studies, I look closer at the effects of contemporary island life on the two species of marten. In particular, I define levels of endemicity found on islands in the North Pacific for *M. caurina*. I use genetic parameters to measure heterozygosity, effective population size, and estimates of gene flow to describe population connectivity and dispersal in light of historical information known for each population.

Finally, I explore the implications of my work for land use policies within these North Pacific Coast archipelagos. Understanding both historical and contemporary processes that drive diversification and subsequent species assemblages across regional landscapes is required for making effective conservation plans, management decisions, and predictive models of landscape connectivity to ensure the persistence of species in these vulnerable high latitude biomes.

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CHAPTER 1

INTRODUCTION

Efforts to discover and describe biological diversity across the globe have built the foundations on which scientists monitor environmental processes and predict future response to large-scale environmental fluctuations. From these efforts, biologically diverse "hotspots" or regions of high conservation concern have been identified (Myers et al. 2000) based on percentages of endemic plants and animals as well as high potential for extinction of species in given regions. These hotspots have become high-priority regions for research and conservation efforts, not only because they represent a significant portion of biological diversity for the planet, but also because they support the evolutionary processes generating high diversity. Hotspots are largely found in tropical regions of the world, due to increased species richness combined with severe extinction rates due to threats such as extensive habitat modification (Wright et al. 2006). Research has indicated, however, that species at high latitudes may have faster rates of speciation and subsequently extinction due to a history of intense climatic shifts over short periods of time (Weir and Schluter 2007). This debate over diversification rates and extinction probabilities and their combined impact on latitudinal diversity continues (Tobias et al. 2008; Weir and Schluter 2008). Nonetheless, temperate regions are also of increasing conservation concern and most recently, the Valdivian rainforest in southern Chile was established as a biodiversity hotspot (Conservation International 2008). Herein, I explore processes related to diversification and conservation concerns in the little explored northern rainforests found along the Pacific Coast of North America; that are analagous forests to those found in the Valdivian region.

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Until recently, organismal diversity at high latitudes was considered minimally important to the global assessment of contemporary biotic diversity, due largely to a lack of knowledge of intraspecific variation within northern species. Molecular genetics provides new perspectives on this global view of diversity by allowing us to place individual organisms in light of their evolutionary history. By looking at genetic diversity through time and space, we can test various processes that may be responsible for diversification of species. This dissertation investigates diversity found at the high latitudes for three species of mustelids (Mammalia: Mustelidae); the Pacific marten (*Martes caurina*), the American pine marten (*Martes americana*), and the ermine (*Mustela erminea*). It examines the driving forces behind diversification within these species, as well as the contemporary influences of landscape change on the dynamics and distribution of populations within these species.

The North Pacific Coast is home to several distinct island groups including the Alexander Archipelago in southeast Alaska, the Haida Gwaii archipelago south of the Dixon Entrance off the coast of British Columbia, and Vancouver Island along the British Columbia coast (Figure 1). This region was historically defined by the possible presence of Pleistocene glacial refugia on the outer edges of the continental shelf, suggesting that vicariance may be the primary driving force behind diversification and the presence of endemic organisms currently described along the coast (Carrera et al. 2007; Hetherington et al. 2003). It has also been hypothesized that the region was an important corridor facilitating movement of early humans from Asia to North America (Dalton 2003). Contemporary fragmentation on these islands includes extensive habitat modification as well as potential barriers to dispersal such as oceanic straits. The region is further

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isolated by the dominant Coast Range mountains that form the eastern spine of the region known as the North Pacific Coast. These factors drive both historical and contemporary processes that influence the foundation of biological diversity in the region, and have implications for the conservation of species across the globe.

The Alexander Archipelago is the largest island archipelago along the North Pacific Coast. It contains four of the ten largest islands under U.S. jurisdiction (>2,000 named islands) and is home to the largest national forest-the 8 million hectare Tongass National Forest. Karst limestone formations dominate the region's island geology, creating a system of well-irrigated soils that now support some of the largest remaining tracts of temperate rainforest in the world. These karst areas and associated caves also provide a detailed fossil history of the last 40,000 years at a few paleontological and archeological sites (Heaton and Grady 2003). This rich fossil record reveals the presence of both ice-adapted species (e.g., ringed seals) and periglacial terrestrial species in glacial refugia during the Pleistocene within this archipelago. This deep and dynamic history may have driven the contemporary singularity of these islands (Heaton et al. 1996). The Tongass is home to many fish and wildlife species that have declined across their southern distributions, including several species of Pacific salmon (*Oncorhynchus spp.*), brown bears (*Ursus arctos*), wolves (*Canis lupus*) and marbled murrelets (*Brachyramphus marmoratus*) as well as distinct evolutionary lineages for many species that are either Nearctic or Holarctic in distribution (Cook et al. 2006; Appendix 2). In several cases, the closest relatives to species found in the Alexander Archipelago are of Beringian origin, illustrating the historical connectivity of the Arctic and these coastal refugia.

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The Haida Gwaii archipelago comprises over 150 islands off the coast of British Columbia. Long hailed as the "Galapagos of the North", the archipelago is home to over 39 endemic plant and animal species (Cowan 1989). The presence of endemic lineages and in some cases, endemic species, further strengthens the hypothesis that glacial refugia persisted along the North Pacific Coast during the last ice age (Reimchen and Byun 2005). Several of the divergent taxa found on these islands have shared evolutionary histories with organisms found in the Alexander Archipelago.

My dissertation focuses on three coastal species, two forest-associated marten species, and the holarctic ermine (short-tailed weasel), a species comprised of three distinct evolutionary lineages. My overall research hypotheses are: 1) Diversification of species during the Pleistocene has played a significant role in generating diversity in high latitudes; 2) Island populations along the North Pacific Coast will exhibit distinct evolutionary trajectories; 3) Contemporary fragmentation of these island landscapes will influence and/or restrict population structure. Specifically, I establish the context of species diversity and distributions within the larger framework of the historical biogeography of boreal North America and Asia. I use molecular genetics to measure historical genetic diversity and ask questions related to the origin of biological diversity in the high latitudes. For example, did Pleistocene glacial events drive diversification within species? Did earlier (Miocene or Pliocene) evolutionary events contribute more or less to contemporary species diversity at the high latitudes? What forces are currently structuring geographic variation in high latitude biomes?

Chapter 2 provides a closer look at a holarctic species, the ermine or short-tailed weasel, and its connections with Asia through Beringian diversification and subsequent

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isolation on the North American continent (Figure 3). I use this species to test the hypothesis that historical diversification of species during the Pleistocene has played a significant role in generating contemporary diversity at high latitudes. The ermine is the only mammal species found along the North Pacific Coast with an evolutionarily deep "island" lineage whose entire distribution falls within the hypothetical regions of coastal glacial refugia during the Pleistocene. This "island" group diverged from Beringian ancestors during the mid-Pleistocene, and remains on an independent evolutionary trajectory. Using nuclear DNA to independently test previously constructed monophyletic clades (Fleming and Cook 2002), these independent genetic markers further define evolutionary divergence within *M. erminea* in North America and largely corroborates previous studies based on morphology and mtDNA. This chapter also uses the ermine as a platform species to test the significance of Pleistocene events on contemporary biological diversity. Although I provide empirical evidence for only ermine, the parallels with similar species in both North America and Europe are drawn to highlight the global significance of past climate fluctuations on species diversity.

In Chapter 3, I explore patterns of endemicity of the Pacific marten by examining population structure of this species and comparing that to its sister species, the American pine marten. I use these two species to test the hypothesis related to whether island populations exhibit signals of isolation and endemism due to historical isolation and differential colonization histories. Due to heavy glaciation that extended largely to the edge of the continental shelf (Figure 2), it can be argued that enough time has not lapsed for these populations to exhibit characteristics of "island life". Chapter 3, however, illustrates that endemic island populations are on distinct evolutionary trajectories along

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the North Pacific Coast. Even though less than 12,000 years may separate them from their closest relatives, it is enough time to see the combined effects of historical and contemporary fragmentation on species diversification and community composition. Also important to note in this study, is that recent colonizers in the region also reflect characteristic features of "island life" in that there are distinct genetic signals within certain island populations even though they may have inhabited the region for no more than the last 10,000 years. *M. caurina* and *M. americana* have different evolutionary histories within the region which suggests separate colonization events from distinct glacial refugia.

Chapter 4 focuses on a comparison of contemporary population structure of the two marten species along the North Pacific Coast. Armed with the historical information regarding population structure (Chapter 3) of the two marten species, I address the effects of contemporary processes such as hybridization, fragmentation, and connectivity on populations of these two species. Again, the tools employed in this study can be used in a larger framework to produce generalized hypotheses for other species along the North Pacific Coast, such as the black bear (*Ursus americanus*) and the northern goshawk (*Accipiter gentilis*). The chapter focuses on the islands of the North Pacific Coast that are home to *M. caurina*, because this species has a limited distribution and a large portion of the genetic diversity for the entire species is found within this region. Nuclear microsatellites provide detailed views of the contemporary processes that influence structure in this species. My findings of extremely low levels of variation suggest that a recent bottleneck may have driven the low diversity within the population found on Admiralty Island. In contrast, the population on Kuiu Island is part of a hybrid zone

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between the two marten species. I attempt to identify the source of these populations and the dynamic interactions between them because this information can be immediately applied to pending management activities on this and nearby islands.

Chapter 5 provides a summary of the dissertation, including aspects from two of my publications that are included in the Appendices, and highlights the future for research in the area of molecular ecology and conservation at species boundaries in the high latitudes. The conclusion addresses the need for incorporating science-based land management practices into the policies that govern public lands on a larger scale, with the Tongass National Forest having high potential to become a model system for these integrative activities and progressive management of federal lands. Conservation concerns on the Tongass will increasingly become driven by scientific investigations, yet managers struggle to incorporate this information into land management plans. It is my hope that this dissertation can facilitate the dialogue between parties within this highly complex region, as well as provide information for further investigations into the structure of biological diversity at the high latitudes, the impact of climate fluctuations and subsequent political mandates that begin to define a new age of climate change and land use policies in the arctic and subarctic regions of the world.

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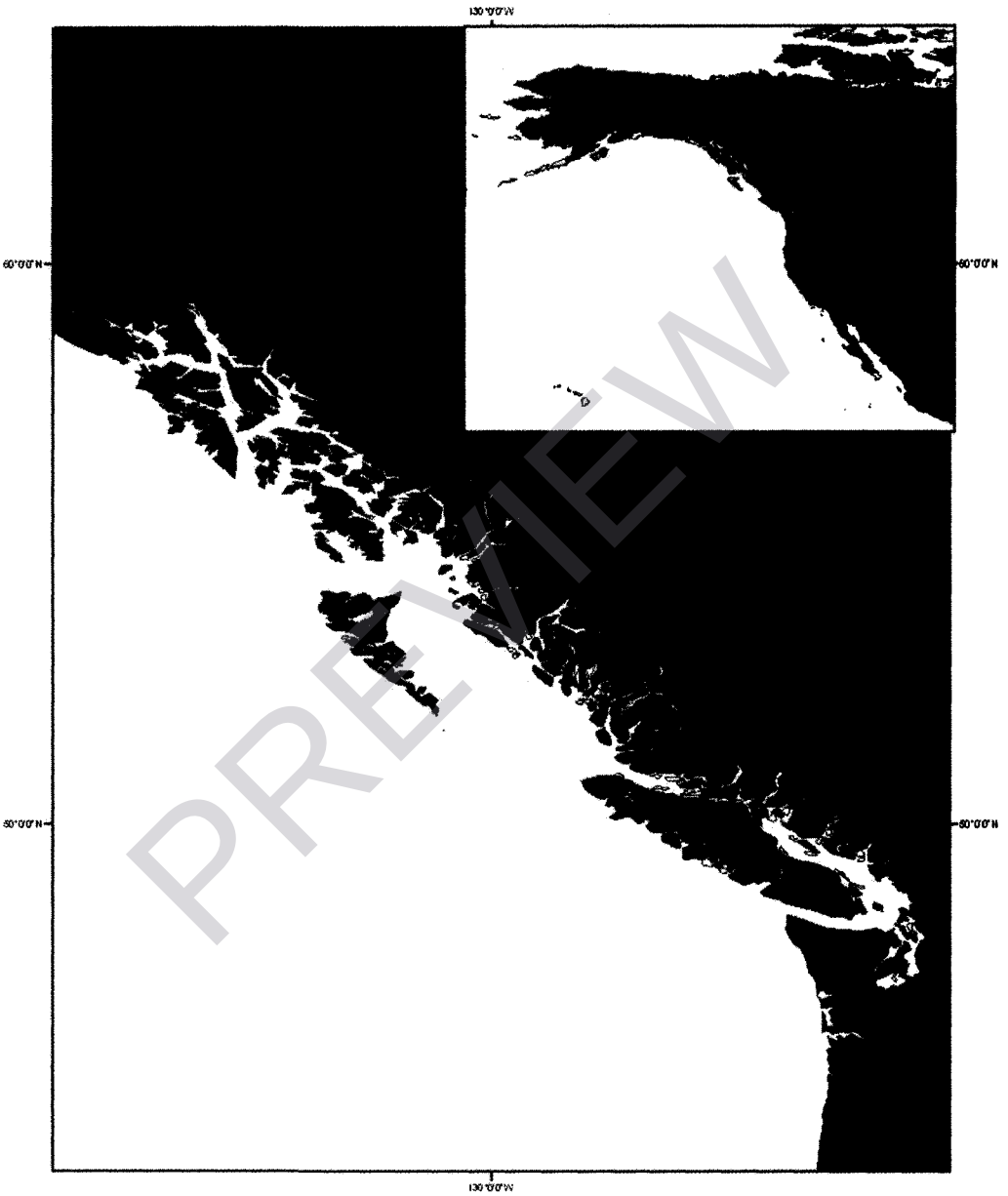
Figure 1: Focal study areas along the North Pacific Coast: 1) Eastern Beringia, 2) Alexander Archipelago, 3) Haida Gwaii archipelago, 4) Vancouver Island, and 5) Washington/Oregon coast



PREVIEW

Journal of Mammalogy, 98(3):715–730, 2017
DOI:10.1093/jmammal/gyx047
Published online May 15, 2017

Historical biogeography sets the foundation for contemporary conservation of martens (genus *Martes*) in northwestern North America

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Effective conservation of insular populations requires careful consideration of biogeography, including colonization histories and patterns of endemism. Across the Pacific Northwest of North America, Pacific martens (*Martes caurina*) and American pine martens (*Martes americana*) are parapatric sister species with distinctive postglacial histories. Using mitochondrial DNA and 12 nuclear microsatellite loci, we examine processes of island colonization and anthropogenic introductions across 25 populations of martens. Along the North Pacific Coast (NPC), *M. caurina* is now found on only 2 islands, whereas *M. americana* occurs on mainland Alaska and British Columbia and multiple associated islands. Island populations of *M. caurina* have a longer history of isolation reflected in divergent haplotypes, private microsatellite alleles, and relatively low within-population diversity. In contrast, insular *M. americana* have lower among-population divergence and higher metrics of within-population diversity. On some NPC islands, introductions of *M. americana* may be related to decline of *M. caurina*. Long-term persistence of these species likely has been influenced by anthropogenic manipulations, including wildlife translocations and industrial-scale deforestation, yet, the distinctive histories of these martens have not been incorporated into natural resource policies.

Key words: carnivore, endemic, introductions, islands, marten

Genetic parameters provide key indicators of the vulnerability of natural populations to extinction (Frankham 2005). Island populations, because they are typically small and isolated, often exhibit reduced genetic variability and elevated levels of inbreeding when juxtaposed against conspecific mainland (continental) populations (Frankham 1997; Bidlack and Cook 2001). Cold saltwater and strong currents are effective barriers to gene flow in many terrestrial vertebrate species (Williamson 1981; Baker et al. 1990), so populations on archipelagos often are differentiated from mainland populations. Although the relationship between genetic variability and extinction is complex (Aguilar et al. 2004), reduced variability and low levels of immigration may increase the probability of extirpation for isolated populations (MacArthur and Wilson 1967; Frankham 2005). Although island populations typically contain low levels of genetic variation (Frankham 1997), they may be essential to long-term persistence of the species and to the origin of new lineages because of their tendency to accumulate novel variation (Wilson et al. 2009). Isolation, therefore, increases the potential for divergence, while also increasing the risk of extinction (MacArthur and Wilson 1967), and these 2 factors have made island populations the focus of research and conservation efforts worldwide (Losos and Ricklefs 2009). Understanding how historical biogeography influences the contemporary distribution of genetic diversity within natural populations is a critical first step towards effective management of island biodiversity.

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Early scientific surveys along the northern North Pacific Coast (NPC) of North America identified high numbers of endemic or regionally distinct organisms (Swarth 1936; Hall 1944) and subsequent investigations of the region's fauna (e.g., Reid et al. 1999), combined with advances in molecular techniques, uncovered a suite of genetically distinct populations and species of conservation concern (Cook et al. 2006). Recent investigations are providing more detailed views of these endemics (Topp and Winker 2008; Sawyer and Cook 2016) and revealing new areas supporting high genetic diversity along the NPC (Latch et al. 2008). This region includes 2 large, north-south oriented archipelagos: the Alexander Archipelago in southeastern Alaska (> 2,000 islands) and to the south, the Haida Gwaii Archipelago along coastal British Columbia (> 150 islands). These archipelagos, and the nearby narrow mainland bounded to the east by the Coast Range, support the largest remaining tract of old-growth temperate rainforest in the world (Alaback 1988). Potential Late Quaternary glacial refugia in this region have been proposed (Byun et al. 1997) and have been explored from geological (Carrara et al. 2003, 2007), paleontological (Heaton and Grady 2003; Ramsey et al. 2004), anthropological (Carlson and Baichtal 2015), and phylogeographical perspectives (Cook et al. 2006; Dawson et al. 2014).

Pacific martens (*Martes caurina* Merriam 1890) are distributed along the northern NPC of North America with disjunct populations found southward into California and the southern Rocky Mountains (Fig. 1). More widespread American pine martens (*M. americana* Turton 1806) have a parapatric northern distribution across North America. Originally described as distinct species, *M. caurina* was later subsumed within *M. americana* on the basis of a hypothesized zone of introgression in Montana (Wright 1953). We use the original 2-species taxonomic classification of Merriam (1890), which has been supported by molecular (Carr and Hicks 1997; Dawson and Cook 2012) and parasitological (Koehler et al. 2009; Hoberg et al. 2012) evidence. Reassessment of genetic diversity and conservation status of these 2 species provides a foundation for effective wildlife management prescriptions within the archipelagos and elsewhere. Further, 3 populations (Kuiu Island, northern and southern Montana) include areas of sympatry for

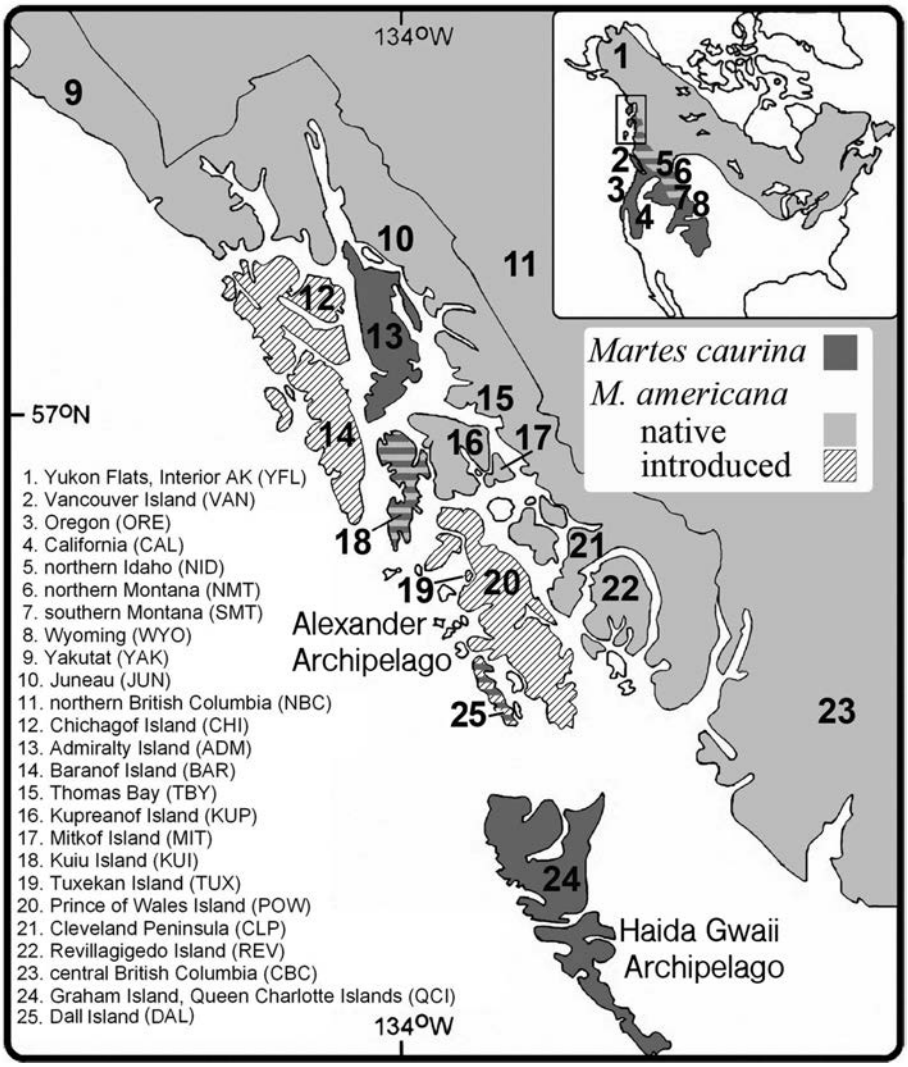

Fig. 1.—Map of localities for all *Martes americana* (light gray) and *M. caurina* (dark gray) populations. Bold hatched lines indicate hybrid zones between the 2 species, light hatching indicates islands that received *M. americana* introductions.

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the 2 species and represent documented hybrid zones (morphological intergradation—Wright 1953; intermixed microsatellite alleles—Small et al. 2003).

A series of wildlife translocations conducted from 1930 to 1950 by the Alaska Game Commission from the coastal mainland and elsewhere into multiple islands of the Alexander Archipelago (Chichagof, Baranof, and Prince of Wales islands) further complicates our understanding of the distribution of these species (Paul 2009). We deliberately include introduced populations in our analysis to facilitate exploration of the dynamics of natural versus human-mediated colonization, an aspect unaddressed by previous phylogenetic studies in this system. We expand upon previous genetic studies of North American martens (Stone and Cook 2000; Stone et al. 2002; Small et al. 2003) in an effort to refine contact zone geography and reconstruct historical biogeographic patterns relevant to conservation. We add key locations, including new insular (Dall Island, Tuxekan Island) and continental (southern Montana, northern Idaho, California) populations, and an additional mitochondrial gene (control region) to fully characterize variation in these species. By placing our new analyses into the context of past studies (Stone et al. 2002; Small et al. 2003), we evaluate historical demographics relevant to conservation of insular and continental populations. We hypothesize that *M. caurina* exhibits a characteristic signature of long-term persistence and diversification in island populations (Stone et al. 2002). Persistence would be consistent with extensive geographic structure uncovered in an associated endoparasitic nematode across island populations of the northern NPC (Koehler et al. 2009). In contrast, we expect *M. americana* will exhibit minimal geographic structure among populations in the Pacific Northwest as a result of recent expansion into the region (Stone et al. 2002). In this paper, we seek to: 1) describe diversity within and among insular populations of 2 species with distinct biogeographic histories; 2) compare genetic structure of both indigenous and introduced insular populations with mainland populations; 3) identify vulnerable island populations based on genetic variability; and 4) discuss these results within the context of future management considerations for this complex coastal island ecosystem.

Materials and Methods

Sampling.—Marten samples were obtained from furbearer trappers through cooperative efforts with state, federal, or provincial natural resource agencies for disposition in the University Alaska Museum of the North at the University of Alaska in Fairbanks, Alaska and Museum of Southwestern Biology at the University of New Mexico in Albuquerque, New Mexico. Other specimens were obtained from the Museum of Vertebrate Zoology at the University of California in Berkeley, California. Samples represent 268 individuals (Supplementary Data SD1) and 25 populations (Fig. 1; Table 1). Populations were defined based on their locations (e.g., islands). The use of vertebrate specimens conforms to American Society of Mammalogists guidelines (Sikes et al. 2016) and institutional requirements. Sampling effort focused on the western region of North America and most intensively on the northern NPC. Of the 6 "pure" *M. caurina* populations (Stone et al. 2002; Small et al. 2003), 3 are restricted to islands and 3 are on the mainland (Fig. 1). *Martes americana* is represented by 16 "pure" populations, including 8 island populations (2 naturally colonized recently, 3 documented deliberate human introductions within the last 80 years, and 1 probable introduction [Tuxekan], and 2 populations of unclear origin [Dall and Revillagigedo]; Table 1—Stone et al. 2002; Small et al. 2003; Paul 2009). The remaining 8 mainland populations are either coastal (west of the Coast Range) or continental (east of the Coast Range).

Laboratory procedures.—DNA was extracted following methods in Fleming and Cook (2002) and Slauson et al. (2008). PCR amplifications were in 50 µl volumes with the following reagents: 1.5 mM $MgCl_2$, 1× dNTPs, 1.0 µM of each primer, 0.05 µl of AmpliTaq polymerase, and 10× polymerase PCR buffer with approximately 1–100 µg of DNA. Control region PCR was completed with a PTC-0200 (MJ Research, Inc., Waltham, Massachusetts) thermocycler with the following conditions: 1 cycle of 94°C for 45 s, followed by 35 denaturation cycles at 94°C for 10 s, annealing at 45°C for 15 s, and an extension at 72°C for 45 s, followed by a final extension at 72°C for 3 min (Stone et al. 2002). Negative and positive controls were included in all experiments. PCR products were cleaned with a PEG (30%) cleanup procedure. The following primer pair was used to amplify 304 bp of the control region: TDKD (5′-CCT GAA GTA GGA ACC AGA TG—Kocher et al. 1993) and CTRL-L (5′-CAC YWT YAACWC CCA AAG CT—Bidlack and Cook 2001). Both forward and reverse strands were sequenced for each individual using either an ABI 377 or ABI 3100 (Wyoming sequences) automated sequencer. Big Dye 1.0 and 3.1 Terminators (Applied Biosystems, Foster City, California) were used in DNA sequencing. Dall Island sequences (n = 5) were generated using an Illumina MiSeq small genome analyzer.

Sequencher v4.6 (Gene Codes Corporation, Ann Arbor, Michigan) was used to navigate sequences, in both forward and reverse directions. Two programs, MacClade v4.0 (Maddison and Maddison 1992) and ClustalX v1.8 (Thompson et al. 1997), were used to align sequences and identify insertions and deletions (indels). We analyzed control region sequences separately and in a second analysis we concatenated control region sequences with cytochrome *b* sequences from Stone et al. (2002) to accommodate linked mitochondrial (mtDNA) inheritance. Genetic diversity and differentiation metrics generated from mtDNA data were compared to data generated from 12 nuclear microsatellite loci (Small et al. 2003). Microsatellite locus Mvis20 of Small et al. (2003) was not included in the current analysis, as Dawson (2008) found that the locus was X-linked. Sequences (n = 268) were deposited in GenBank (KX807723–KX807981).

Evolutionary relationships.—For 304 bp of the mtDNA control region (n = 268), we used jModelTest v2.1.7 (Guindon and Gascuel 2003; Darriba et al. 2012) to find the best model of evolution to fit the data. Akaike information criteria, Bayesian

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Table 1.—Summary statistics from nucleotide sequences of the mtDNA cytochrome *b* (Stone et al. 2002 and this study) and control region (this study) for *Martes americana* and *M. caurina* from northwestern North America, and fragment data from 12 nuclear microsatellites (Small et al. 2003). Bold F_{IS} values denote significant inbreeding (Bonferroni correction applied). BC = British Columbia; SE AK = Southeast Alaska.

Populations	Abbreviation	Cytochrome *b*			Control region			Nuclear microsatellites (12 loci)					
		n	Haplotypes	Haplotype richness	*n*	Haplotypes	Haplotype richness	*n*	Alleles	Allelic richness	H_E	H_O	F_{IS}
Martes americana													
Mainland													
Northern Idaho	NID				19	7	0.37						
Central British Columbia	CBC	6	2	0.33	10	6	0.60	17	5.46	4.13	0.70	0.61	0.12
Yukon Flats, interior AK	YFL	10	3	0.30	9	6	0.67	25	5.69	3.63	0.23	0.55	**0.13**
Thomas Bay, SE AK	TBY	5	3	0.60	10	5	0.50	20	4.23	3.34	0.62	0.50	**0.21**
Northern British Columbia	NBC	5	3	0.60	5	4	0.80	5	4.00	4.00	0.67	0.66	0.02
Juneau, SE AK	JUN	5	2	0.40	12	4	0.33	25	5.08	3.46	0.61	0.61	**0.17**
Cleveland Peninsula, SE AK	CLP	5	3	0.60	10	3	0.30	25	5.31	3.66	0.63	0.56	0.12
Yakutat, SE AK	YAK	5	1	0.20	10	3	0.30	22	4.00	2.91	0.54	0.47	0.13
Island, non-introduced													
Dall Island, SE AK[a]	DAL	6	2	0.33	5	2	0.40						
Mitkof Island, SE AK	MIT	5	2	0.40	10	4	0.40	25	4.69	3.39	0.59	0.48	**0.18**
Kupreanof Island, SE AK	KUP	2	1	0.50	11	3	0.27	25	4.45	3.10	0.56	0.49	**0.13**
Revillagigedo Island, SE AK[a]	REV	5	1	0.20	10	2	0.20	25	3.54	2.74	0.48	0.40	0.26
Island, introduced													
Chichagof Island, SE AK	CHI	15	3	0.20	14	6	0.43	25	4.23	3.24	0.57	0.50	0.11
Prince of Wales Island, SE AK	POW	10	2	0.20	11	3	0.30	25	4.38	3.29	0.62	0.47	**0.24**
Baranof Island, SE AK	BAR	10	1	0.10	11	1	0.09	26	3.54	2.46	0.45	0.36	**0.20**
Tuxekan Island, SE AK	TUX				4	1	0.25						
Hybrid *M. americana*/*caurina*													
Northern Montana	NMT	2	2	1.00	9/1	7	0.70	11	4.54	3.72	0.63	0.55	0.14
Southern Montana	SMT	2	1/1	1.00	9/1	7	0.70	11	5.31	4.20	0.68	0.48	**0.31**
Kuiu Island, SE AK	KUI	23	3/1	0.17	1/9	6	0.50	25	4.85	3.20	0.54	0.45	**0.18**
Martes caurina													
Mainland													
California	CAL				20	5	0.25						
Wyoming	WYO	5	1	0.20	5	3	0.60						
Oregon	ORE	6	1	0.17	15	1	0.07	16	3.31	2.73	0.50	0.53	-0.04
Island													
Vancouver Island, BC	VAN	2	1	0.50	14	3	0.21	23	2.92	2.08	0.31	0.29	0.07
Admiralty Island, SE AK	ADM	21	1	0.05	12	1	0.08	25	1.31	1.23	0.09	0.08	**0.09**
Queen Charlotte Islands, BC	QCI	5	1	0.20	9	1	0.10	11	2.00	1.87	0.30	0.28	0.05
Totals													
Martes americana		96			178			301					
Martes caurina		64			90			112					

[a]Populations of uncertain origin.

information criteria, and decision theory all selected the HKY (Hasegawa, Kishino, and Yano 1985) model of evolution (Yang et al. 1994). We included nucleotide sequence data from portions of mtDNA control region and cytochrome *b* from 1 European pine marten (*M. martes*; GenBank AF336969 and AF154975, respectively) and 1 sable (*M. zibellina*; GenBank AF336970 and JQ343004, respectively) as outgroups for phylogenetic reconstruction. Phylogenetic trees were constructed using MrBayes (Huelsenbeck and Ronquist 2001; Ronquist and Huelsenbeck 2003) and RAxML (Stamatakis 2014). In this case, we constructed trees using control region and cytochrome *b* independently and then by concatenating the 2 loci. We ran HKY and GTR (general time reversible) reverse-jump models of evolution as a comparative framework. We completed 6 runs over 5,000,000 generations with a burn-in period of 1,250,000 (25%) at which point the log-likelihood values became stationary. Consensus phylogenies were visualized in FigTree v1.4.2 (http://tree.bio.ed.ac.uk/software/figtree/). For network construction, we employed the Median-Joining Network (MJN—Bandelt et al. 1999), a method that yields the best genealogies under strict parsimony conditions (Cassens et al. 2003). Networks are often employed for large datasets based on closely related species or for population-level studies (Posada and Crandall 2001) as they show the number of base-pair differences between each haplotype. We used the R{Pegas} package (Paradis 2010) to construct the shortest network separating *M. americana* from *M. caurina* based on control region variation. Arlequin v3.01 (Excoffier et al. 2005) was used to calculate haplotype (h) and nucleotide diversity (π) for each population.

Population structure.—All population-level analyses were carried out using the 304 bp segment of the mitochondrial control region and then compared across the cytochrome *b* and microsatellite data (Stone et al. 2002; Small et al. 2003) for

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corresponding specimens (n = 209). We conducted a hierarchical analysis of molecular variance (AMOVA) to examine population structure within and between species using Arlequin. Significance was assessed using nonparametric permutations, followed by recalculation of all statistics to form a null distribution ($\alpha < 0.05$—Excoffier et al. 1992). An AMOVA was conducted independently for both species to determine the relative partitioning of variance among individuals within populations and among island and mainland populations. Introduced populations (Table 1) were excluded from the AMOVAs to ensure that the tests summarized genetic variation within and among groups with no a priori assumptions (Araya-Anchetta et al. 2013). We generated pairwise F_{ST} statistics (Weir and Cockerham 1984) in Arlequin to assess interpopulation differentiation and compared the results to independent values generated from 12 microsatellite loci for a subset of the populations, as reported elsewhere (Small et al. 2003).

Population expansion.—We tested for signals of expansion in each population using DNAsp v5 (Librado and Rozas 2009) for mismatch analysis, Lamarc v2.1.10 (Kuhner 2006) for g-statistics, and Arlequin for Tajima's D and Fu's F_S ($\alpha < 0.05$—Fu 1997). All analyses were run with 10,000 iterations unless otherwise noted. The mismatch distribution test measures population expansion based on pairwise differences between haplotypes (Rogers and Harpending 1992) and assumes that the taxa are related, the differences are mutations, and the mutations occur at a constant rate through time. Fu's F statistics (F_S—Fu 1997) and Tajima's D (Tajima 1989) allow for additional, independent tests of expansion by examining deviations from neutrality. Fu's F_S uses pairwise differences and D compares theta ($\theta = 2N_f\mu$) values based on nucleotide site differences (Excoffier et al. 2005). Significantly negative values of F_S or D indicate an excess of low-frequency mutations over that expected under a standard model of neutrality for populations. Fu's F_S and Tajima's D are used widely in tests for signals of expansion and are more conservative and arguably have greater statistical power than other tests, such as mismatch distributions (Ramos-Onsins and Rozas 2002). Although most demographic analyses are prone to overestimation, especially in closely related populations, they can still provide a relative measure of growth or contraction for species at similar levels of divergence (Grant 2015).

We used g-statistics as an additional test for expansion in each population, excluding all invariable populations (Admiralty Island, Baranof Island, Tuxekan Island, Haida Gwaii, and Oregon). The g-statistic measures exponential population growth using estimates of θ ($2N_f\mu$). The g-statistic measures growth in populations and θ measures effective population size relative to mutation rate, $\theta = 2N_f\mu$, where μ is the mutation rate of the control region and N_f the female effective population size (Domingues et al. 2006) when based on mtDNA. Negative values of g indicate that a population is in decline, while positive values indicate population growth. In this analysis, θ indicates time to coalescence for genealogies of a specific population. When compared to unbiased estimates such as number of pairwise differences or nucleotide diversity, a larger θ reflects a longer time to coalescence across population genealogies given the observed population growth (Delport et al. 2007). The g-statistic has an upward bias (Kuhner et al. 1998), so we used 3 *SD*s as our test of significance (Lessa et al. 2003).

Lastly, we generated control region Extended Bayesian Skyline Plots (EBSPs; Supplementary Data SD2) for each putative species with admixed localities excluded. Analyses were run in Beast v2.4.3 (Bouckaert et al. 2014) with a chain length of 500 million generations, a strict clock, and sampling every 5,000 generations with a burn-in of 25% resulting in 10,000 final trees. General set up followed the online Beast2 EBSP tutorial (Heled and Vaughan: beast2.org/tutorials). Convergence (effective sample size > 300) was evaluated in Tracer v1.6 (Rambaut et al. 2014) and plots were visualized in R.

Results

Control region.—Control region sequences were variable in both *M. americana* and *M. caurina* populations with a total of 49 haplotypes identified with 38 variable sites, 33 substitutions (28 transitions, 6 transversions), and 6 indels. There were 7 sites with fixed differences between *M. americana* and *M. caurina* (Fig. 2). Across 178 *M. americana*, 29 distinct haplotypes (Table 2a) were identified, whereas 92 *M. caurina* had 20 haplotypes (Table 2b). Admiralty, Baranof, Tuxekan, and Haida Gwaii islands, and Oregon were invariable; these populations were excluded from population-level analyses but included in phylogenetic analyses. Sixteen of 29 (55%) *M. americana* haplotypes were unique to single populations,

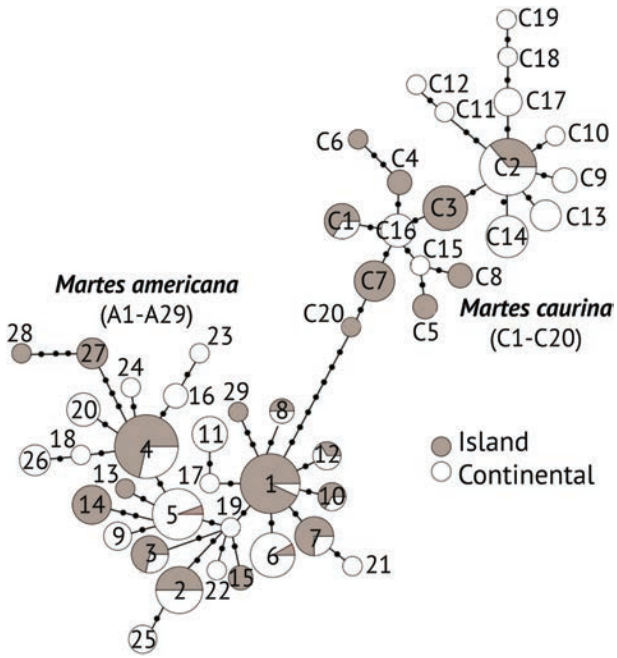

Fig. 2.—Haplotype network for *Martes americana* and *M. caurina* mitochondrial control region sequences. Circle size is proportional to the number of individuals with each haplotype; the number of mutations separating haplotypes is indicated by dots along the links. Pie colors indicate mainland haplotypes (white) and island haplotypes (gray).

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Table 2.—Control region haplotypes by locality for populations of a) *M. americana* and b) *M. caurina*. Bold populations are recognized hybrid populations.

a) *M. americana*

	Haplotype																												
Population	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29
BAR	11																												
CHI	4	2	5	1	1	1																							
DAL																											4	1	
KUI	3			3									1																
KUP	5			4			2																						
MIT	1	3		2			4																						
POW		1		8				1																					1
REV														8	2														
TUX				4																									
CBC	1				4											2	1	1	1										
NBC		1		1					2	1																			
NID		3		5			2					2								5	1	1							
NMT		1	2	2		2			1		1																		
SMT											1																		
YFL					2	2		1			2												1	1					
CLP		2		2	6																								
JUN	1				5	3																			3				
TBY	3	1		3						2		1																	
YAK						4					2															4			
Total	29	14	7	35	18	12	8	2	3	3	6	3	1	8	2	2	1	1	1	5	1	1	1	1	3	4	4	1	1

b) *M. caurina*

Population	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20
ADM			12																	
KUI				2	2	1														
QCI							9													
VAN	4	8						2												
NMT																				1
SMT	2	2							2	1	1	1								
ORE		15																		
CAL													4	10	1	5				
WYO																	3	1	1	
Total	6	25	12	2	2	1	9	2	2	1	1	1	4	10	1	5	3	1	1	1

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and 17 of 20 (85%) *M. caurina* haplotypes were unique to single populations. Sequences in 6 populations exhibited transversions (1 *M. caurina*: Wyoming; *2 M. americana*: Dall Island and Prince of Wales Island; 3 hybrid populations: northern and southern Montana and Kuiu Island).

We calculated haplotype richness (Table 1) for each population by dividing the number of control region haplotypes within a population by the total number of haplotypes and correcting for sample size. Haplotype richness is an analogue to allelic richness (Kawamoto et al. 2008) and was higher for the control region compared to cytochrome *b* in 7 of the 14 *M. americana* populations that had both sequences. Three island populations of *M. americana* had equivalent richness across both loci, while 4 localities (1 island, 3 mainland) had lower haplotype richness for control region over cytochrome *b*. In contrast, only the Wyoming population of *M. caurina* showed greater haplotype richness for control region compared to cytochrome *b*. The remaining 4 *M. caurina* populations had elevated cytochrome *b* richness. Populations demonstrating the highest haplotype and nucleotide diversity occurred in recognized hybrid populations. Haplotype diversity was highest in southern and northern Montana, and nucleotide diversity was highest in Kuiu Island and northern Montana where haplotypes characteristic of both species were present (Table 3).

Phylogenetic relationships.—For the Bayesian consensus tree (Fig. 3), control region sequences were concatenated with cytochrome *b* sequences only for the 23 individuals with complete cytochrome *b* sequences (1,140 bp) described in Stone et al. (2002). Some localities are not represented because corresponding cytochrome *b* sequences were unavailable. The 50% majority rule consensus tree consistently separated *M. caurina* from *M. americana* populations.

Comparatively, cytochrome *b* analyses identified 9 mutations separating these 2 species. Network analyses also highlight differences in haplotype diversity within each group. Whereas common *M. americana* haplotypes are widely dispersed across both continental and island locations for this species (i.e., Haps A1, A3, A4, A5, A6; Fig. 2), *M. caurina* haplotypes tend to be more limited in geographic distribution (i.e., haplotypes C4–C8; Fig. 2). Approximately 32% of *M. caurina* haplotypes are endemic to a single island, whereas only 10% of *M. americana* haplotypes are endemic to an island.

Population structure.—Overall, AMOVA values across all *M. americana* and all *M. caurina* populations (Table 4) indicate greater percent haplotypic variation within populations compared to among populations; however, there are differences between species when island and mainland populations are compared. Across insular *M. caurina* populations, there is significantly greater genetic variation among populations and relatively little variation within populations (α = 0.05 level; Table 4). In contrast, island *M. americana* populations have haplotypic variation more evenly partitioned among and within populations. For mainland populations of *M. caurina*, there is nearly twice as much variation partitioned among individuals within populations as there is among populations and this pattern is amplified in mainland *M. americana* which harbor substantially more haplotypic variation within populations than among populations.

Across all *M. americana* populations except Dall and Revillagigedo islands, pairwise F_{ST} values were rarely higher than 0.2 (Table 5) and lower than all pairwise F_{ST} values among *M. caurina* populations. Pairwise F_{ST} values among *M. americana* populations were within the range of pairwise

Table 3.—Results of demographic tests for 2 species of *Martes* from northwestern North America. *SD*s are provided for nucleotide diversity (π) and haplotype diversity (h). Tests of expansion (Fu's F_S, Tajima's *D*, *g*-statistics) are reported for all variable populations of *M. americana* and *M. caurina*. All *g*-statistics are nonsignificant (within 3 *SD*s of zero) and their associated θ ($2N_f\mu$) values are reported.

Species	Population	π	h	*D*	F_S	*g*	θ
M. americana							
	NID	0.007 ± 0.005	0.854 ± 0.047	0.95	−0.99	161.56	0.0106
	CBC	0.007 ± 0.005	0.844 ± 0.103	0.53	−1.58	675.05	0.0293
	YFL	0.008 ± 0.005	0.911 ± 0.062	1.29	−1.72	383.86	0.0138
	TBY	0.007 ± 0.005	0.844 ± 0.080	1.47	−0.65	253.08	0.0093
	NBC	0.009 ± 0.006	0.833 ± 0.222	1.09	0.01	380.53	0.0105
	JUN	0.008 ± 0.005	0.758 ± 0.081	0.60	1.31	5.26	0.0051
	CLP	0.003 ± 0.003	0.622 ± 0.138	0.83	0.46	236.30	0.0029
	YAK	0.004 ± 0.003	0.711 ± 0.086	1.64	0.6	100.23	0.0026
	DAL	0.004 ± 0.004	0.400 ± 0.237	−1.05	1.69	−37.25	0.0038
	MIT	0.007 ± 0.005	0.778 ± 0.091	1.59	0.59	58.00	0.0049
	REV	0.005 ± 0.004	0.356 ± 0.159	0.02	3.03	−173.92	0.0026
	KUP	0.006 ± 0.004	0.691 ± 0.086	1.31	1.96	−79.15	0.0061
	CHI	0.006 ± 0.004	0.833 ± 0.071	1.03	−1.51	512.17	0.0081
	POW	0.006 ± 0.004	0.491 ± 0.175	−0.89	0.36	43.32	0.0062
Hybrid populations							
	KUI	0.023 ± 0.013	0.879 ± 0.060	1.70	1.98	−0.26	0.0151
	NMT	0.012 ± 0.007	0.933 ± 0.062	−1.04	−1.61	11.49	0.0136
	SMT	0.006 ± 0.004	0.933 ± 0.062	−1.14	−1.53	42.94	0.0201
M. caurina							
	CAL	0.006 ± 0.004	0.679 ± 0.074	0.95	1.55	−21.29	0.0043
	VAN	0.003 ± 0.002	0.615 ± 0.102	0.70	0.38	161.32	0.0024
	WYO	0.003 ± 0.003	0.700 ± 0.218	0.24	−0.48	911.12	0.0092

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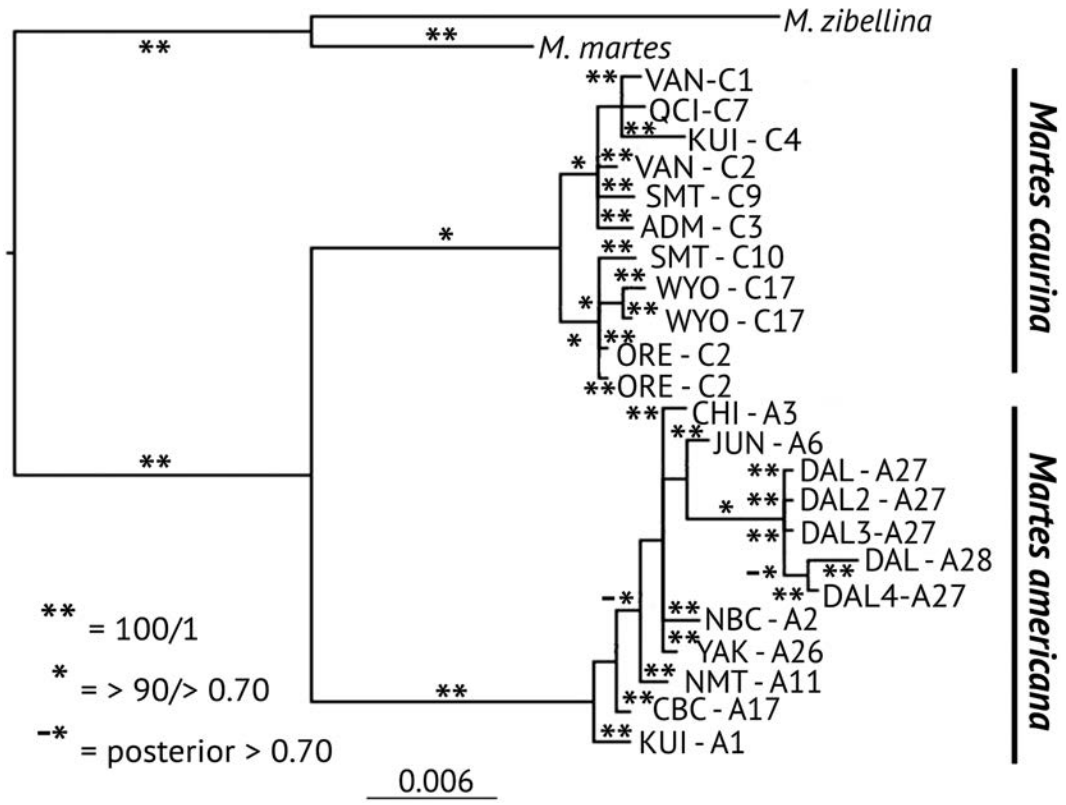

Fig. 3.—Phylogeny of *Martes americana* and *M. caurina* based on maximum likelihood (ML) and Bayesian inference (rooted). Analyses are based on mtDNA from the control region (this study: 304 bp) and cytochrome *b* (Stone et al. 2002) using an HKY + I evolutionary model. ML bootstrap and Bayesian posterior probabilities are displayed at each node (bootstrap support value/posterior probability).

F_{ST} values measured in other mammal species with moderate gene flow between populations (Hellborg et al. 2002). The highest pairwise F_{ST} values between *M. americana* populations are between Dall and Revillagigedo Islands when compared to other populations. These 2 islands were also the only *M. americana* populations that were significantly different from all other *M. americana* populations. Dall Island, in particular, harbors 2 endemic haplotypes (Fig. 2: A27, A28), separated from the nearest *M. americana* haplotype by multiple mutations.

Although average pairwise F_{ST} values for the mtDNA control region for *M. caurina* was more than double that of *M. americana* populations (0.69 and 0.33, respectively), these values were not significantly different (2 tailed students *t*-test $\alpha > 0.01$; Table 5). Microsatellite F_{ST} values (0.54 and 0.13, $\alpha < 0.01$, for *M. caurina* and *M. americana*, respectively) were significantly different and support greater population structure and lower gene flow among populations of *M. caurina* compared to *M. americana*. The highest pairwise F_{ST} value, other than between the invariable populations (Admiralty, Baranof, and Haida Gwaii islands and Oregon), was between Wyoming and other *M. caurina* populations.

Population expansion.—Mismatch distributions (Supplementary Data SD3) show weak support for recent expansion in *M. americana* and *M. caurina* populations. However, mismatch distributions have low statistical power (Ramos-Onsins and Rozas 2002) and are sensitive to recently bottlenecked populations (Roques and Negro 2005). A recent bottleneck is a distinct possibility for several insular populations including Admiralty and Haida Gwaii islands (populations with extremely low variation), and Baranof, Prince of Wales, and Chichagof islands, which received recent introductions of few individuals. The mismatch distributions for Yukon Flats, Yakutat, Idaho, central British Columbia, Prince of Wales Island, and northern and southern Montana show strict, unimodal distributions, corroborating the hypothesis of recent (Holocene) expansion (Rogers and Harpending 1992). We can reject a model of demographic expansion (sum of squared deviation [SSD]; $\alpha < 0.05$) for central British Columbia, Wyoming, Yakutat, Northern Idaho, and Revillagigedo Island populations, suggesting demographic stability for these localities. Significantly bimodal or "ragged" distributions ($\alpha < 0.05$) further support demographic equilibrium of central British Columbia and Yakutat populations.

For each population, we used Fu's *F* statistic (F_S), Tajima's *D* (*D*), the *g* parameter (*g*), and theta (θ; Fluctuate—Kuhner et al. 1998) as tests of demographic expansion for the mtDNA (Table 3). Fu's F_S showed significant signals of expansion averaged over all populations for both *M. caurina* (−7.98; $\alpha < 0.005$) and *M. americana* (−15.55; $\alpha < 0.001$), but no single population was significant. Tajima's *D* was not significant for any population of either species. All populations were nonsignificant for recent demographic expansion (e.g., zero was within the 95% confidence intervals or within 3 *SD*s [values not shown] for *g*-statistics for all populations). EBSPs were

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Table 4.—Analysis of molecular variance (AMOVA) results reported for populations of *Martes americana* and *M. caurina* in this study. We compared across each species, as well as each species group of island or mainland populations. Overall F_{ST} values for each group are reported in the last column.

AMOVA	Source of variation	Sum of squares	Variance components	% Haplotype variation	Overall F_{ST}
All *M. americana*	Among	18.10	0.13	27.88	0.12
	Within	81.09	0.95	72.12	
All *M. caurina*	Among	8.24	0.31	33.58	0.34
	Within	21.71	0.60	66.42	
All *M. caurina* islands	Among	28.86	1.20	88.51	0.89
	Within	5.14	0.16	11.49	
All *M. caurina* mainland	Among	8.45	0.32	37.27	0.37
	Within	19.35	0.54	62.73	
All *M. americana* islands	Among	15.33	0.66	42.72	0.43
	Within	24.67	0.88	57.28	
All *M. americana* mainland	Among	18.10	0.13	11.76	0.12
	Within	81.09	0.95	88.24	

Table 5.—Weir and Cockerham's (1984) pairwise F_{ST} values for a) *M. americana* and b) *M. caurina* for 13 and 12 microsatellite loci[a], respectively (above diagonal; microsatellite data from Small et al. 2003) and mtDNA control region (below diagonal; this study). Bold values are significantly different from zero ($\alpha = 0.05$, Bonferroni correction applied to microsatellite data). n/a = not available.

a) *M. americana*

	BAR	CBC	CHI	CLP	DAL	JUN	KUP	MIT	NBC	NID	POW	REV	TBY	TUX	YAK	YFL
BAR		0.16	0.25	0.21	n/a	0.23	0.22	0.21	0.21	n/a	n/a	0.31	0.15	n/a	0.27	0.21
CBC	**0.54**		0.08	**0.05**	n/a	**0.03**	**0.11**	**0.06**	0.00	n/a	n/a	**0.15**	**0.07**	n/a	**0.11**	**0.03**
CHI	**0.46**	**0.14**		0.09	n/a	0.13	0.13	0.16	0.09	n/a	n/a	0.19	0.12	n/a	0.24	0.08
CLP	**0.81**	0.00	**0.27**		n/a	**0.05**	**0.12**	**0.08**	0.04	n/a	n/a	**0.12**	**0.09**	n/a	**0.17**	**0.07**
DAL	**0.96**	**0.73**	**0.78**	**0.83**		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
JUN	**0.49**	0.05	0.08	0.11	**0.73**		**0.15**	**0.12**	0.03	n/a	n/a	**0.19**	**0.12**	n/a	**0.14**	0.02
KUP	**0.27**	0.11	0.08	**0.26**	**0.77**	**0.15**		**0.06**	**0.06**	n/a	n/a	**0.24**	**0.14**	n/a	**0.19**	**0.10**
MIT	**0.39**	**0.17**	0.07	**0.31**	**0.77**	**0.16**	−0.04		0.01	n/a	n/a	**0.27**	**0.10**	n/a	**0.21**	**0.07**
NBC	**0.82**	−0.07	**0.22**	0.06	**0.77**	0.10	0.23	0.24		n/a	n/a	**0.21**	0.05	n/a	**0.08**	−0.01
NID	**0.50**	0.08	**0.14**	0.08	**0.71**	**0.16**	0.10	0.09	0.07		n/a	n/a	n/a	n/a	n/a	n/a
POW	**0.70**	**0.14**	**0.21**	**0.14**	**0.74**	**0.22**	**0.24**	**0.24**	0.10	0.03		n/a	n/a	n/a	n/a	n/a
REV	**0.81**	**0.43**	**0.56**	**0.54**	**0.84**	**0.45**	**0.54**	**0.56**	**0.50**	**0.42**	**0.57**		0.20	n/a	0.27	**0.21**
TBY	**0.32**	**0.08**	**0.07**	**0.23**	**0.76**	0.13	−0.06	0.03	0.19	0.10	**0.20**	**0.53**		n/a	0.21	**0.12**
TUX	**1.00**	0.20	**0.39**	**0.30**	**0.87**	**0.30**	0.41	**0.41**	0.27	0.07	−0.06	**0.67**	0.37		n/a	n/a
YAK	**0.74**	**0.26**	**0.24**	**0.48**	**0.85**	**0.25**	**0.35**	**0.30**	0.22	**0.33**	**0.44**	**0.65**	**0.34**	**0.66**		**0.11**
YFL	**0.44**	−0.03	0.01	0.09	**0.75**	0.03	0.01	0.04	−0.02	0.06	**0.13**	**0.48**	−0.01	**0.27**	0.14	

b) *M. caurina*

	CAL	ADM	ORE	QCI	VAN	WYO
CAL		n/a	n/a	n/a	n/a	n/a
ADM	**0.70**		**0.58**	**0.75**	**0.65**	n/a
ORE	**0.27**	**1.00**		**0.39**	**0.35**	n/a
QCI	**0.58**	**1.00**	**1.00**		**0.51**	n/a
VAN	**0.18**	**0.88**	**0.31**	**0.73**		n/a
WYO	**0.46**	**0.94**	**0.83**	**0.90**	**0.61**	

[a]Microsatellite locus Mvis20 originally included in Small et al. (2003) was found to be X-linked (Dawson 2008) and not included in the current analysis for both species. MA15 was monomorphic in *M. caurina* and removed from F_{ST} analyses of *M. caurina*.

uninformative (Supplementary Data SD2), suggesting either an extreme historic bottleneck event in both populations that effectively prevented interpretation of N_f or that additional loci are required.

Discussion

Within the archipelagos of North America's northern NPC, contemporary genetic diversity and patterns of endemism result from complex geologic processes, natural fragmentation of the temperate rainforests, long-term population isolation, and more recently, human-mediated disturbances (Murie 1959; Bailey 1993; Paul 2009; Cook and MacDonald 2013). Thus, parsing signatures of demographic change in martens potentially illustrates the impact of both evolutionary processes and anthropogenic manipulation on island diversity. As a federally designated Management Indicator Species, martens function as a proxy for forest health (Simon 1980; Hargis and McCullough 1984;

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Flynn and Schumacher 1997). Because negative responses to insularity are evident in specialized, higher trophic taxa (Holt et al. 1999; Krauss et al. 2003), these mesocarnivores have an increased risk of extirpation. Taxonomy, biogeographic history, introductions, pathogens, hybridization, and the consequences of isolation on islands are all critical factors to consider in management, particularly within the context of accelerating environmental change (Ruesink et al. 1995; Pyšek and Richardson 2010; Malaney and Cook 2013; Robertson et al. 2014).

History highlights diversity.—Understanding Pleistocene refugial distributions and subsequent colonization histories enables rigorous interpretation of contemporary genetic diversity (Waltari et al. 2007). Along the NPC, significant variability between island and continental sister species or lineages reflects the consequences of historical processes on contemporary species assemblages (e.g., Dawson et al. 2014; Sawyer et al. 2017). Following the Last Glacial Maximum (LGM), *M. americana* tracked boreal forest expansion northwestward from a refugium in eastern North America (Graham and Graham 1994). This species arrived recently (late Holocene) along the NPC (Fig. 1) via river corridors through the Coast Range (Stone et al. 2002) and subsequently colonized or was translocated to several islands. In contrast, *M. caurina* was thought to be isolated in 1 or more southern LGM refugia along the west coast, spreading northward along the Pacific Coast (early Holocene—Stone et al. 2002) or eastward to the southern Rocky Mountains (Graham and Graham 1994). Haplotype networks (Fig. 2) and phylogenetic reconstructions (Fig. 3) illustrate the historical divergence within each species and each population's contribution to geographic structure and overall genetic diversity. Unique haplotypes and elevated differentiation (F_{ST}) on Revillagigedo and Dall islands suggest that geographic proximity does not necessarily translate to higher genetic similarity (Fig. 2; Tables 2a and 4). This curious result, also seen in red squirrels (*Tamiasciurus hudsonicus*) on Revillagigedo Island (Hope et al. 2016), requires additional investigation in other forest-associated species. The history of the Dall Island population, which plausibly received migrants from the neighboring introduced population on Prince of Wales Island, also needs more detailed sampling and assessment. Whether the 2 endemic haplotypes, separated from other *M. americana* haplotypes by multiple mutations, reflect earlier colonization event of martens on this remote western island is unclear.

Overall low F_{ST} values within *M. americana* suggests less population structure compared to *M. caurina* populations. The degree of divergence among private mtDNA haplotypes in Southeast Alaskan *M. americana* populations and other *M. americana* haplotypes is less than that between the private insular haplotypes among *M. caurina* populations (e.g., Admiralty, Haida Gwaii, Kuiu islands). Greater divergence among insular *M. caurina* populations reflects longer persistence and isolation in the region and possibly smaller population sizes, despite apparently viable densities for Kuiu and Admiralty islands (R. Flynn, Alaska Department of Fish and Game, pers. comm.). In addition, several mitochondrial and microsatellite alleles are shared widely across *M. americana* populations. One widespread *M. americana* haplotype (A4) is found from northern Montana to Kuiu Island. These sites, largely covered by ice during the LGM, were recently colonized by *M. americana*. *Martes caurina* on average has more private alleles (both control region and microsatellite) per population (2.33 and 0.78, respectively) compared to *M. americana* (1.67 and 0.69, respectively). High within-population diversity (and heterozygosity) and fewer private alleles in *M. americana* suggest higher historic or contemporary connectivity among populations, consistent with recent (late Holocene) expansion across North America. This general pattern is mirrored in other forest-associated organisms that colonized deglaciated areas at the end of the Pleistocene (Lessa et al. 2003; Hope et al. 2012; Chavez et al. 2014; Kerhoulas et al. 2015).

Many of the patterns we document are also found in genetic signatures of some marten parasites. Genetic structure in *Soboliphyme baturini*, a parasitic nematode (Koehler et al. 2009) of northern mustelids, mirrors host patterns, including long-term separation of *M. caurina* nematodes endemic to Admiralty Island and Haida Gwaii, recent westward expansion of *M. americana* into Southeast Alaska with subsequent colonization by the nematode, and also multiple, independent anthropogenic transplants of *M. americana* to Chichagof Island (Koehler et al. 2009; Hoberg et al. 2012).

Introduced populations.—Species introductions can facilitate mixing of previously distinct populations of a single species (Peacock et al. 2009) or may introduce novel parasites or invasive species. The Alexander Archipelago has experienced a series of introductions ranging from amphibians (Pauly et al. 2008) to ungulates (Cook et al. 2006; MacDonald and Cook 2007), yet the consequences are poorly understood. Because martens are a commercially important component of the furbearer industry (MacDonald and Cook 2007; Alaska Department of Fish and Game 2010), the Alaska Game Commission established "new" populations or supplemented existing populations during the 1930–1950s on Baranof, Chichagof, and Prince of Wales islands (Elkins and Nelson 1954; Burris and McKnight 1973; Alaska Department of Fish and Game 2010) from several mainland *M. americana* sources. Molecular signatures largely corresponded with the written records of introductions (Stone et al. 2002; Small et al. 2003), although the possibility of prior occupation by *M. caurina* on islands such as Prince of Wales (Pauli et al. 2015) should be more rigorously explored using genome-level analyses aimed at detecting admixture.

Some introduced *M. americana* populations exhibit relatively high genetic diversity (Prince of Wales, Chichagof islands) while others have lower diversity (Baranof Island) when compared to naturally colonized islands (Table 1). Introductions from multiple source populations, as recorded for martens on Prince of Wales and Chichagof islands, may lessen the impact of founder effects (i.e., loss of variation) that typify many introduced populations (Dlugosch and Parker 2007). Chichagof Island martens are derived from populations from Baranof Island, Revillagigedo Island, the Stikine River area, Wrangell Island, Mitkof Island, and a site near Anchorage, Alaska (Elkins and Nelson 1954; Burris and McKnight 1973). Baranof

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and Prince of Wales islands martens were from coastal mainland populations taken near Behm Canal and Thomas Bay. The different levels of variation in these translocated populations may reflect severe founder events, subsequent bottlenecks, or simply differing histories of colonization and introduction (Nei et al. 1975). Other island populations of *M. americana* in Southeast Alaska (MacDonald and Cook 2007) may have originated through colonization from nearby island source populations (e.g., Dall from Prince of Wales). Future investigations could monitor the effects of colonization on the genetic structure of these introduced populations if specimen archives were augmented annually. Because these islands function as independent tests of the impact of translocations, they have the potential to provide key insight into changing conditions.

Additional layers of genetic complexity in North American martens include 2 natural hybrid zones previously hypothesized in Montana and on Kuiu Island (Small et al. 2003). Both hybrid zones are characterized by admixed microsatellite alleles and mtDNA haplotypes characteristic of both species (Table 1, 2), producing higher haplotype or nucleotide diversity in hybrid populations relative to parental populations (Hewitt 2004; Swenson and Howard 2005). Of the 11 control region sequences from Kuiu Island, 2 haplotypes are shared throughout the range of *M. americana* including island and continental populations. Four new haplotypes were identified on Kuiu, among which 1 is *americana*-like (A13) and 3 are *caurina*-like (C4, C5, C6). Elevated and novel haplotypic diversity in this contact zone is consistent with patterns in other hybrid zones (e.g., Bradley et al. 1993). Hybridization can lead to decreased hybrid fitness (Muhlfeld et al. 2009), extinction of parental species (Rhymer and Simberloff 1996), prevention of adaptation (Eroukhmanoff et al. 2013), an increase in invasive success (Blumler 2003; Rieseberg et al. 2007), and outbreeding depression due to the disruption of co-adapted gene complexes (Shields 1987). Hybridization also may enhance the fitness of colonizing lineages via the capture of local adaptation (Racimo et al. 2015) and may promulgate speciation (Rheindt and Edwards 2011).

Conservation implications for insular populations.—Populations on islands, especially small islands, often contain less genetic variation than mainland populations (Bidlack and Cook 2001; Hayaishi and Kawamoto 2006). Decreased variation can lower fitness and evolutionary potential, ultimately leading to extinction in extreme cases (e.g., an extinction vortex—Gilpin and Soulé 1986; Newman and Pilson 1997; Frankham 1998, 2005; Alsos et al. 2012).

Martens provide a case study in conservation biology at multiple temporal and spatial scales (Cook et al. 2006; Dawson et al. 2007). Although they are tightly associated with high-volume old-growth forests (Potvin et al. 1999; Flynn and Schumacher 2016), federal timber harvest standards in the Tongass National Forest were adopted (United States Department of Agriculture, Forest Service, Alaska Region 1997; United States Department of Agriculture, Forest Service 2016) without a clear understanding of the complexity of insular marten populations and without the knowledge of 2 species in the region. This lack of clarity resulted in uneven application of timber harvest rules (Cook et al. 2006; United States Department of Agriculture, Forest Service 2016). For example, Kuiu Island is currently scheduled for significant habitat modification in old-growth reserves originally identified as central for martens' persistence (Stewart 2016). Kuiu Island supported an endemic population of *M. caurina*, but this population is now apparently being introgressed by *M. americana* (Small et al. 2003). Furthermore, the low genetic variability of the other *M. caurina* population potentially portends an increased risk of extinction (Frankham 2005; Whittaker and Fernández-Palacios 2007). Given their federal status related to old-growth forests and our growing understanding of how fundamental principles of island biology (insularity, distribution of genetic diversity, species assemblages—MacArthur and Wilson 1967; Whittaker and Fernandez-Palacios 2007) are impacting martens, we encourage the incorporation of new scientific information into management prescriptions for this vast and dynamic archipelago.

We note that declining populations of the Alexander Archipelago wolf (*Canis lupus ligoni*) did not figure into recent policy decisions (United States Fish and Wildlife Service 2016), despite documented genetic discreteness of populations at island and regional scales (Weckworth et al. 2005, 2015; Muñoz-Fuentes et al. 2009, 2010; Stronen et al. 2014; Cronin et al. 2015; Fredrickson et al. 2015). The Alexander Archipelago continues to be identified as a center of endemism in the northern latitudes due to its distinct biological diversity (Smith 2016). Unfortunately, the maintenance of endemism is only tangentially incorporated into contemporary forest conservation practices.

Wildlife management in the region may benefit from an island-by-island approach (MacDonald and Cook 2007). Understanding the historical framework that contributed to the evolutionary distinction of insular populations, in particular, is critical to the maintenance of contemporary biodiversity. Only within the last several decades have modern molecular tools demonstrated the hidden diversity of this coastal biome, long suspected by early 20th century naturalists (e.g. Swarth 1911, 1936). Still, significant human-induced change has already impacted islands (Cook and MacDonald 2013). For *M. caurina*, control region haplotypes on 3 NPC islands represent over one-third of documented mtDNA diversity (Table 1). Other old-growth obligates sharing similar patterns of endemism and evolutionary histories (flying squirrels, *Glaucomys sabrinus*—Bidlack and Cook 2002; ermines, *Mustela erminea*— Fleming and Cook 2002; Alexander Archipelago wolves—Weckworth et al. 2015) may be impacted by decreased volume of old-growth forests. In a period of accelerating change, understanding the evolutionary history of the Alexander Archipelago's biota could provide resource managers with key perspectives to build effective management prescriptions (Smith 2016). This pair of species, in particular, represents the results of 1 of several intriguing evolutionary experiments that played out along the NPC producing unique variability and complex interactions. This natural experiment, however, has been impacted by a series of anthropogenic manipulations that deserve further scrutiny and debate.

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Acknowledgments

This project was funded by a Grant-in-Aid of Research from the American Society of Mammalogists (NGD) and by the National Science Foundation (NSF 0196905, 0415668, 1258010), United States Fish and Wildlife Service, USDA Forest Service (Tongass National Forest and Pacific Northwest Research Center), Idaho State University, Alaska Department of Fish and Game, and United States Geological Survey. S. O. MacDonald and other members of Tongass field crews assisted with fieldwork; K. Gamblin and S. Sonsthagen provided substantial support in the laboratory. Special thanks to R. Flynn, T. Schumacher, K. Hastings, and R. Lowell for providing specimens or assistance with logistics for fieldwork in southeastern Alaska. B. Zielinski, K. Slauson, the Museum of Vertebrate Zoology at the University of California, Berkeley, and the University of Alaska Museum of the North provided samples. We thank M. Fleming and E. Lessa for independent reviews of the manuscript. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the United States Government. This paper is dedicated to the memory of Glen Ith.

Supplementary Data

Supplementary data are available at *Journal of Mammalogy* online.

Supplementary Data SD1. Appendix of all samples used, listed by museum identification number (UAM numbers, unless otherwise noted), with haplotype assignment and frequencies (N). "A" haplotypes indicate those belonging to *M. americana* and "C" haplotypes, to *M. caurina*.

Supplementary Data SD2. Extended Bayesian Skyline Plots and associated histograms for *M. americana* and *M. caurina* control region samples, with hybrid localities removed. Plots show a relatively constant N_f through time for both species, however histogram results indicate there is not enough information in a single mitochondrial locus to accurately infer N_f through time and these distributions likely reflect the priors.

Supplementary Data SD3. Mismatch distribution α values ($\alpha < 0.05$*, $\alpha < 0.01$**, $\alpha < 0.001$***) for mitochondrial control region sequences from each sampled locality.

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Submitted 27 October 2016. Accepted 28 March 2017.

Associate Editor was Jacob Esselstyn.

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STATEMENT OF DR. NATALIE G. DAWSON

REGARDING

THE NORTH KUIU TIMBER SALE,

KUIU ISLAND

I, NATALIE G. DAWSON, state as follows:

1. I am a professor and Wilderness Institute director at the University of Montana with 15 years of experience studying and teaching on the Tongass National Forest. I spent the majority of this time on Kuiu Island, studying pine marten (*Martes americana* and *Martes caurina*) and small mammals. My research focuses on the impacts of fragmentation at the forest and landscape levels on small mammal distributions and genetic diversity. I also administer an institute focused on public land education and outreach. As part of this position, I have been a field educator for groups of students who participate in field-based education courses on the Tongass National Forest.

2. I received my doctorate in biology from the University of New Mexico in 2008. My dissertation research focused on the distribution and diversity of small mammal populations on the Tongass National Forest (Dawson 2008).

3. As part of this research, I partnered with the Alaska Department of Fish and Game and the USDA Forest Service to do a focused research project on the population dynamics of pine marten (*M. americana and M. caurina*) on Kuiu Island. From 2003-2011, I spent up to four months each year living and studying on North Kuiu, stationed at Rowan Bay.

4. During my time as a researcher on the Tongass National Forest, I have published or co-published nine manuscripts describing aspects of my research in the region. This includes one paper that was released in 2017 that directly addresses the pine marten population declines on north Kuiu Island and impacts to genetic diversity should these populations risk extirpation (Dawson et al. 2017).

5. My research on north Kuiu Island is ongoing, and I am still actively examining the dynamic environment on north Kuiu to better understand population dynamics of pine marten species.

6. Because of my research, I was part of the 2006 TLMP Conservation Strategy Review and supplemental TLMP revision processes as a consultant scientist who commented on various aspects of the planning process.

7. I have reviewed the 2007 North Kuiu Timber Sale Environmental Impact Statement (EIS) and the 2016 Supplemental Information Report (SIR) for the North Kuiu Timber Sale. I have also reviewed the cutting units proposed for the North Kuiu Timber Sale as listed in the September 25, 2017, Cruise of Record.

8. Since 2007, we have new and significant information regarding the locations, habitat use, and population structure of pine marten on Kuiu Island that should be incorporated into any current or future land management activities on North Kuiu island.

9. Since 2007, we have formally identified two species of pine marten in North America (Dawson and Cook 2012). The western species, *M. caurina*, has a limited range in the western U.S., which includes north Kuiu Island in the Tongass National Forest, and represents a significant portion of the total genetic diversity for the species. In fact, 75% of the genetic diversity for *M. caurina* on Kuiu Island, as represented by the unique patterns of DNA found in individual pine marten, are unique to this species on this island, and found nowhere else in the world (Dawson et al. 2017).

10. The population of pine marten on Kuiu Island is unique, of global significance, and should be protected.

11. Kuiu Island represents the only island-based hybridization zone for these two species of pine marten. Hybrid zones are documented regions where biological diversity can lead to the adaptive evolution of species, which means that they can facilitate adaptation because of the genetic diversity found in these areas where two species coexist and interbreed (Thompson 1996). This is currently the situation on Kuiu Island. Two species of marten coexist, interbreed, and produce viable offspring that are contributing to the unique genetic diversity on this island. At this point, our research illustrates that this hybridization is developing novel genetic diversity that is creating a higher overall genetic diversity for the two species on the island.

12. The collective research with the Alaska Department of Fish and Game that began in 2006 resulted in the discovery of 1) low numbers of pine marten on the island (the lowest population numbers of both species relative to any other island where they have been studied on the Tongass); and 2) higher annual mortality in the species than on any other study of the species on the Tongass (ranging from 20-60%). Because of these results, both subsistence and commercial trapping season for pine marten (as furbearer species) was closed for the years 2007-Present (Flynn et al. 2013).

13. Commercial trapping is still closed. However, subsistence trapping season is now open on Kuiu Island, and there is no evidence that populations of pine marten have rebounded on the island.

14. Based on our research results, the original EIS for the North Kuiu Timber Sale does not adequately address this new and relevant information (Dawson et al. 2017, Koch 2016, Flynn et al. 2013). The research referenced in this statement was not included in the original North Kuiu Timber Sale EIS. The 2016 SIR does not include the most accurate available scientific information about pine marten on north Kuiu Island.

15. The 2016 SIR cites Flynn et al. 2013 but does not state all of the management implications where evidence suggests pine marten population numbers on Kuiu Island are still low and probably below sustainable levels. Although the SIR references this as a result of trapping, we know from our research that pine marten numbers continued to decline even after trapping season was closed, so mortality on the island and low population numbers cannot be explained only by trapping pressure. Simply closing the trapping season did not stop the population decline. We infer there are larger, ecologically-based reasons why populations may be declining on the island (Koch 2016).

16. The best available and most current research indicates that further timber harvest on Kuiu Island would negatively impact pine marten populations (Dawson et al. 2017, Koch 2016, Flynn et al. 2013). The proposed North Kuiu Timber Sale poses a significant threat to an already depleted and declining population with globally unique genetic attributes. This information was not known when the original 2007 EIS was written and was not addressed in the SIR.

I declare under penalty of perjury that the foregoing statement is true and correct.

Dated this 7th day of March, 2018.

Natalie G. Dawson, Ph.D

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BIOLOGY AND CONSERVATION OF

MARTENS, SABLES, AND FISHERS

A New Synthesis

EDITED BY

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and Steven W. Buskirk

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First published 2012 by Cornell University Press

Printed in the United States of America

Library of Congress Cataloging-in-Publication Data

Biology and conservation of martens, sables, and fishers : a new synthesis / edited by Keith B. Aubry … [et al.].
p. cm.
Includes bibliographical references and index.
ISBN 978-0-8014-5088-4 (cloth : alk. paper)
1. Martes. 2. Martes—Ecology. 3. Wildlife conservation. I. Aubry, Keith Baker.
QL737.C25B516 2012
599.76'65—dc23 2012003137

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Behind the Genes

Diversification of North American Martens (*Martes americana* and *M. caurina*)

NATALIE G. DAWSON AND JOSEPH A. COOK

ABSTRACT

Originally, 2 species of martens were described in North America: the American marten (*Martes americana*) and the Pacific marten (*M. caurina*). The description of intermediate forms suggested hybridization between the species, and they were reclassified as a single species, *M. americana*, containing 14 subspecies. Additional morphometric and phylogeographic studies have uncovered patterns of differentiation that support the recognition of 2 distinct species. Previous studies discovered genetic patterns associated with differential range expansions by each species after the retreat of glaciers during the last ice age in North America. Hybridization occurs between these closely related species, but phylogeographic studies based on a suite of molecular markers document the diversification and independent histories of these 2 species of martens in North America. This chapter summarizes results from both morphometric and phylogeographic studies of North American martens. Altogether, those studies strongly support the occurrence of 2 independent and evolutionarily distinct groups of martens in North America that are concordant with the original taxonomic descriptions of 2 different species. We conclude with a brief discussion regarding the use of taxonomic classifications for the management and conservation of North American martens.

Introduction

According to the taxonomic overview of Wozencraft (2005), the genus *Martes* includes 8 extant species worldwide (*M. americana, flavigula, foina, gwatkinsii, martes, melampus, pennanti,* and *zibellina*). Recent genetic studies (Stone and Cook 2002; Koepfli et al. 2008) suggest that this radiation may also include the wolverine (*Gulo gulo*) and, possibly, the tayra (*Eira barbara*). Detailed assessments of variation within the genus have highlighted other

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unresolved taxonomic problems, including the question of whether extant North American martens represent a single species, *Martes americana*, the American marten; or 2 species, *M. americana* and *M. caurina*, the Pacific marten.

Although *M. caurina* was considered a distinct species as early as 1890 by Merriam, Wright's (1953) subsequent morphometric study of martens within a hybrid zone resulted in the assignment of *M. caurina* as a subspecies within *M. americana*. Recent taxonomic summaries (e.g., Hall 1981; Baker et al. 2003; Wozencraft 2005) followed Wright's recommendations and included all extant martens in North America in a single species, *M. americana*, although several authors continued to refer to 2 distinct "groups" of martens in North America, the *americana* group and the *caurina* group (e.g., Hagmeier 1955; Anderson 1970; Clark et al. 1987).

In the past few decades, several studies based on molecular data independently concluded that 2 distinct species of martens exist in North America (e.g., Carr and Hicks 1997), returning to the earlier taxonomic designations of *M. americana* and *M. caurina*. Initially, genetic studies of North American martens were based on a single mitochondrial marker, but additional sets of molecular markers consistently identified 2 reciprocally monophyletic clades among North American martens (Stone and Cook 2002; Small et al. 2003; Dawson 2008). Those analyses also revealed distinct zoogeographic histories for the 2 marten groups and provided a much more robust empirical framework for exploring the evolutionary processes that led to their divergence.

Marten Taxonomy and Morphometrics in North America

Martes americana (Turton 1806) was first described on the basis of specimens from eastern North America. Rafinesque (1819: 82–83) described a distinct marten found in the "regions watered by the Missouri" as "very different from the common marten of Europe, Asia and America." In one of the early assessments of martens in western North America, Gray (1865) described *M. americana abietinoides* from the Selkirk Mountains in southern British Columbia, indicating that the species' range extended westward to include portions of the Rocky Mountains. Merriam (1890: 27–28) later described *Mustela (= Martes) caurina* based on a specimen from Grays Harbor County in western Washington, noting that "The skull of *Mustela caurina* differs from that of *M. americana* in the following particulars: The rostral portion is broader and shorter; the audital bullae are shorter and less inflated; the frontals are broader both interorbitally and postorbitally; the shelf of the palate is less produced behind the plane of the last molar; the first upper premolar is smaller and more crowded; the upper molars are larger . . . the last upper molar is not only larger, but has a much broader saddle." These differences are clearly evident when skulls from each group are compared directly (Figure 2.1). Merriam's

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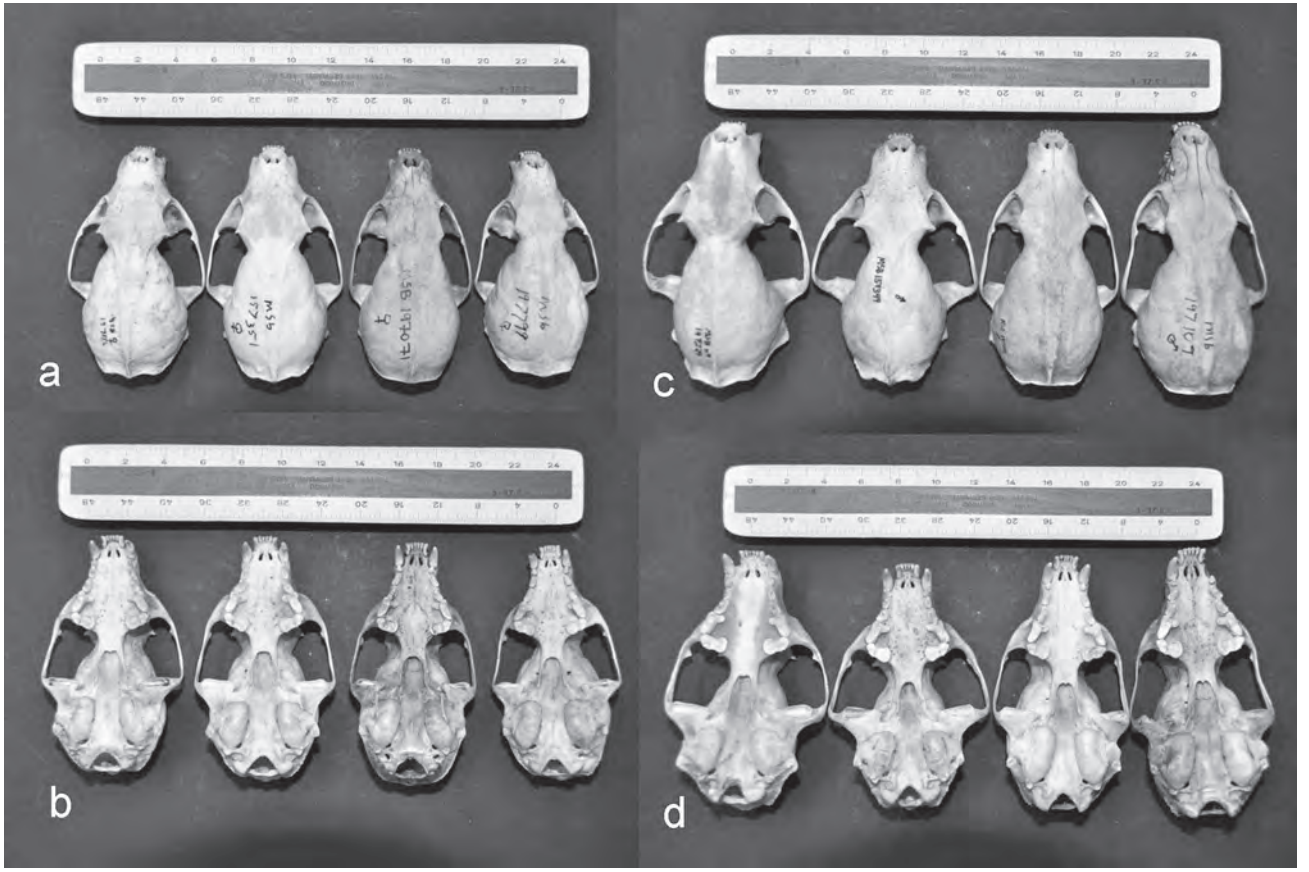

Figure 2.1. Dorsal and ventral views of adult skulls (Museum of Southwestern Biology) of *Martes americana* and *M. pacifica* from populations in northwestern North America. (a) Dorsal and (b) ventral views of 2 female *M. pacifi*ca (MSB 197756, British Columbia, Vancouver Island; MSB157351, British Columbia, Graham Island) and 2 female *M. americana* (MSB197071, Northwestern Territories, Vermillion Creek; MSB197799, British Columbia, Francois Lake). (c) Dorsal and (d) ventral views of 2 male *M. pacifica* (MSB 197229, Alaska, Admiralty Island; MSB157349, British Columbia, Moresby Island) and 2 male *M. americana* (MSB197101 and MSB197109, Northwestern Territories, Vermillion Creek).

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(1890) species description includes 17 skull and 8 tooth measurements, as well as 25 ratios of cranial and dental measurements. Rhoads (1902: 456) examined 129 martens from throughout their range in North America, and his results supported the distinct cranial characteristics of *M. caurina* in an expanded species account: "As compared with skulls of *M. a. actuosa* from Mackenzie, B.A. [British America], and *M. americana* from north of Lake Superior. . . . The skull of *caurina* viewed from above is greatly broadened and flattened. . . . In conformity to this relative shortening and widening, *caurina* has a markedly wide brain-case and interorbital region, the postorbital processes being widely and bluntly developed and the frontals abruptly constricted behind them. . . . The lowness or flatness of the cranium is also marked."

Rhoads (1902) described a new subspecies, *M. caurina origenes*, from the mountains of southern Colorado, thereby extending the range of *M. caurina* eastward to the southern Rocky Mountains and raising the possibility of geographic contact or overlap with *M. americana*. Later mammalogists acknowledged the distinctive shape of *M. caurina* skulls in state-level monographs of western mammals, as they attempted to clarify the distribution of the 2 species based on the cranial characteristics put forth by Merriam (1890) and Rhoads (1902). Davis (1939) reported the occurrence of *M. caurina* in central and southern Idaho, and Dalquest (1948) reported that both species were present in Washington. Hall (1946) and Durrant (1952) considered the range of *M. caurina* to include Nevada and Utah, respectively. In general, *M. americana* was considered the eastern species of marten, with a range extending from the eastern edge of North America into the Great Plains region, whereas *M. caurina* was considered the western form, restricted to the Rocky Mountains and the west coast of North America. Davis (1939) hypothesized that the Rocky Mountains were a geographic barrier between the 2 species, clearly considering their ranges to be allopatric.

Another issue regarding the question of how many species of martens occur in North America concerns the extinct noble marten, *M. nobilis*. This Pleistocene species occupied western North America (Lyman 2011) and, although larger in size, has been allied with *M. caurina* (Anderson 1970; Youngman and Schueler 1991). Additional study of morphometric or genetic variation using ancient DNA analyses should help clarify the taxonomic status and paleoecology of this species (Hughes 2009).

For many biologists, however, the number of marten species occurring in North America was settled by a study of morphometric variation in martens conducted by Wright (1953) and based on 245 skulls and "several hundred" skins from northern Idaho, western Montana, and southern British Columbia. When Wright (1953) began his investigation, his objectives were to refine the distributional limits of the 2 species in the central Rocky Mountains, and to explore the consequences of potential contact between them. Wright's

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(1953) findings, based on 13 standard cranial measurements, suggested contact with intergradation between the 2 species. For his assessment, Wright chose representative *M. americana* from 2 sites in southern British Columbia, and representative *M. caurina* from Idaho and the Sapphire Range in southern Montana. Martens from areas located between these "pure" populations were intermediate in size and shape. For his analyses, Wright (1953) classified samples from northern Idaho and near Whitefish, Montana, as *M. americana*, although the northern Idaho samples showed "some tendency" toward characteristics of *M. caurina*. He assigned specimens from Clearwater and Red Lodge counties in Montana to *M. caurina*, whereas specimens from the Swan, South Fork, and Sun River drainages were considered intermediate, based on 4 of the cranial measurements used in the original description of *M. caurina* (Merriam 1890): (1) length of auditory bullae, (2) length of inner lobe of the upper molar, (3) rostral breadth, and (4) height of the cranium (Wright 1953). Wright (1953) noted that the specimens of *M. americana* used by Merriam (1890) and Rhoads (1902) were both few in number and from distant locations (e.g., the Adirondack Mountains in New York). Wright (1953: 84) concluded that "since intergradation is occurring between populations previously regarded as distinct species, it appears that we are dealing with only a single species." He asserted that the occurrence of intermediate-sized specimens in the Swan, South Fork, and Sun river drainages of Montana (17 females and 15 males) reflected clinal variation. In accordance with biological thought at that time, Wright (1953) assumed that the occurrence of hybridization meant that these forms were conspecific; however, with the development of molecular techniques, hybridization between species is known to be far more common than was generally accepted when Wright published his findings (Hewitt 1989; Arnold 1997; Wayne and Brown 2001).

Wright (1953) also assessed variation in pelage color, but concluded that these characters were locally specific. For example, the bright orange throat patch and light coat color he identified as characteristic of martens from the Sapphire Mountains and Bitterroot Range in southern Montana, fall within the range of *M. caurina* and, coincidentally, are characteristic of island populations of *M. caurina* in southeast Alaska (R. Flynn, Alaska Department of Fish and Game, personal communication).

In his monograph on the taxonomy of North American mammals, Hall (1981) followed Wright's (1953) recommendation and included the *caurina* group as a subspecies within *M. americana*. Nonetheless, other researchers continued to acknowledge the existence of 2 morphologically distinct groups of martens in North America (Hagmeier 1955; Anderson 1970, 1994; Banfield 1974; Clark et al. 1987; Graham and Graham 1994). No comprehensive reevaluation of morphometric variation among North American martens has been conducted since Wright's study, although one researcher inadvertently indentified differences between the species based on samples collected along

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the North Pacific coast of North America. Nagorsen (1994) examined variation in body weights among island and mainland martens in the Pacific Northwest; in British Columbia, he found that island martens (*M. caurina*) were larger than mainland martens (*M. americana*). In contrast, martens from islands in the Alexander Archipelago (located north of the islands in British Columbia) were only weakly divergent from those of mainland southeast Alaska. Nagorsen's (1994) study included samples only from Baranof and Chichagof islands in the Alexander Archipelago, both of which contain populations of *M. americana* that were introduced from mainland sources. Comparing body weights between island (*M. caurina*) and mainland (*M. americana*) martens, Nagorsen (1994) found significant differences ($P < 0.01$) among all age classes and between the sexes. Thus, without knowing the history of these reintroductions, or the taxonomic status of martens in southeast Alaska or in the Queen Charlotte Islands, Nagorsen (1994) documented morphometric differences consistent with the recognition of *M. caurina* and *M. americana* as distinct species.

North American martens have been partitioned into as many as 14 subspecies, including *M. americana caurina* (Figure 2.2). With the exception of intensive studies of a few subspecies of conservation concern, such as *M. a. atrata* (Newfoundland Island endemic) and *M. a. humboldtensis* (Coast Range of northern California), there have been no recent comprehensive reviews of subspecific variation among North American martens. Limited sampling within 12 of the 14 recognized subspecies (1–3 samples from each) by Carr and Hicks (1997) precluded a rigorous assessment of mtDNA variation and subspecies limits.

Phylogeography of North American Martens

Phylogeographic analyses use genetic data to understand the historical processes that resulted in the current geographic distribution of a species. These methodologies have also been used to refine taxonomic nomenclature, especially when morphological differences are combined with assessments of genetic variation to define species (e.g., Rissler et al. 2006). The first phylogeographic studies of North American martens showed divergence between the *caurina* and *americana* groups, as reported in previous morphometric studies. Carr and Hicks (1997) used the maternally inherited mitochondrial cytochrome *b* gene to examine relationships among *Martes* species and, in particular, to investigate variation in North American martens. They found that pairwise sequence divergence (an index of base-pair differences in DNA sequences) between the *americana* group and the *caurina* group was as great as the sequence divergence among Palearctic species of *Martes* (*M. zibellina*, *M. martes*, *M. melampus*). Carr and Hicks (1997) included specimens from the Selkirk Mountains in British Columbia, as did Wright (1953), and found

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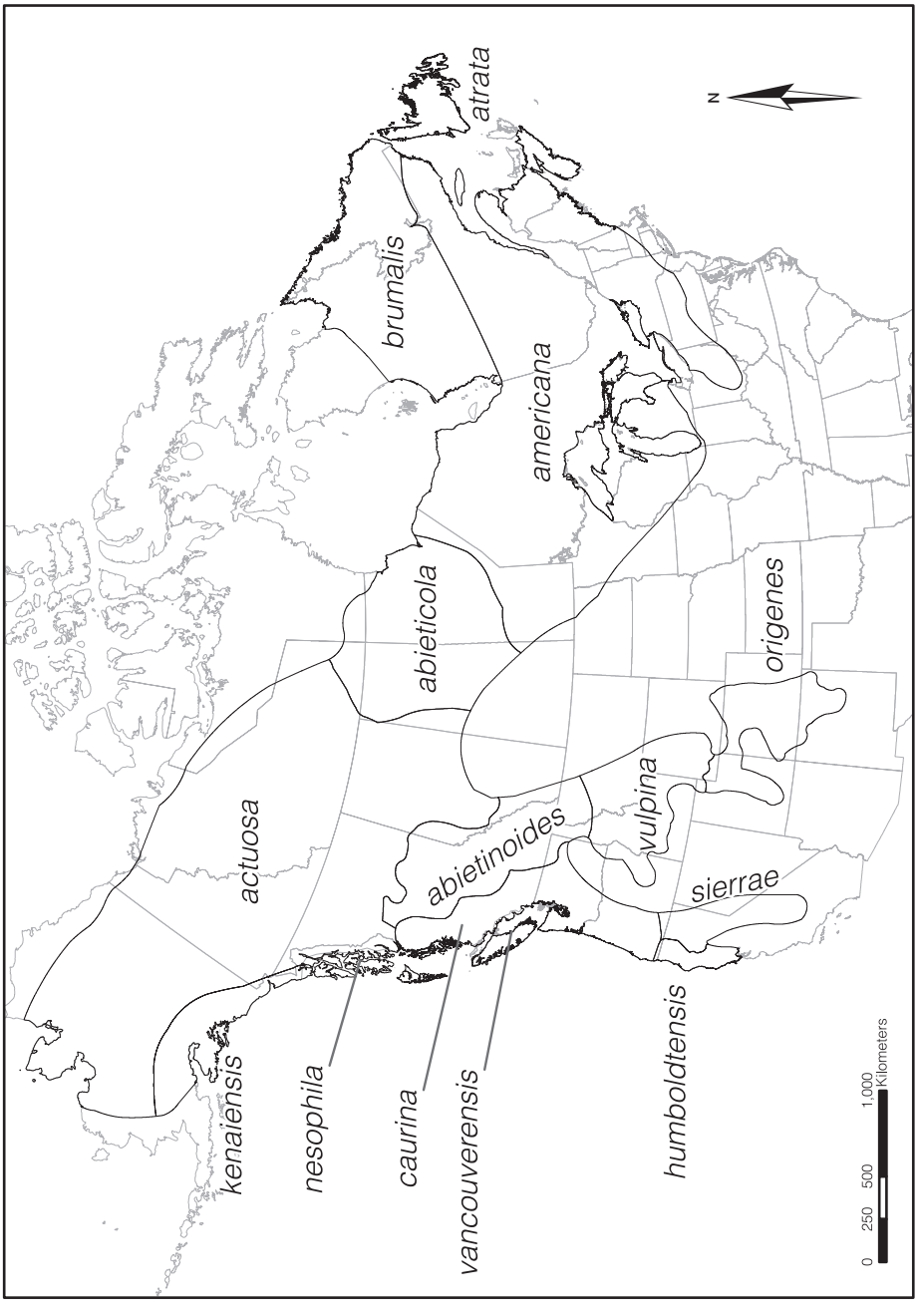

Figure 2.2. Geographic distribution of the 14 subspecies of *Martes americana* recognized by Hall (1981).

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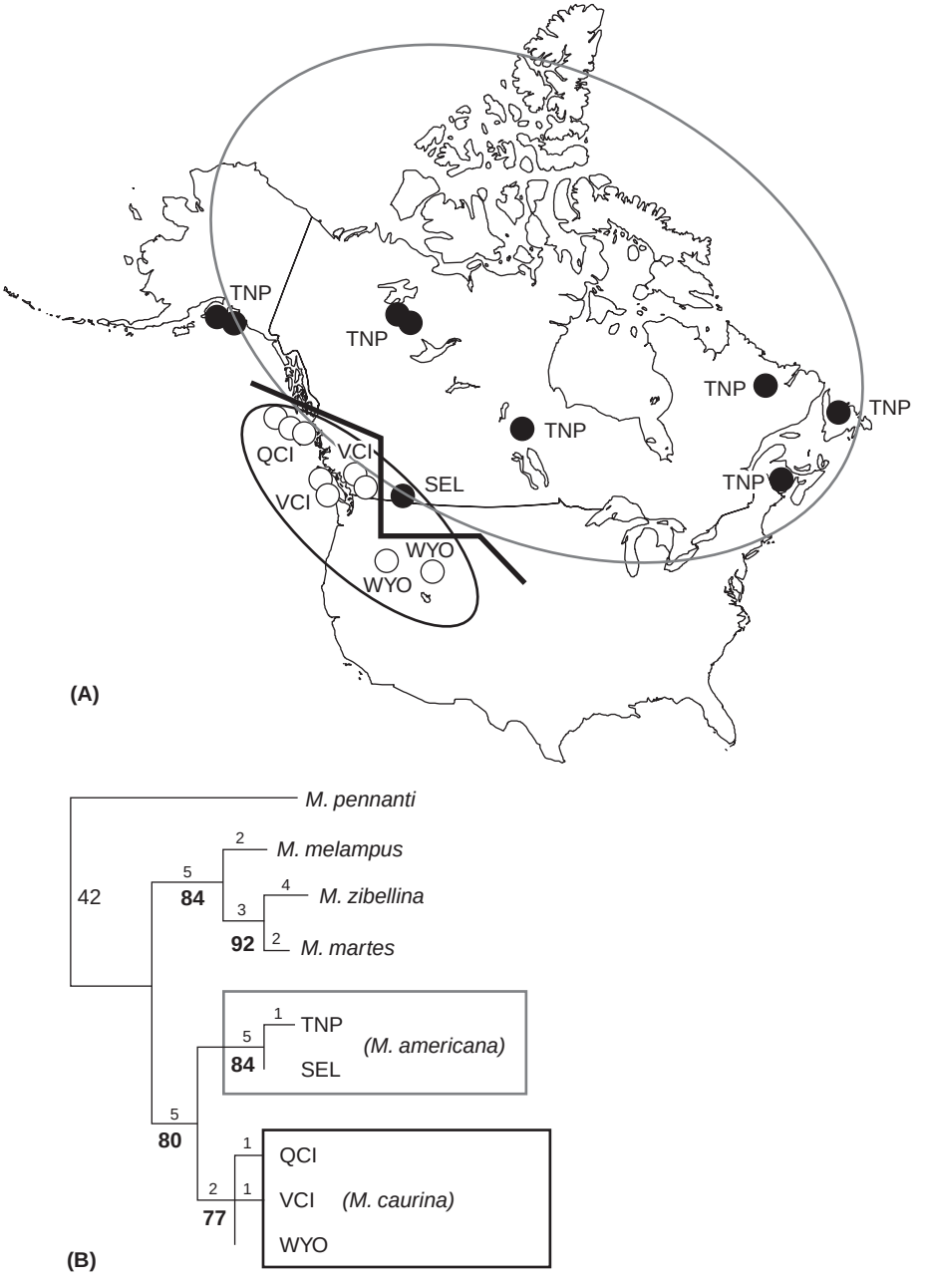

Figure 2.3. (A) Depicts the geographic boundary between *Martes americana* (light gray ellipse) and *M. caurina* (dark gray ellipse) based on cytochrome *b* sequence data. (B) Shows reciprocal monophyly between the *americana* and *caurina* clades, as well as the sequence divergence compared to other members of *Martes*. Both figures are adapted from Carr and Hicks (1997).

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that those individuals were from the *americana* clade, consistent with the original taxonomic designation for this population (Gray 1865). Thus, the findings of Carr and Hicks (1997) provided the first evidence of genetic differentiation between the *americana* and *caurina* groups. Moreover, based on the phylogenetic species concept (Cracraft 1989), they concluded that these 2 groups represent distinct species (Figure 2.3).

Stone and Cook (2002) found that *M. caurina* and *M. americana* are reciprocally monophyletic sister taxa resulting from a single colonization event from Asia across the Bering Land Bridge into North America. Subsequent isolation into distinct eastern and western glacial refugia during the late Pleistocene resulted in divergence of the 2 groups of martens within North America. Stone et al. (2002) found that these taxa corresponded to previously recognized morphometric clusters, with the *americana* group extending from the east coast of North America (including Newfoundland populations) into northwestern North America, and the *caurina* group extending from the west coast of North America eastward into the Rocky Mountains. The divergence of these reciprocally monophyletic groups ranges between 2.5 and 3.0%, which corresponds to about 1 million years of independent evolution based on the estimated mutation rate of the cytochrome *b* gene in martens (Stone et al. 2002). Whereas the *americana* group comprised populations with little intraclade divergence and a signal of population expansion, the *caurina* group contained substantial subpopulation structure and no signal of recent expansion. That study also demonstrated a potential zone of contact similar to that described by Wright (1953). Although Stone et al. (2002) substantiated the conclusion drawn by Carr and Hicks (1997) that 2 distinct species of martens occur in North America, they did not formally revise marten taxonomy.

Small et al. (2003) then explored patterns of molecular variation between the *americana* and *caurina* clades using nuclear microsatellites, and largely corroborated findings from mtDNA analyses that there were 2 independent marten clades in North America (Figure 2.4). Small et al. (2003) described contact zones between the 2 clades in Montana and on Kuiu Island in southeast Alaska by identifying hybrid individuals using Bayesian assignment tests. Furthermore, their estimates of population structure indicated generally lower heterozygosity values, higher inbreeding coefficients, and numerous discrete alleles in the *caurina* group, whereas populations in the *americana* group were generally more genetically variable and shared more alleles across localities. Similarly, Kyle and Strobeck (2003) found little substructuring within *M. americana* populations in northern North America. These findings are consistent with the hypothesized northwestward expansion of *M. americana* during glacial retreat, as they followed expanding boreal forest conditions northward.

Small et al. (2003) also shed new light on the underlying taxonomic framework for Wright's (1953) study. All the populations used by Wright to compare

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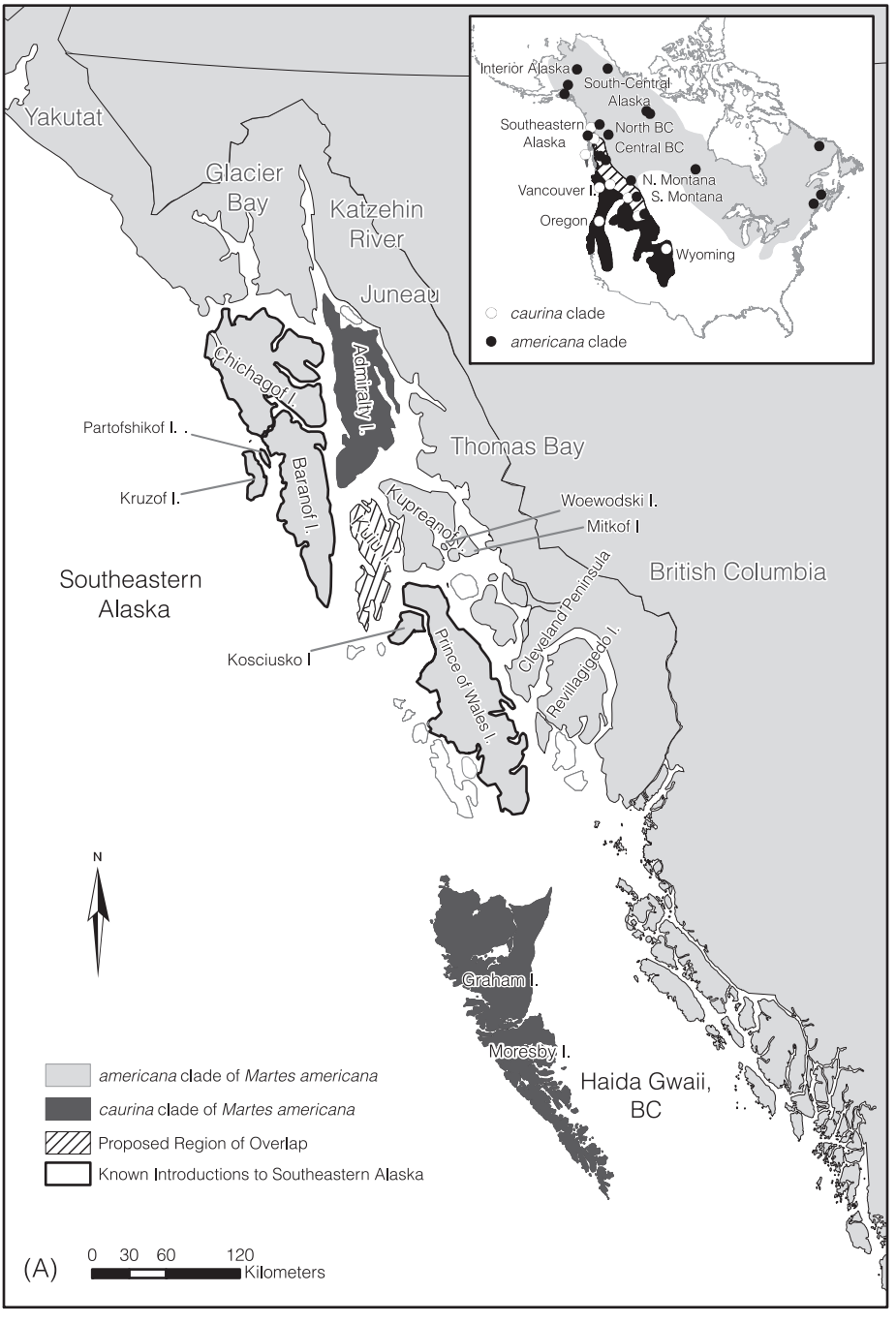

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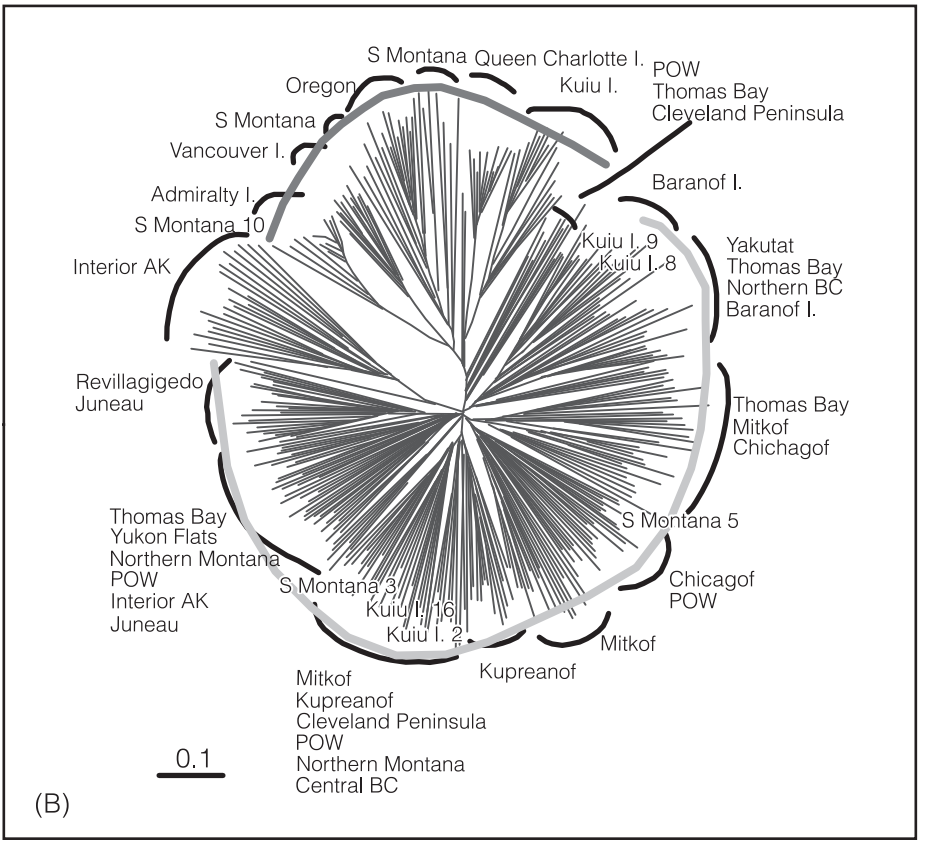

Figure 2.4. Concordance between (A) mitochondrial DNA studies (modified from Stone et al. 2002) and (B) the allele-sharing network based on 14 microsatellite (nuclear DNA) loci (modified from Small et al. 2003), with lines indicating populations of *Martes caurina* (dark gray) and *M. americana* (gray).

M. americana with *M. caurina* appear to have been located within the hybrid zone for these 2 species as defined by molecular markers. Wright (1953) concluded that intergradation between the *caurina* and *americana* groups invalidated their status as distinct species; however, specimens that he assumed were from "pure" populations appear to have been collected within the zone of introgression, such that Wright compared martens only from hybrid populations. In contrast, more geographically extensive sampling in subsequent molecular studies has resulted in a series of markers that are diagnostic for the 2 species (Small et al. 2003; Dawson 2008).

A large number of phylogeographic studies worldwide have identified complex forces that drove sequential range contractions and expansions for many species during the early Holocene; unraveling these histories is key to understanding contemporary diversity (Hewitt 1996; Lessa et al. 2010).

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Slauson et al. (2009) investigated phylogeographic diversification within the *caurina* group in coastal California, Oregon, and Washington and concluded that regional genetic differentiation may reflect the isolation of populations in disjunct forest refugia during the Wisconsin glaciation. At the continental scale, Dawson (2008) concluded that both the *caurina* and *americana* clades exhibited signals of recent population expansion, supporting their distinct evolutionary histories as hypothesized by previous researchers (Carr and Hicks 1997; Stone et al. 2002). Although each clade showed signals of expansion from glacial refugia, the refugial localities from which they expanded and the temporal duration of expansion events vary between clades, further reflecting the distinct evolutionary history of each species (Waltari et al. 2007; Dawson 2008).

Relatively few studies have investigated genetic variation among marten populations in eastern North America (e.g., Broquet et al. 2006a; Williams and Scribner 2010). Most studies have focused on the homogeneous structure of marten populations in eastern North America, due either to reintroduction events (Williams and Scribner 2010) or to the hypothesized recent expansion of *M. americana* from a single glacial refugium (Graham and Graham 1994; Kyle and Strobeck 2003). The Newfoundland marten, *M. a. atrata*, is genetically distinct from other *M. americana* populations (McGowan et al. 1999), but it is more closely related to all other *M. americana* than to any *M. caurina* population. Furthermore, Kyle and Strobeck (2003) compared *M. americana* populations across Canada and found little variation among populations.

Of the 14 subspecies of *M. americana* recognized by Hall (1981), 10 are found in western North America (Figure 2.2) where both the *americana* and *caurina* clades occur. The primary zone of contact between these taxa occurs along the central Rocky Mountains of Idaho and Montana and potentially into British Columbia, with an isolated contact zone on Kuiu Island in the Alexander Archipelago in southeast Alaska (Small et al. 2003). Multiple glacial refugia in the west may have contributed to observed geographic variation within the *caurina* clade (Dawson 2008) and is consistent with patterns of genetic variation reported for other species that expanded from glacial refugia during the Holocene (Hewitt 1996; Lessa et al. 2003).

In summary, phylogeographic studies (e.g., Carr and Hicks 1997; Stone et al. 2002; Small et al. 2003; Slauson et al. 2009) largely corroborate the findings of earlier morphometric studies (Hagmeier 1955; Anderson 1970, 1994; Banfield 1974; Clark et al. 1987; Graham and Graham 1994) and reveal independent evolutionary histories for *M. americana* and *M. caurina*. *Martes americana* has recently expanded from glacial refugia in the east, whereas *M. caurina* shows signs of earlier expansion, potentially from multiple refugia in the west (Slauson et al. 2009; N. Dawson, unpublished data).

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The historical habitat associations and contemporary population distributions of *M. caurina* largely match Merriam's (1890: 27) description: "The marten inhabiting the dense spruce forests of the heavy rain-fall belt along the northwest coast from northern California to Puget Sound, and doubtless ranging much farther north." Even with contemporary (and likely historical) hybridization between *M. americana* and *M. caurina*, significant differentiation between these species is apparent. Hybridization between species is a relatively common event (Arnold 1997), and other species within *Martes* hybridize with each other (Davison et al. 2001); consequently, lumping these species only because of hybridization is unwarranted. We conclude that there are 2 extant species of martens in North America (Figure 2.2): *Martes americana* (Turton 1806), the American marten, and *Martes caurina* (Merriam 1890), the Pacific marten, and recommend that current taxonomic classifications be modified to restore these previously recognized species to the list of North American mammals.

New Insights for Old Debates

The original taxonomic classification of 14 subspecies among North American martens has been heavily debated. Neither morphometric (e.g., Hagmeier 1955) nor genetic (e.g., Kyle and Strobeck 2003) studies support the recognition of most of the eastern subspecies within *M. americana,* with the exception of *M. a. atrata*, the Newfoundland pine marten (McGowan et al. 1999). In contrast, the disjunct distribution of populations in the western United States may indicate that subspecific differentiation within *M. caurina* more accurately reflects patterns of underlying geographic variation resulting from isolation in disjunct forest refugia during the last glaciation (Slauson et al. 2009).

We analyzed additional genetic data to evaluate the validity of our proposal to formally recognize the occurrence of 2 species of martens in North America. Using nuclear DNA markers described by Koepfli et al. (2008), and additional markers developed at the USGS Alaska Science Center (Table 2.1), we found at least 1 allele per locus among 7 independent loci that distinguished *M. americana* from *M. caurina*. Within the previously identified contact zones (Small et al. 2003), we identified heterozygous individuals for 3 nuclear loci (growth hormone receptor, GHR; feline sarcoma protooncogene, FES; agouti signaling protein, AG), providing additional evidence for introgression between the 2 species in limited areas throughout Montana, southern British Columbia, and southeast Alaska (Carr and Hicks 1997; Stone et al. 2002; Small et al. 2003). We also identified heterozygotic individuals in Idaho. These findings are consistent with independent evolutionary histories for *M. americana* and *M. caurina,* followed by secondary contact as populations expanded in the Holocene. Further study of the extent and dynamics of

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Table 2.1. Locus, number of alleles, primer name, and primer sequence for the 7 nuclear loci screened across multiple populations of *Martes americana* and *M. caurina*

Locus	Alleles		Primer	Primer sequence
	M. americana	*M. caurina*		
Agouti Signaling Protein	A	B	AG393(F) AG1113	CCT ACT CCT GRC CAC CCT GC CTG AAA GGA CTA GTT CAT
5-HT1A Serotonin Receptor	A	B	HT1A HT1A (R)	TCA GCT ACC AAG TGA TCA CCT CAG GGA GTT GGA GTA GCC
Retinoid Binding Protein	A,C	B,C	IRBP35F IRBP785	GGA TGC AGG AAG CCA TCG TGG TGT CCC CAC ACA GGG TA
Growth Hormone Receptor	A,C,D	B,C,D	GHR GHR (R)	CCA GTT CCA GTT CCA AAG AT TGA TTC TTC TGG TCA AGG CA
Apolipoprotein B	A	B	APOB APOB (R)	GGC TGG ACA GTG AAA TAT TAT GAA AAT CAG AGA GTT GGT CTG AAA AAT
Nicotinic Alpha Polypeptide	A	B	CHRNA1 CHRNA1R	GAC CAT GAA GTC AGA CCA GGA G GGA GTA TGT GGT CCA TCA CCA T
Feline Protooncogene	A,B,C,D,G,H	E,F,G,H	FESi14 FESi14R	GGG GAA CTT TGG CGA AGT GTT TCC ATG ACG ATG TAG ATG GG

Sources: Primers were redesigned based on information reported by Kukekova et al. (2004), Yu et al. (2004), Koepfli and Wayne (2003), Våge et al. (2003), Sato et al. (2003), and Eizirik et al. (2003)

Note: Alleles per locus are listed by species to illustrate diagnostic loci, as well as those with alleles shared between species

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these contact zones would provide additional insights into the evolutionary history of North American martens.

The Role of Taxonomy in Species Conservation

Taxonomic classifications provide a means to characterize and measure biological diversity, and are often used to establish priorities for the conservation of species and populations (McNeely 2002). The degree of conservation concern varies among extant marten populations in North America. American martens are widely distributed, although some populations are at risk of extirpation (e.g., McGowan et al. 1999). The Pacific marten occurs throughout western North America, but there are a number of relatively small and disjunct populations that may exhibit reduced levels of genetic variability (Small et al. 2003). In some cases, isolated populations may be differentiated by a single nuclear allele or mitochondrial haplotype (e.g., Admiralty Island in southeast Alaska; N. Dawson, unpublished data). Higher inbreeding coefficients for Pacific marten populations may signal that reduced population size has resulted in a loss of genetic diversity (N. Dawson, unpublished data). Finally, several populations of this species are believed to have been extirpated, and some remnant populations appear to contain relatively few individuals (Slauson et al. 2009).

A taxonomic classification that accurately reflects geographic variation in genetic characteristics can also be an important tool for designing effective reintroduction strategies for restoring species to their former ranges and protecting the genetic legacy of populations (Schwartz 2007). For example, if translocations are planned to augment remnant populations of Pacific martens along the Pacific coast, it is imperative that translocated individuals be obtained from other Pacific marten populations. Human-mediated introductions on islands in southeast Alaska may have led to the subsequent disappearance of Pacific marten populations from those islands (Hoberg et al., this volume). Maintaining the genetic legacy of species and populations requires collaboration between researchers and management agencies (Isaac et al. 2007). Revising the taxonomic status of North American martens provides a new empirical framework for managing broad- and fine-scale genetic diversity among North American martens, and for gaining a better understanding of the biology of North American *Martes,* including their behavior, ecology, physiology, parasitology, and conservation.

Acknowledgments

Funding for Natalie Dawson's dissertation was provided by the USDI U.S. Fish and Wildlife Service, USDA Forest Service Alaska Region and Forestry Sciences Laboratory, and National Science Foundation (NSF DEB 0196095

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and 0415668). Technical assistance was provided by the USDI U.S. Geological Survey Alaska Science Center. We thank Rod Flynn, Anson Koehler, David Nagorsen, Stephen MacDonald, Richard Popko, Tom Schumacher, Karen Stone, Alasdair Veitch, and Jack Whitman for help with various aspects of our work on martens over the past decade. A special thanks to Yadeeh Sawyer for assistance with graphics.

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THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Transportation and Public Facilities

OFFICE OF THE COMMISSIONER
Marc Luiken, Commissioner

3132 Channel Drive
P.O. Box 112500
Juneau, Alaska 99811-2500
Main: 907.465.3900
dot.state.ak.us

February 18, 2016

The Honorable Christine Bitterman
Mayor of Kake
266 Front Street
Kake, Alaska 99830

Dear Mayor Bitterman:

The Alaska Department of Transportation and Public Facilities (DOT&PF) has decided to close-out the Kake Access federal project in order to investigate a more cost-effective project.

In 2012, the Alaska State Legislature appropriated $40 million in state funds to construct a single-lane gravel road connection between Kake and Petersburg. This funding was added to an existing federal project with the intent to improve access and mobility for the residents of Kake. A public road and shuttle ferry connection between Kake and Petersburg was proposed to improve transportation access to Petersburg's commercial and medical services; and air, ferry, and freight transportation services.

The principal factors supporting the decision to close the project is that the federal project is not fully funded and the need to operate and maintain a shuttle ferry across Wrangell Narrows would add significantly to the Department's annual maintenance and operating expense. The estimated annual operation and maintenance cost of the road and the Wrangell Narrows ferry crossing is estimated to be in excess of $510,000.

DOT&PF has determined that it would not be prudent to proceed in light of the State's current fiscal situation. The Department proposes to initiate a new scoping effort to develop a project that provides the community of Kake improved access to forest resources. The new scoping effort will also support future transmission of low cost hydroelectric power while staying within the available funding and with lower maintenance and operations costs.

We invite any comments you may offer.

Sincerely,

Marc Luiken
Commissioner

cc: The Honorable Tom Reinarts, Mayor, City of Kupreanof
The Honorable Bert Stedman, Senator
The Honorable Jonathan Kress-Tomkins, Representative
William Bean, Manager, City of Kake
Casimero Aceveda, President, Organized Village of Kake
Gary Williams, Executive Director, Organized Village of Kake
The Honorable Mark Jensen, Mayor, Petersburg Borough
Steve Giesbrecht, Manager, Petersburg Borough
Barry Morrison, President, Petersburg Indian Association

Pence, Sitka - FS

From: Hernandez Burke, Melinda - FS
Sent: Thursday, February 28, 2019 8:28 PM
To: Pence, Sitka - FS
Subject: FW: Organized Village of Kake comments for DEIS ~ Roadless Rulemaking 2019
Attachments: OVK Coverletter Feb. 28, 2019 DEIS.pdf; 20190213_AKRR_ReviewDEIS ~ Organized Village of Kake.docx; Goldschmidt-Haas map.pdf; 20190214 _AKRR_ScopingMeetingSummaries.pdf; OVK Kake Community Use Area.jpg; Alaska Specific Roadless Rule Public Scoping Process 2018 ~ Earl Stewart.pdf; AK Roadless Rule letter and RES 2018-24.pdf; Letter to Sec. Perdue Feb. 2019.pdf; OVK Request for extension ~ AK Specific Roadless Rule timeline.pdf; Dawson 2008.pdf; Dawson et al. 2017.pdf; Dawson, North Kuiu Statement (2018).pdf; Dawson & Cook (2012).pdf; DOT closes out Kake Access Project 2_18_16.pdf

Importance: High

Melinda Hernandez Burke
Tribal Relations Program Manager

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Caring for the land and serving people

From: Dawn Jackson [mailto:ed@kake-nsn.gov]
Sent: Thursday, February 28, 2019 5:09 PM
To: sitka.pence@fs.fed.us
Cc: Hernandez Burke, Melinda - FS <mhernandezburke@fs.fed.us>; Tu, Kenneth K -FS <kktu@fs.fed.us>; OVK Council <ovkcouncil6@gmail.com>; Burt Jackson <nr@kake-nsn.gov>
Subject: Organized Village of Kake comments for DEIS ~ Roadless Rulemaking 2019
Importance: High

Ms. Pence,

If all attachments (14 in total) do not go through, please advise.

Gunalcheesh,

Dawn Khaaxwáan Jackson

Executive Director
Organized Village of Kake
P.O. Box 316
Kake, AK 99830
Email: ed@kake-nsn.gov
(907) 785-6471 ext. 111

Core Purpose: Strengthen Tribal Community and Culture
Core Values: Respect, Collaboration, Endurance, Safety and Security