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North Fork Watershed Analysis

Acknowledgements

North Fork Salmon Ecosystem Analysis

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Introduction

Watershed Analysis Overview

Watershed analysis is ecosystem analysis at the watershed scale; it is both an analysis and information gathering process. The purpose of watershed analysis is to provide a means by which the watershed can be understood as an ecological system and to develop and document an understanding of the processes and interactions occurring in a watershed. This is the purpose of this watershed analysis of the North Fork of the Salmon River (refer to Figure Intro-1. Klamath Basin Vicinity Map and Figure Intro-2. North Fork Salmon River Watershed Vicinity Map on pages 3 and 4, respectively).

Watershed analysis is required in Key Watersheds and Riparian Reserves. This analysis focuses on specific Issues and Key Questions within the watershed.They are assessed in terms of biological, physical and social importance. Some of these aspects may include beneficial uses, vegetative patterns and distribution, wind, fire, important wildlife species, migration routes, dispersal habitat, human use patterns, the importance of vegetative corridors streams, and riparian corridors. The analysis also includes an identification of management opportunities which will provide background for the development of management decisions in the future.

The analysis process is also used as a vehicle for implementation of Forest planning direction. It is an intermediate analysis between land management planning and project planning. It is purely an analysis step and does not involve National Environmental Policy Act (NEPA) decisions. It provides a means of refining the desired condition of the watershed, given the Goals and Objectives, Management Areas and Standards and Guidelines from the *Forest Land and Resource Management Plan* (Forest Plan), current policy, and other applicable State and Federal regulations.

The Forest Plan has been updated to reflect direction contained in the Record of Decision (ROD) for the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.* There are 9 different Management Areas contained within the North Fork Watershed analysis area. They are Riparian Reserves, Partial Retention, General Forest, Wilderness, Late-Successional Reserves, Recreational River, Retention, Wild River and Scenic River.

Process and Document Organization

The analysis was conducted by a core Forest Ecological Analysis Team (FEAT) and an expanded team of District resource specialists. During the entire analysis phase participation and involvement of other Federal agencies was encouraged. General notices were sent regarding a public meeting at Sawyers Bar, and draft chapters were circulated to representatives from other Federal Agencies, including Environmental Protection Agency, National Marine Fisheries Service, and United States Fish and Wildlife Service (USFWS).

There are 6 steps in conducting ecosystem analysis at the watershed scale. The six steps are:

Step 1 - Characterization of the Watershed
Step 2 - Issues and Key Questions
Step 3 - Current Conditions
Step 4 - Reference Conditions
Step 5 - Interpretation
Step 6 - Recommendations

The purpose of **Step 1** is to place the watershed in context within the river basin, provinces, or a broader geographic area. This step briefly analyzes and describes the dominant physical, biological, and human dimension features, characteristics, and uses of the watershed.

Step 2 identifies the variety of uses and values associated with the watershed. This step focuses the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed. Also involved in this step is the formulation of analysis questions using the indicators most commonly used to measure or interpret these ecosystem elements.

Step 3 documents the current range, distribution and condition of the relevant ecosystem elements.

Step 4 explains how existing conditions from Step 3 have changed over time as the result of human influence and natural disturbances. This step develops a reference for later comparison with current conditions over the period that the system evolved and with key plan objectives identified in Step 2.

Step 5 compares existing, historical and reference conditions of specific ecosystem elements. This stepexplains significant differences, similarities or trends

and their causes. The capability of the system to achieve key management plan objectives is also evaluated.

Step 6 identifies those management activities that could move the ecosystem towards reference conditions or management objectives, as appropriate. References are developed for later comparison with the current conditions over the period that the system evolved and with key plan objectives identified in Step 2. Management activities in Step 6 are expressed in general terms; they identify what needs to be done and why, but not how. This step ultimately provides the purpose and need for implementation of individual projects designed to achieve desired conditions.

Appendices A through J are included in support of information and findings contained within the analysis and are as follows:

- A -- Endangered Species Act and Other Species Considerations Questions & Answers
- B -- List of Analysis Area Maps
- C -- Late Successional and Old Growth Forest Associated Species
- D -- Transportation System Interactions
- E -- Special Forest Products
- F -- Risk/Fire Behavior Potential Analysis
- G -- Northern Spotted Owl Habitat/50-11-40 Analysis
- H -- Forest Plan Feedback
- I -- Visual Quality Improvement Opportunities
- J -- North Fork Riparian Reserves

Relationship to Other Analyses and Planning

As stated previously, this level of analysis occurs between the land management plan and project-level analyses. More detailed analysis is necessary for NEPA sufficiency; therefore, individual project analyses will focus on site-specific issues and their potential environmental effects.

National Hierarchical Framework

The USDA Forest Service has instituted a National Hierarchical Framework of ecological units. This framework is used to classify land based on combinations of physical and vegetative factors. Use of the National framework allows the Forest Service to maintain consistency throughout the lands it manages across the United States. The boundaries are used to describe areas of similar geology, soils, vegetation and fauna. The analysis area falls entirely within the Klamath Mountains Section of this hierarchy.

Information and Data Sources

Data and information used in this analysis have come from several different sources. The set of Klamath National Forest Planning Map Layers were the source for the following geographic information system (GIS) layers which were used during the process: **Watershed Layer** (with analysis area and sub-watersheds delineated), **Geologic Layer** (with rock types and geomorphic terranes), **Digital Elevation Data Layer, Precipitation Layer, Soils and Existing Vegetation Layer**, **Fire Layer** (which included past fire perimeters, starts and intensity), **Stream Layer** (with watercourses delineated to approximate the extent of annual scour), **Land Allocations** (from the Forest Plan), and **Roads Layer**. From these data layers, information such as fire hazard, soil erosion hazard and interim Riparian Reserve boundaries were derived.

Additional non-GIS sources of information were incorporated into the analysis. Stream surveys and fisheries habitat typing data was available for some streams within the analysis area. Other information was obtained from Forest planning documents, aerial photo interpretation, County museum records, published reports and papers, and also through personal communications.

An Iterative Process

Watershed analysis will be an on-going process. The initial analysis report will serve as a foundation onto which new information will be added in the future. In addition, the analysis process will continue to be refined as new methods and strategies are developed and applied.

Figure Intro–1

Klamath Basin Vicinity

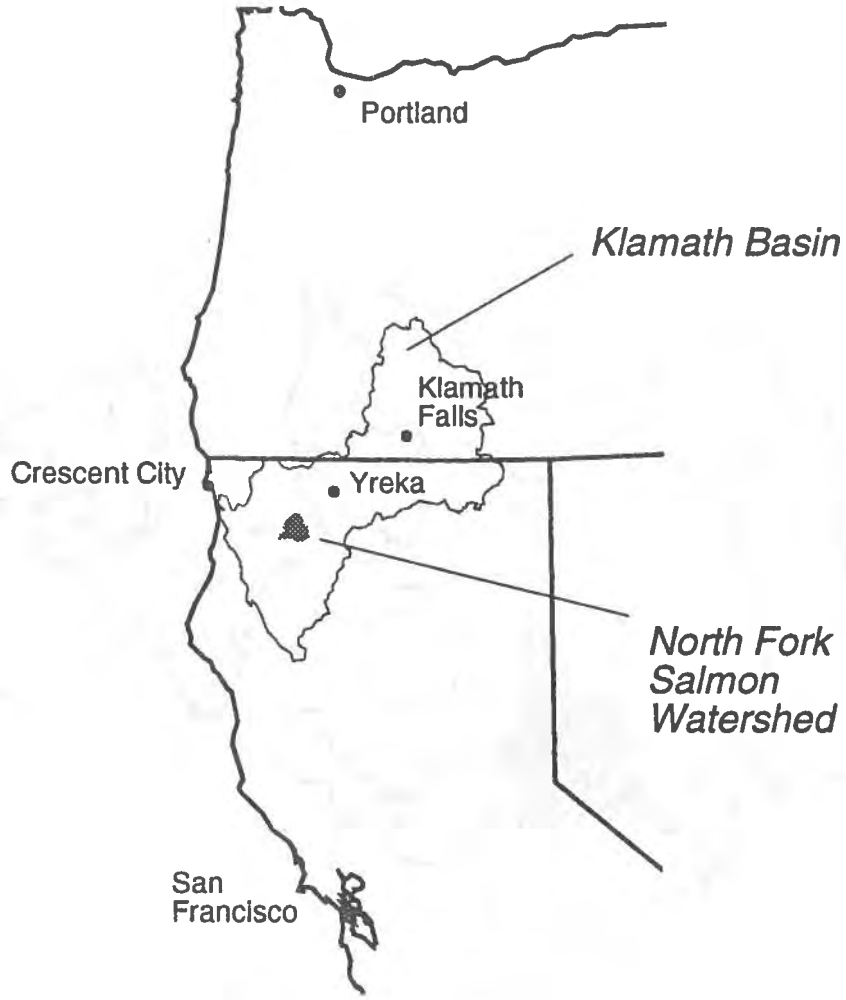
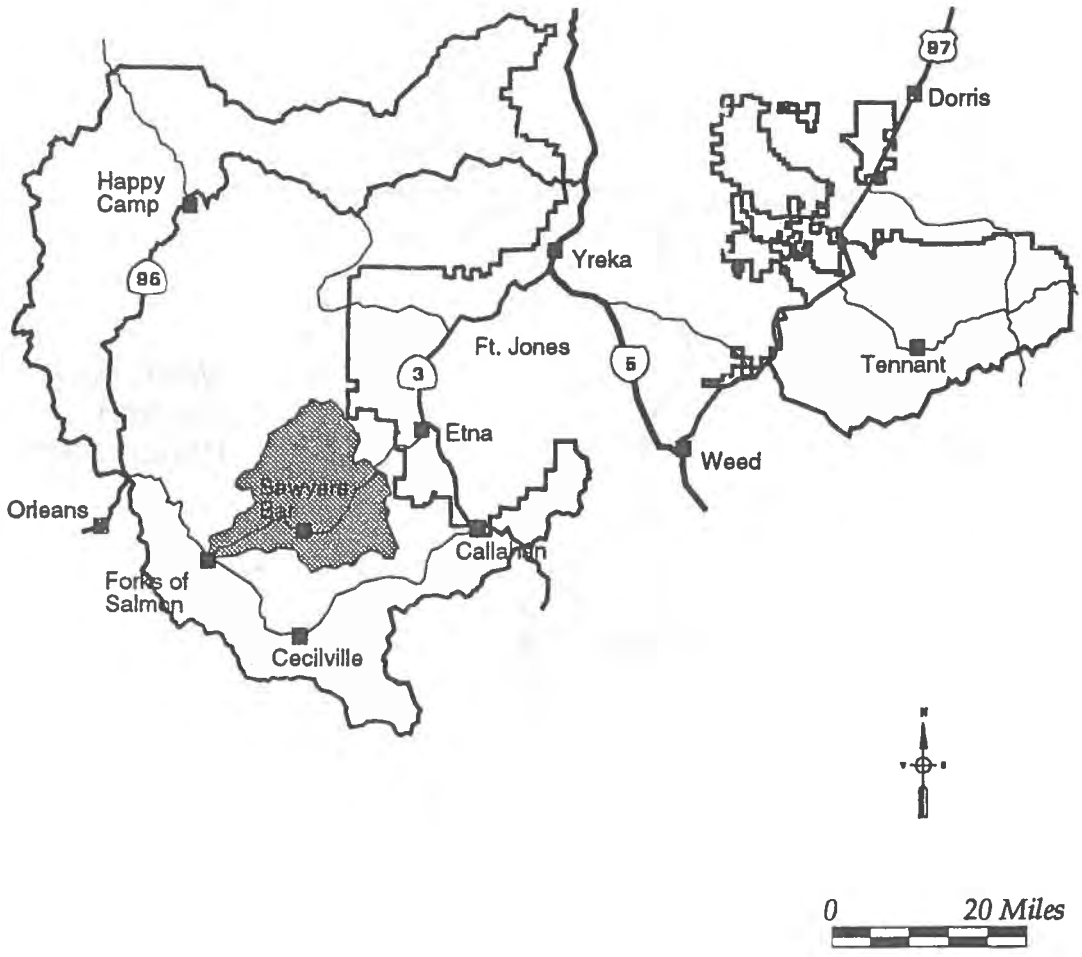


Figure Intro–2

North Fork Salmon Watershed

Klamath National Forest



North Fork Ecosystem Analysis

Step 1 - Characterization

The North Fork Watershed is within the Klamath Mountains Physiographic Province in the western portion of the Klamath National Forest. This watershed is one of two major forks of the Salmon River, a tributary to the Klamath River. The watershed is fairly typical of the Province's rugged, isolated, river sub-basins. The historical human use and the local community dependence upon resource commodities are also typical within the region.

The tributuries of the watershed supply high quality water, beginning at the headwaters near English Peak and descending as a series of cacades and riffles to join and form the North Fork of the Salmon River. These waters merge with the South Fork of Salmon River at the Forks of Salmon, which forms the mainstem of Salmon River.

Elevations in the watershed range from 1,100 to 8,170 feet. The landscape is steep to very steep, with little flat terrain and gentle slopes. The topography is very dissected with sharp ridges and streams oriented in random directions.

Climate is a typical Mediterranean climate common in the Klamath Province mountains of Southern Oregon and Northern California. Yearly precipitation totals range from 35 inches in the west to 80 inches to the north. The precipitation occurs mostly during winter snow and rain storms. Major floods in the past have had severe impacts to the stream system. The most recent, and most destructive, was the 1964 flood. A series of smaller flood events occurred between 1970 and 1974. The summers are usually hot and dry, but thunderstorms are common and are the major source of wildfire ignitions.

The area is dominated by timbered stands of Douglas-fir, with ponderosa pine, sugar pine, white fir and incense cedar also present. In general, the southern exposures are sparsely forested and support shrub types in shallow rocky soils. Northern exposures are forested and dominated by older, mature forest stands. Historically, these were more open forest stands of large Douglas-fir and ponderosa pine trees. During the last half-century, however, the trend has been for shade-tolerant tree species, primarily true fir and Douglas-fir, to invade and dominate forest stands. Many of these stands have filled in dramatically and are beginning to exceed the vegetative capacity of the site.

Of the total 130,200 acres within the landscape, 1,200 acres (about 1%) are privately owned and 129,000 acres are managed by the Forest Service. Wilderness comprises 43% of the area. The rest of the watershed has primary objectives for other resource values. Just over 32% is in Late Successional Reserves (LSRs) and Riparian Reserves (RRs). The remaining 25% is available for timber harvest with considerations for visual quality and site capability (refer to Figure 1-1 Land Management Plan Direction).

While the North Fork Watershed does not have features remarkably unique from others within the province, it does have features that have significance to the watershed. Many of these are important biological reserves or part of a larger network. Some are important uses or processes that characterize the watershed. American Indian use, mining influence, fire history, timber harvest and floods have helped to shape the watershed and will continue to be key influences.

The watershed has habitat critical to wildlife and fish species that are listed or petitioned for listing through the Endangered Species Act. Some of these habitat features may be at risk and need protection or enhancement. Older, late successional forest stands and anadromous fish habitat are considered some of the most important features within the watershed. (Refer to Appendix A - Endangered Species Act and Other Species Considerations Questions & Answers.)

Current management issues are restoration of fire and flood effects, need for protection of key forest resources, high fire hazard conditions, timber stands that are becoming overstocked and experiencing moderate to high mortality, and areas that have watershed features at risk.

There are 34,000 acres of LSRs identified for the protection and to enhance conditions of late successional and old growth forest ecosystems which provide habitat for species dependent on this forest type, including the northern spotted owl. There are 2 LSRs within the watershed. Portions of 1 LSR were burned severely in the 1994 Specimen Fire.

In recent years, fire has been the greatest single impact to the watershed. Fire has always been a major ecosystem component, but fire return intervals have dramatically lengthened during the past 75 years. This resulted in interruption of the natural process of fuel reduction, nutrient cycling, successional changes, and the spatial arrangement of vegetation. This has resulted in recent fires that are very intense and large in scale, which have caused severe damage to the resources.

Within the last 20 years, 3 major stand-replacing fires have burned portions of this and adjacent watersheds. Fire suppression effectiveness and changes in precipitation patterns have contributed to this landscape-altering phenomena. The potential for fires of this magnitude are a major concern and could threaten key resources such as LSRs, watershed or fishery resources.

Based on recent disturbances, 2 areas have been identified within the Klamath National Forest Land Management Plan (Forest Plan) as areas with watershed concerns. These areas, as well as other impacted areas, will be evaluated for current watershed conditions and recovery.

The North Fork watershed is the ancestral home to members of the Karuk and Shasta American Indians. Today, few American Indians live within the watershed, but members of the tribes continue to come to the area and utilize it for their traditional gathering practices and cherish it as their ancestral land.

Historical human use played a significant role in shaping the current condition. In the 1850s, gold brought in thousands of people who started communities within the basin. Gold was extracted by hydraulic placer mining and hard rock mining. These mining techniques had dramatic changes on the landscape, principally river bars and side streams where tailing piles are still very apparent today. Infrastructure was needed to support the growing amount of people and supplies. Existing trails and new trails were widened to accommodate large pack trains of mules hauling supplies and equipment. They were later developed into wagon roads which accessed the mining towns. Vast stands of timber were removed to build the towns and feed the steam boilers.

Sawyers Bar is the only community remaining today with approximately 40 full time residents and a portion of vacation homes maintained for summer use. The town also serves as a gathering area for mail service to the residents in the outlining parcels of private property. There are also residences dispersed along the river corridor.

Even though this is an isolated, sparsely populated area, the cultural lifestyle and dependency upon the land are key characters of the area. The people take great pride in their self sufficiency and strong ties to the land. Contemporary attitudes and beliefs are dichotomized between values of amenity and commodity. The common bond is the culture and rural lifestyle. Although there are value differences, the people come together in many ways to foster a sense of community and civic involvement. Incomes are derived from a multitude of ways that centers around living and working within the Salmon River drainage.

Purchases for everyday living are made outside the basin but much is derived from the landscape in the form of gardens and raising stock. Electricity is not available from public utilities within or from adjacent landscapes.

Roads within the landscape are narrow and steep (refer to Figure 1-2 North Fork Salmon Base Map). For example, there are only 4 miles of two-lane pavement (within the landscape), which then narrows to a single lane that meanders along the river to Forks of Salmon. Roads that access side drainages from the main road are gravel surfaced and are used by the local community that is heavily reliant on firewood collection along these roads. The public utilizes the landscape for recreation, hunting, and fishing.

The North Fork of the Salmon River is a component of the National Wild and Scenic River System, with segments designated as Wild and Recreational. The Outstandingly Remarkable Value for which this river was designated is its anadromous fisheries. The North Fork is an important refugia for the last remaining wild-run spring chinook salmon which are petitioned for listing in the Klamath River Basin. Steelhead, proposed for listing as Threatened, utilize the quality habitat in both North Russian and Specimen Creek, tributaries of the North Fork.

Recreation use is low to moderate and oriented to wilderness backpacking, river use, hunting and general recreational use. Areas within the landscape offer opportunities for feelings of solitude and spaciousness.

Step 2 - Issues and Key Questions

Introduction

Ecosystem analysis is an iterative process. The following Issues and Key Questions were developed by the watershed analysis team for the North Fork Watershed. Sources for these Key Questions include published studies, environmental assessments, public meetings, and personal knowledge of the watershed team and local Interagency Team.

Purpose of Issues and Key Questions are to:

-- Identify the variety of uses and values associated with the watershed.

-- Focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values or resource conditions within the watershed.

-- Formulate analysis questions using the indicators most commonly used to measure or interpret these ecosystem elements.

Issues and Questions

1. Human/Social
   a. What and where are human uses occurring?
   b. What perceived uses/demands are not being met?

2. Forest Health
   a. In terms of vegetative biomass (stocking as an example), are there any current risks to forest health problems?
   b. Can specific stand conditions or areas be identified as high risk areas?

3. Fire
   a. What is the Fire Behavior Potential (Hazard) in the watershed?
   b. What is the Fire Occurrence within the watershed?
   c. Are there High Risk areas in/or bordering High Fire Behavior Potential areas?
   d. Where will the occurrence of a predicted High Intensity fire be a concern?
   e. How can the predicted High Intensity fire in/or near these priority areas be mitigated?
   f. What were the key features affected by the Specimen Fire and what is the trend for these over time?

4. Allowable Sale Quantity (ASQ)
   a. How does the Forest Plan timber targets become refined at the watershed level?

5. Late Successional Reserve
   a. What are the key components of the LSRs?
   b. What is the status of the LSR processes and features; by percent for both current and capable land conditions?
   c. What are the short and long term trends of the LSR processes and features?
   d. How can we sustain the viability of LSRs overtime?
   e. What is the desired condition for habitats within the Specimen Fire area?

6. Areas with Watershed Concerns
   a. From a watershed viewpoint, what sub-watersheds are still at risk? Are there additional watersheds at risk, not identified during the LMP process?
   b. What specifically are the features and processes that influence areas with watershed concerns?
   c. Are these risk features recovering?
   d. What actions could speed up the recovery?
   e. What processes could prevent recovery of the of the watershed concern features ?
   f. What would signal that the watershed is no longer a area with watershed concerns?

7. Riparian Reserves
   a. What are the current characteristics of riparian reserves within this watershed?
   b. How have the past disturbances/processes influenced riparian reserves in this watershed?
   c. How do riparian reserves characteristics and processes respond to disturbance? What are their trends?

8. Aquatics
   a. What is the role of the watershed for aquatic species?
   b. What are the current habitat conditions, listed by features?
   c. How are aquatic species utilizing habitat.
   d. What are the trends?

Step 3 - Current Conditions of the Watershed

Introduction

This chapter describes the current range, distribution and condition of the physical, biological and human ecosystem elements within the North Fork Watershed as related to the identified issues. A general description of human uses and benefits will also be incorporated.

The description of current features and processes are organized to reflect the interrelationships in a hierarchial design:

I. Human and Social Dimension
II. Forest Health
III. Fire
IV. Allowable Sale Quantity
V. Late-successional Reserves
VI. Areas with Watershed Concerns
VII. Riparian Reserves
VIII. Aquatics

I. Human/Social Dimension

Key Question: What and where are human uses occurring?

Response: Human uses are occurring within the watershed in traditional use areas of mining, ranching and recreation. These uses are occurring mostly in the areas accessible by existing roads and wilderness trails. Water is a predominant factor for human use whether for mineral extraction activities or recreation.

Background Information

Regionally, social attitudes tend to be commodity oriented, long-time resident values and rural lifestyle. Timber harvesting, mining, recreational use, ranching, government employment, and fish and game have been important. Four major groups are identified: American Indians, long-term residents, destination recreationists and new rural.

Currently, about 100 people live in the analysis area in the communities of Forks of Salmon and Sawyers Bar. At Sawyers Bar, 30 people live within the parameters of town and another 30 live along the river and surrounding creeks. Approximately 40 people live in and around Forks of Salmon community.

American Indian

Information about local American Indian lifeways is based upon archaeological and ethnographic research and consultation with knowledgeable tribal representatives. Additional information is being gathered in a study by contract with Rob Winthrop to adequately assess the cultural significance and traditional American Indian use in the watershed. After completion of this study, it will be attached to this document for references on ancestral and contemporary use in the North Fork and neighboring Main Salmon watershed.

Many Karuk descendants still live in the county, although they have no reservation land. The Karuk are the second largest tribe in California and became a formally recognized tribe in 1979. Today they have approximately 2,500 members nation-wide.

The Konomihu and New River Shasta, historically having linguistic and cultural ties to the Shasta Tribe, once inhabited western portions of the watershed. They have all but virtually disappeared. Apparently, remaining tribal survivors were adopted into other larger tribes (Winthrop and Winthrop, 1991). Local information suggests there are very few local descendants in the watershed today.

The cultural belief systems of local American Indians vary; therefore, discussions about religious beliefs and lifeways are broadly defined. Animals, plants, and certain landscape settings are inherently essential to traditional use. The natural world continues to play an extensive role in shaping beliefs, customs, and social practices. Some tribal members adhere closer than others to cultural customs and have strong concerns over changes in the landscape their family traditionally occupied for centuries. Many continue to value and rely on traditional resources.

Successful management enhancement activities generally benefit local American Indian cultures. Such beneficial activities include watershed fisheries improvement programs, cultural resource monitoring, ethnohistoric and ethnographic research, educational programs, cooperative stewardship programs, land allocations emphasizing American Indian cultural uses, and cooperative inter-agency planning.

Fuelwood

Census data indicates the majority of area residents heat primarily with wood. Woodcutting in the watershed is believed to be light because of the limited number of roads and availability of firewood. As with other areas on the District, woodcutters are primarily opportunistic, gathering wood along roads with gentler slopes. Two primary woodcutting areas are Kelly and Jessups Gulches. Some houses may use propane for heating fuel, but most use propane for lights and refrigeration.

Community Stability

The communities of Sawyers Bar and Forks of Salmon are located within or adjacent to the analysis area. A common social interaction is the controversy over how recent Federal management has affected the local communities culture, economy, residence and quality of rural life. Settlement patterns and lifestyles have influenced this interaction.

There are limited opportunities or employment (jobs) in the analysis area. Potential opportunities for local employment would probably be short-term, and might include watershed restoration, road rehabilitation and work with the State and/or Federal government.

A current proposal exists to reopen the Liberty Mine which closed in 1930s. This operation has the potential to create approximately 10 new jobs.

A wide array of special forest products (SFP) are found in the analysis area (refer to Appendix E for a complete listing of SFPs). All are of importance to American Indian Tribes. While available for limited personal use, some special forest products are of commercial value, with high demand regionally and found in abundance in the area. The amount of commercial use of SFPs overall is unknown, but believed to be low. Currently, the commercial harvest of mushrooms is open on the forest. Local personal use collection of mushrooms is believed to be fairly high within the watershed.

Water Quality

The North Fork of the Salmon River is a designated component of the National Wild and Scenic Rivers system, based on it's anadramous fisheries values. The river contains both Recreational and Wild River segments.

Census data collected in 1990 indicates that water sources for a majority of households are from sources other than drilled or dug wells. There is no public or private company that provides water to the outlining communities. Sawyers Bar Community Service District municipal system diverts water primarily from Tanner Gulch and Jessups Creek for some community and school use. Most households have open sources from creeks or springs and function by gravity flow. Sixteen residences have special-use permits for domestic water transmission lines to extract water from the North Fork Salmon River. The Forest Service Administration Site derives water from an underground well.

Mine tailings, waste and discharge are possible sources of water contamination. Of concern are the fine-grained mine tailings from milling or other chemical-based processes used to extract gold from ore. Most, if not all, mill tailings produced from mining in the 1800s and early 1900s have been flushed through the stream system.

Mercury, a heavy metal used to extract gold, has been observed in crevasses and pockets of streams in mined areas. Though its solubility in water is very low, it can enter the food chain through benthic invertebrates, and consequently the fishery. No information has been collected regarding the presence or absence of mercury in stream sediments or in the fishery.

Several samples of water discharging from adits in the Liberty Mining District have been sampled for total metals content. Testing was conducted to establish current background levels of metals. Soluble arsenic, chromium and nickel may occur in levels exceeding drinking water standards from two adits. These waters are not used as drinking water sources, and the flow rates were very low at the time of testing. Arsenic is commonly found in detectible concentrations in many of the natural waters of the area, as well as from mine discharge. It is not considered a water quality concern because of low concentrations. Currently, the known threat to water quality is from natural and disturbance-related sedimentation.

Recreation

Current recreation uses include camping, fishing, hiking, hunting, mountain biking, recreational dredging, sightseeing, kayaking, swimming and woodcutting. Most use begins with river kayaking in April and ends with hunting season in November. With several trailheads for access, wilderness use is the greatest single recreation component in the analysis area.

There are 3 developed campgrounds in this analysis area: Idlewild, Red Bank and a small campground at the Mulebridge Trailhead. All campgrounds are used primarily by river-associated recreationists. Occupancy use is estimated at 30% and 20%, respectively, throughout the season (Memorial Day - Labor Day), with the peak use (30-40%) from mid-March to early July. Overnight stays before going into the wilderness is the greatest use for Mulebridge, a trailhead to the Marble Mountain Wilderness. All campgrounds provide good swimming, day-use, hiking and fishing access.

Although salmon fishing is closed, steelhead and resident trout fishing is still popular today on the North Fork of the Salmon. Most fishing is done from river banks as water flow limits use by drfit boats. Actual use data is unavailable.

There are several maintained trails in the analysis area accessing both remote, non-wilderness areas and Marble Mountain and Russian Wilderness Areas. Within the watershed, 56,000 acres (43%) are

designated wilderness areas. Trail use includes hiking, horseback riding, swimming, recreational mining, livestock entry access and American Indian spiritual quests. Overall, wilderness trail use is low (0-100 visits/year) for the side trails. The main access trails along Little North Fork and Main North Fork receive a high amount of use before visitors disperse into different areas of the wilderness.

Two outfitter guides live locally and pack into the wilderness areas. Five other packers are based out of Scott Valley and utilize the southern part of the Marble Mountains.

Some recreationists perceive that wilderness use by cattle lessens their natural or pristine experience. These recreationists look at cattle movement through meadows, small drainages and lakes as a conflict with their personal values of a wilderness experience.

Because of the steepness of the topography, deer hunting is generally preferred on existing open roads. Many hunters use either Idlewild or Mulebridge Trailhead as a base camp.

Mountain biking is limited in this watershed, with one route from Blue Ridge Lookout down Picayune Road (Forest Service Road Number 39N28). Bikers can go up Pollocks Gulch Road to Yellowjacket Ridge Road (40N51) and down the Garden Gulch Trail and back to Sawyers Bar Road (County Road Number 1C01). The Sawyers Bar Road (1CO1) itself is also used for mountain biking and is a published bike touring route.

Recreational gold suction dredging or panning occurs at various locations along the river. Use is estimated to be moderate, with 100-120 user days per year within the July 1st through September 15th season. These users utilize recreational facilities, including 8 river access points, sanitation facilities and parking areas.

Sightseeing is another use of the area. The relatively undeveloped, natural-appearing scenery is valued as an attraction by both local residents and users alike. Used most often for sightseeing are both the river and Sawyers Bar Road. The area was inventoried for existing visual condition levels in 1988, and the data is displayed in Table 3-1.

Table 3-1. North Fork Analysis Area - Existing Visual Condition Levels

Existing Visual Condition Levels	Acreage	Percent of Watershed
Untouched	89,000	68
Unnoticed	5,400	4
Minor Disturbance	5,100	4
Disturbance	8,000	6
Major Disturbance	4,700	4
Drastic Disturbance	18,800	14
Total	131,100	100

No rafting occurs on the river and kayaking is very limited and can only be done early in the season or during years with high water.

The river receives moderate use by locals and campers during the summer for swimming and other water play. The river's cool water is a drawing feature particularly during hot weather. Peak use on hot summer days has been estimated at over 100 user days. There are 4 designated river accesses with trails. Those seeking more seclusion use streamside areas with undeveloped access.

Commodity Use

Livestock Grazing

The livestock industry in Siskiyou County plays an important role in the local economy as well as contributing to local custom and traditional lifestyles. Agriculture is the sixth largest source of wage or salary employment in the county. There are portions of 4 grazing allotments comprised of approximately 38,000 acres within the watershed. Permitted livestock numbers on these allotments total 400 cow/calves for a 3-month season (July 15 to October 15).

According to the 1993 herd census information from the Siskiyou County Farm Bureau, the total number of cattle (including bulls, cows, calves, heifers, and steers) in the county is approximately 68,000 head. The total number permitted on the Klamath National Forest seasonally is 5,873 head. Less than 1% of the total livestock numbers in the county are supported by this watershed.

There are 2 families dependent on these allotments for seasonal livestock grazing needs to support their overall ranching operations and economic livelihood. Private grazing lands are extremely scarce in the county and are a costly alternative to public land permits. For example, Federal Animal Unit Month (AUM) costs are currently $1.61 for Fiscal Year 1995. Private land costs, however, are $15/AUM. For

400 head for 3 months, this equals $18,000, whereas at $1.61/AUM, the cost is $1,922.

The Forest Service cost to administer grazing permits is approximately $5/AUM. Some of the monies collected (25%) for AUMs are used for rangeland improvement, with the rest going to the County and the Treasury receipts.

The portions of 4 allotments within the North Fork Watershed are located in South Russian, Etna Creek, Little North Fork and Shelly Meadows. Refer to Tables 3-2 and 3-3 for more information on these grazing allotments.

Table 3-2. Total Grazing Allotment Acreage and Cow/Calf Numbers

Name	Total Acres	Number of Cow/Calf Permitted in Allotment	Number of Cow/Calf Grazed in Watershed
Little North Fork	45,068	250	100
Shelly Meadows	5,559	60	60
Etna Creek	18,917	50	15-20
South Russian	13,209	40	20
Total		**400**	

Table 3-3. Grazing Allotments - Information in Analysis Area Only

Name	Acres	Grazable Acres	Grazed Acres <40% Slope	Key Area Acres [1]
Little North Fork	21,135	8,095 (38%)	476	10
Shelly Meadows	4,695	2,442 (52%)	162	20
Etna Creek	7,174	4464 (62%)	412	5
South Russian	5,796	2,722 (47%)	127	10
Total	**38,800**	**17,723**	**1,177**	**45**

[1] Key grazing areas within the watershed have Condition and Trend transects, ECODATA plots and/or utilization measurements. All key areas are wet or moist meadows, with the exceptions of Devil's Canyon which is dry and Cabin Gulch which has a wet and a dry portion that is monitored.

The Little North Fork allotment areas grazed in the watershed include: **Devil's Canyon**, Dollar and Angel Meadows, and **Hamilton Camp** and other small stringer meadows.

The Shelly Meadows allotment areas grazed in the watershed include: **Shelly Meadows, Bug Gulch, Cabin Gulch,** Middle Gulch and **Grants Meadow.**

The Etna Creek allotment areas grazed in the watershed include: Taylor Hole, **Twin Lakes** and other small stringer meadows.

The South Russian allotment areas grazed in the watershed include: **South Russian drainage,** Creole Belle and other stringer meadows.

(The **bold** indicates areas monitored as key grazing areas within the allotment.)

Mining

Surface disturbance appears strongest on the North Forks of the Salmon, Jackass Gulch, Sawyers Bar and Eddy Gulch drainages where tailing piles and cut banks are most evident. Remains from historical mining include tailings, mining remnants, homestead sites, small cemeteries, historic structures and mining ditches.

At present there are an estimated 187 mining claims located on the North Fork of the Salmon River; 98 are placer and 89 are lode claims. The recreational placer (dredging) claims have a use of 2-4 weeks per year during the period of July 1 to September 15. Operators either camp on-site or stay at commercial lodging facilities. They often shop at local stores in the communities of Somes Bar or Etna. Some miners have second homes within the watershed where they stay during the mining season, while others maintain year-round permanent residences.

On file at the Salmon River District office is a request for a prospecting operation on one claim that will entail ground-disturbing activities on approximately 3-5 surface acres (the rest will be in tunnels). The Liberty Mine has a request to complete a mine and milling operation to process 150 tons of ore per day. Evaluation of this operation is in progress with NEPA regulations and District personnel.

Roads, Special-Use Permits and Private Land

Present-day communities, such as Sawyers Bar, still draw from frontier traditions and appreciate the rural lifestyle. Opposition towards Federal land management policies has been created, as people have left because of these land management conflicts. This view is socially perpetuated by a high percentage of the local population at Sawyers Bar.

Former RARE II, or roadless, areas are one aspect of Federal land management in that people place differing values on. Former RARE II areas (now Released Roadless Areas) occupy about 28,000 acres (22%) of the analysis area. Some individuals view these areas as providing a vital link for biodiversity and wildlife movement between the Marble Mountain and Trinity Alps Wilderness Areas.

Others perceive these areas as limiting opportunities for timber harvest with the current restriction on road building.

Roads currently have, and will continue to play, an important role for humans in the watershed. Roads allow for access into many areas for utilization of resources. Most roads were constructed for timber sale access and now benefit other users. Uses include, but are not limited to, private inholdings, permittees, fuelwood collection, fire management, recreation and other administrative uses. The County Road (1C01) allows for access through the watershed to other State highway systems. Most of the road system within the watershed is used for hauling timber products, fire prevention, recreation and administrative traffic. All human uses are completely inter-related with roads and the access they provide.

For a more complete description of road systems see Appendix D - Transportation System Interactions.

Today, private land within the analysis area is approximately 1,230 acres. Lands are located primarily along the 2E01 Road, with one parcel located up North Fork, several up Eddy Gulch, North Russian Creek, and another up Whites Gulch.

There are 9 authorized recreational residences located on the North Fork Salmon River. The recreational residences are on term permits. Along Road 40N47 are 14 summer homes with special-use permits.

Special-use authorizations on the North Fork Salmon River are associated with public road right-of-ways, easements, disposal areas, domestic water sources for private landowners, an instream gauging station, utility and parking area access for private ownership, and two microwave installations. The current special-use case load is not anticipated to increase in the future. Private landownership is limited and special-use authorizations have been in use for extended periods of time in association with these private land holdings.

II. Forest Health

Key Question: In terms of vegetative biomass (stocking as an example), are there any current risks to forest health?

Response: Current risks to forest health include vegetative stocking density, insects and disease. The exclusion of fire, combined with climatic conditions, have created overstocked stands. These conditions are found throughout the watershed and represent 12,400 acres of the watershed. A variety of insects and diseases are found in the area. A 1994 aerial survey identified a total 13,800 acres of scattered mortality.

Background Information

Forest health can be defined as an ecosystem or combination of ecosystems which have plant and animal species and genetic diversity, is resilient to disturbance, is sustainable over time, and meets the desired conditions of the area. This definition will have slight variations based on different land allocations and the resulting desired conditions. For example, decadence in a forested stand is a desirable characteristic in a Late-successional Reserve (LSR). It would not be desirable in matrix lands, where the desired condition is to maximize wood fiber production.

There are 4 basic, inter-related factors which affect forest health: fire potential, stocking density, insects and disease. Each of these usually works in combination with each other as a pest complex.

A variety of pest complexes exist in the analysis area. These complexes usually include more than one combination of the inter-related factors of drought, stand density, insect or disease infestation. Weakened trees due to climatic or environmental factors are more susceptible to insects or disease. The insect/disease infestations are usually host-specific, occurring widespread throughout the area. As a result of the exclusion of fire as a disturbance process and an agent of decomposition, increases in vegetative biomass has occurred throughout the area.

Fire Potential/Overstocking: The lack of fire, past climatic conditions and the potential effects from wildfire have a strong influence on forest health. The exclusion of fire and climatic influences and their relationship with overstocking will be discussed in this section. "Fire Effects" (Issue #3) is a separate issue which follows this discussion.

Overstocking can be defined as a condition of the vegetation which is at, or will exceed, the site capabilities over time, leading to stagnation in vegetative growth and vigor and eventually mortality. Overstocking is occurring throughout area, including plantations, resulting in stagnation of growth and vigor. These dense stands are unlikely to attain structural characteristics of late-successional forests due to interactions of pest complexes. Using size classes 2, 3, 4 & 5 with a crown closure of "G" (70-100% crown cover) from the Klamath National Forest Land and Resource Management Plan (Forest Plan) Timber Type map as a source, 12,400 acres (excluding wilderness) of potentially overstocked stands are in the analysis area.

The current fire regime, combined with climatic

conditions, has directly influenced the development of densely stocked stands within the watershed. Fire suppression strategies have basically removed fire as a primary disturbance process in the area. The removal of fire has allowed shade-tolerant species such as white fir and Douglas-fir to invade in what were once more open, mature pine and oak stands.

Review of past records has determined that the last 100 years have been the second wettest century on record, a factor which has further exacerbated the establishment of densely stocked stands. Over time, the shade-intolerant species are slowly replaced by shade-tolerant species.

Competition-induced stress becomes more prevalent as the quantity of live vegetation increases. The mixed conifer stands have had the most dramatic increase in vegetative biomass. The lower elevations have seen an increase in the hardwood and brush components which has had effects on the health of conifers. Increases in stand density, in combination with the drought for 20 years, creates increased competition for limited moisture and nutrients. This in turn predisposes the trees to being susceptible to pest complexes. Higher stand densities have also increased fuel loadings, creating the potential for large-scale disturbances from fire.

Insects and Disease: A variety of insects and diseases are found in the area. More prevalent ones include: White Pine Blister Rust, Dwarf mistletoes, Western Pine Beetle, Pine Engraver Beetle and Fir Engraver Beetle. Individual tree mortality from insects and disease occurs widespread throughout the area (i.e. low, mid and upper elevations). Aerial survey results of the Forest from 1993 and 1994 identified 2,600 and 13,800 acres of recent mortality respectively. Refer to Table 3-4 1993 and 1994 Acres and Degree of Tree Mortality by Area and Figure 3-1 Timber Mortality Map, for 1993 and 1994 survey results. These areas would need further site investigation to field verify actual mortality and ground locations. Small pockets of less than 20 acres are also found.

Table 3-4, 1993 & 1994 Acres and Degree of Tree Mortality by Area

Degree of Mortality	1994 General Locations	1994 Acres	1993 Acres
High	Cronan & Garden Gulches	600	200
Moderate	Jessups Gulch, Upper Whites Gulch, South Russian, Snoozer	8,100	800
Low	Heiney Gulch, Smith Ridge, Klamath Basin, North Russian, English Peak, Big Creek	5,100	1,600
	Total	13,800	2,600

Source: 1993 & 1994 Ocular Aerial Survey Timber Mortality Map

Note: High mortality areas are defined as greater than 10% of tree stems recently dead; moderate mortality with 5-9% stems recently dead, and low at 1-4% recently dead.

III. Fire

Key Question: What is the Fire Behavior Potential (Hazard) in the watershed?

Response: By assigning fuel models to the existing vegetative conditions, running the models through BEHAVE (Rothermel 1972) at the 90th percentile weather, Fire Behavior Potential classes are identified.

Background Information

Fire behavior potential modeling is done in order to estimate the severity and reistance to control that can be expected when a fire occurs during what is considered the worst-case weather conditions.

The modeling incorporates fuel condition, slope class and late summer weather conditions in calculating projections on flame lengths and rates of spread. A *low* rating indicates that fires can be attacked and controlled directly with handline and will be limited to burning in understory vegetation. A *moderate* rating indicates that handlines alone would not be sufficient in controlling fires and that heavy equipment would be more effective. Areas rated as *high* represent the most hazardous conditions in which serious control problems would occur, i.e., torching, crowning and spotting. Control lines are established well in advance of flaming fronts with heavy equipment and backfiring may be necessary to widen control lines.

Late summer weather conditions are referred to as the "90th percentile weather" data, which is a

standard used when calculating fire behavior (90th percentile weather is defined as the severest 10% of the historical fire weather, i.e. hot, dry and windy conditions occurring on mid-afternoons during fire season). These are identified on the Fire Behavior Potential Map (refer to Figure 3-3). Table 3-5 displays the acres associated with each Fire Behavior Class in the watershed.

Table 3-5 Acres by Fire Behavior Class in the Watershed.

Fire Behavior Class	Acres (% of Watershed)
High	49,043 (38%)
Moderate	32,762 (25%)
Low	44,852 (34%)
Non-Flammable	3,653 (3%)

Current Fire Regime

A fire regime is a description of the role fire plays in an ecosystem. For consistency in this analysis, the fire regime descriptions used are based on the fire severity or the effects of fire on the dominant vegetation.

The current fire regime is characterized as having a short return (25-100 year intervals) of crown/severe surface fires. This is characterized as a moderate to high severity fire regime. Partial to complete stand-replacement fires in mature stands of conifer and hardwoods can be expected from the current fire regime.

Current Vegetative Conditions

Current vegetative structure and patterns have been greatly influenced by fire suppression policies and the wet climatic conditions that have been present for the majority of this century (refer to Figure 3-2). With the combination of these two influences, species composition has changed from open stands of conifers and hardwoods to stands of a mixed conifer-hardwood overstory with encroachment from shade-tolerant conifers. As more shade-tolerant species (i.e., white fir, Douglas-fir and incense cedar) grow in the understory, a multi-storied stand is created, increasing the stocking level. As stocking levels increase, inter-tree competition increases. Soil nutrients and moisture availability become limiting factors. The vegetation becomes stressed as sunlight, moisture and nutrients become limited. Fire-adapted and shade-intolerant species are not regenerating because of the increased shading and lack of fire to create openings.

Early seral vegetation (grass, forbs, brush and saplings) are found in large homogenous blocks in the watershed. Most of this vegetation has developed as a result of the effects of wildfires that have occurred in the past 18 years. These vegetative types are very susceptible to rapidly spreading fire (Fuel Models 4, 5 and 6).

In areas where fires have not burned in recent years, vegetation has become denser than it had been historically. Multiple canopies are now the rule rather than the exception. Stocking, in terms of conifer and hardwood basal area and total vegetative biomass, has become a serious problem for stand vigor. Decadence within stands has increased. More shade-tolerant species are now found within many of the stands. Shade-intolerant species, such as ponderosa pine, black oak and sugar pine are fading out of the stands and not being replaced. Duff layers in these stands have increased and the accumulation of available fuels in all size classes have increased. Dense conifer stands can now be found on any aspect. These stands have established under wet climatic conditions and are very susceptible to high severity fire as climatic conditions become drier (i.e., drought conditions; Fuel Models 8, 9 and 10).

Some areas harvested during the past four decades currently have an increased fuel loading due to lack of slash treatment. These areas are susceptible to high intensity fire (Fuel Model 12).

Tree planting after timber harvest and past fires have created approximately 9,000 acres of plantation within the watershed. These plantations are generally very homogenous in stand structure and tend to be dense. This creates a high fire behavior potential condition that will sustain a crown fire (stand replacing event; Fuel Models 5 and 6).

These vegetative conditions are directly linked to fuel models which are used to determine the Fire Behavior Potential. Aspects are also incorporated into the BEHAVE runs, since they are an influence on fire behavior. Aspects with south exposures are more apt to burn with higher intensities. Fire behavior and resistance to control are also strongly influenced by slope and weather parameters. Table 3-6 shows the fuel models and fire behavior potential ratings that have been modeled for the vegetation within the watershed.

Table 3-6 Fuel Models and Fire Behavior Potential Ratings.				
Fuel Model	Aspect	Slope <65%	Slope >65%	Crown Closure >70%
1	S & W	High	High	N/A
1	E	Mod	High	N/A
1	N	Mod	Mod	N/A
4	All	High	High	N/A
5	S, W, E	High	High	N/A
5	N	Mod	High	N/A
6	All	High	High	N/A
8	All	Low	Low	N/A
9	S & W	Mod	Mod	High
9	E & N	Low	Mod	High
10	S & W	High	High	N/A
10	E & N	Mod	Mod	High
12	All	High	High	N/A
N/A = Not Applicable				

Table 3-7 shows the acres associated with each fuel model in the watershed. These are identified in Figure 3-4 Fuel Model Map.

Table 3-7 Acres per Fuel Models in Watershed.	
Fuel Model	Acres
1	331
4	2,650
5	23,522
6	177
8	40,609
9	16,419
10	40,980
12	1,208. *
98	3,678. **
99	888
Total	130,463
* 0-5 year old plantations ** non-flammable	

Specimen Fire Effects

Key Question: What were the key features affected by the Specimen Fire?

Response: The following fire severity tables and reports show the affects from the Specimen Fire on a number of the key features and will help to answer this key question.

Background Information

Table 3-8 depicts the severity ratings by management area. Note that in this table, the acres burned in the Riparian Reserves (RRs) are duplicated in the LSR and Wilderness Management Areas. RRs are not considered a management area within LSR or Wilderness, since the values for RRs are managed for throughout LSR and Wilderness Management Areas. In the analysis of the Specimen Fire, 25% of the fire area is within the area that can be considered a RR. Of this area, 29% burned with moderate to high severity.

Table 3-8. Specimen Fire Severity by Management Area in Acres and Percent ( ).					
Fire Severity	Fire Area	LSR	Wilderness	RRs	Partial Retention
High	1,366 (16)	799 (26)	539 (11)	212 (10)	28 (8)
Moderate	1,770 (21)	882 (29)	767 (15)	386 (19)	121 (35)
Low	5,240 (63)	1,365 (45)	3,660 (74)	1,475 (71)	200 (57)
Total	8,376 (100)	3,046 (36)	4,966 (59)	2,073 (25)	349 (4)

Table 3-9 indicates that Dispersal Habitat within the LSR was slightly affected by the fire. Within the LSR, almost half (49%) of the fire area was in non-suitable habitat. Of the area burned, (25%) was potential habitat and 20% was suitable habitat. The potential habitat within the LSR consisted mostly of plantations, with some of the habitat consisting of natural pole stands. Within the potential habitat area involved, 76% burned with high and moderate severity. Of the suitable habitat involved, 83% burned with low severity.

Table 3-9. Fire Severity by Late-successional Habitat Type within the LSR in Acres and Percent ( ).

Fire Severity	Dispersal	Non-Suitable	Potential	Suitable	Total
High	0 (0)	395 (26)	365 (47)	38 (6)	798 (26)
Moderate	43 (25)	549 (37)	222 (29)	67 (11)	881 (29)
Low	135 (75)	546 (37)	182 (24)	503 (83)	1,366 (45)
Total	179 (6)	1,490 (49)	769 (25)	608 (20)	3,045 (100)

Within the Marble Mountain Wilderness Area, 539 acres (11%) burned at high severity, 767 acres (15%) burned at moderate severity, and 3,660 acres (74%) burned at low severity.

IV. Allowable Sale Quantity

Key Question: How does the Forest Plan timber targets become refined at the watershed level?

Response: The timber targets are refined at the watershed scale from the Forest Plan data which is derived at the Forest Level. The Interpretation Step (Step 5) will refined the target as it takes into account all the land allocations, capabilities and availability.

Background Information

In 1994 the President's Forest Plan, as documented in the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl* (known as the President's Forest Plan ROD), was designed to break the gridlock between the timber industry and environmentalists. The Klamath National Forest Record of Decision was signed on July 5, 1995.

Implementation of the Forest Plan, along with completing watershed analysis under the President's Forest Plan, is directing the Forest allowable sale quantity level. The Forest Plan designates lands as matrix which will provide the allowable sale quantity (ASQ). The 4 matrix management areas will contribute to the ASQ at different levels, based on the Forest Plan standards and guidelines. There are approximately 32,000 acres of matrix lands within the watershed. The 4 matrix areas are shown in Table 3-10.

Table 3-10 - Acres of Matrix Lands by Management Area in Watershed.

Management Area (MA)	Acres
MA 11 - Retention	670
MA 13 - Recreational Rivers	3,079
MA 15 - Partial Retention	27,364
MA 17 - General Forest	873

Timber harvesting may occur in lands other than matrix, but the volume will not count towards the ASQ. Harvesting in other land designations will be completed to improve and/or maintain other resource values and objectives, i.e., maintenance of habitat diversity to protect resources from large-scale disturbances. Table 3-11 lists acres of seral stage in the 4 matrix management areas in the watershed.

Table 3-11. Acres of Seral Stage by Forest Plan Management Areas.

	MA 13	MA 11	MA 15	MA 17	Total Ac.	% of Matrix
Early	298	202	4,490	125	5,115	19
Pole	763	258	4,570	242	5,833	22
Mid-Mature	928	209	6,915	261	8,313	31
Late	774	0	6,738	173	7,685	28

*The above table includes harsh site and low site acres.

V. Late-successional Reserves

Late-successional Reserves (LSRs) are land allocations from the Forest Plan. The objective of the LSRs is to protect and enhance the conditions of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth related species, including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old growth forest ecosystem.

Key Question: What are the Key Components of the LSRs?

Response: The key components of LSRs are large blocks of late-successional habitat with the following characteristics: (1) mulit-species and multi-layered forests, (2) large trees, (3) snags and large logs, (4) moderate to high canopy closure, and (5) trees with physical defects. The Little North Fork LSR contains 2,970 acres of late-successional habitat and the North Fork portion of the Eddy Gulch LSR

contains 10,153 acres of late-successional habitat.

Background Information

The LSRs represent a network of existing old growth forests that are retained in their natural condition with natural processes (such as fire) allowed to function to the extent possible. The LSRs are designed to serve a number of purposes. First, they provide a distribution, quantity and quality of old growth forest habitat sufficient to avoid foreclosure of future management options. Second, they provide habitat for populations of species that are associated with late-successional forests. Third, they will help ensure that late-successional species diversity will be conserved (President's Forest Plan ROD, 1992).

Within the LSRs, the characteristics of individual areas will vary according to the dominant vegetative species, soil site class, topography, aspect and other site factors. Ideally, the LSR would consist of well-dispersed and continuous large blocks of conifer forests with the following characteristics:

(1) multi-species and multi-layered assemblages of trees,
(2) the overstory trees would be of large diameter and tall,
(3) moderate-to-high accumulations of large logs and snags,
(4) moderate-to-high canopy closure,
(5) moderate-to-high numbers of trees with physical defects such as cavities, broken or dead tops, and large deformed limbs, and
(6) moderate-to-high amounts of fungi, lichens, and bryophytes (mosses and liverwort).

At higher elevations where true fir habitats dominate and on sites with a large hardwood component, the overstory trees will be smaller and the stands may be less dense and less diverse, but important structural characteristics, such as snags and defects, will be present to provide the needs of late-successional associated species.

There are 2 LSRs partially contained within this watershed. One is within the Little North Fork subwatershed below the wilderness boundary (Little North Fork LSR RC-347). The other occupies the drainages flowing northwest into the North Fork from Eddy Gulch to Russian Creek, including South Russian Creek and Whites Gulch (Eddy Gulch LSR RC-345). In addition, there are 2 known spotted owl activity centers within the matrix. One hundred acres of the best northern spotted owl habitat has been designated for each of these known activity centers. These 100-acre LSRs are located in Jackass Gulch and Shiltos Creek.

The wet climatic conditions for the majority of this century combined with fire suppression have changed the vegetative composition, structure and pattern in the LSRs. The vegetative composition in the LSRs has shifted from fire adapted shade-intolerant conifers and hardwoods to more shade-tolerant non-fire adapted conifers such as white fir. Stand structure has also changed with a denser shade-tolerant understory found not only on moist north and east aspects but also on normally more sparse south and west aspects.

Little North Fork LSR

The Little North Fork LSR contains 9,197 acres, of which 7,658 acres are within the North Fork Analysis Area. The other 1,539 acres are on the west edge of the analysis area in Crapo Creek. Based on the 1994 Soil Survey for the Klamath National Forest Area of California, about 5,050 acres (66%) of the LSR in this watershed is capable of supporting dense late-successional conifer forest.

A large block of mid-to-late-successional forest is in the area from Garden Gulch to Titmouse Gulch. Another block of mid-to-late-successional forest is situated between Sur Cree Creek and Cherry Creek, and another in lower Specimen Creek.

The total acreage of mid-to-late-successional conifer forest in the LSR is 2,970 acres, or 59% of the capable site. Past timber harvest plantations (1,506 acres), and natural pole stands (363 acres) make up 37% of the 66% capable site. The plantations are found along roads in Specimen Creek and Little North Fork. The natural pole stands are scattered throughout the LSR on the better sites (refer to Figure 3-5 Late-successional Habitats-Little North Fork LSR).

Table 3-12 shows the acres of vegetation type and percent of capable sites in the Little North Fork LSR.

Table 3-12. Late-successional Habitats-Little North Fork LSR (capable site only).

Vegetation Type	Acres	% of Capable Site in LSR
Mid- to late-successional habitat	2,970	59
Plantations 0-20 years old	779	16
Plantations <20 years old	727	14
Natural pole stands	363	7
Sparse conifer stands *	211	4
* Remnant conifer stands from past disturbances.		

Within the LSR there are 3 known spotted owl activity centers. One center was burned at a high intensity by the Specimen Fire in 1994. There is one goshawk management area in the LSR and marten and fisher have been sighted within the LSR. There have been

no sightings of western pond turtles or willow flycatchers in the LSR. For a complete list of known or suspected species that utilize late-successional habitats and could be found within this LSR, refer to Appendix C-Late-successional and Old Growth Forest Associated Species.

Eddy Gulch LSR

The Eddy Gulch LSR occupies approximately 62,000 acres and is within four watersheds. Within the North Fork Analysis Area, there are 26,000 acres of the Eddy Gulch LSR. The other 35,000 acres are distributed in three watersheds: Callahan, Upper South Fork and Lower South Fork.

Based on the 1994 Soil Survey for the Klamath National Forest Area of California, about 16,000 acres (59%) of the LSR in this watershed is capable of supporting dense late-successional conifer forest. The extensive road building and timber harvest in the LSR has left the mid-to-late-successional conifer stands highly fragmented.

The mid-to-late-successional forests in Eddy Gulch, Whites Gulch, South Russian Creek and Music Creek have been dissected by roads and dotted with clearcuts. There is still a significant amount (59%) of mid- to late-successional forest in these drainages and throughout the LSR, but it is not in large contiguous blocks. Pockets of mid-to-late-successional forest are found scattered throughout the LSR on the patches of good soil within the larger areas of poor soil. These pockets of mid-to-late-successional forest are important to late-successional associated species for foraging and dispersal. The total acreage of mid-to-late-successional conifer forest is about 10,000 acres, or 65% of the capable site in the North Fork portion of the LSR.

Plantations established after timber harvest (1,800 acres), and natural pole stands (2,700 acres) makeup 29% of the capable site in the LSR. The plantations are concentrated in the major drainages and the natural pole stands are scattered throughout the LSR on the better sites.

Table 3-13 shows the acres of vegetation type and percent of capable sites in the Eddy Gulch LSR.

Table 3-13. Late-successional Habitats-Eddy Gulch LSR (capable site only).

Vegetation Type	Acres	% of Capable Site in LSR
Mid- to late-successional habitat	10,153	65
Plantations 0-20 years old	858	5
Plantations <20 years old	916	6
Natural pole stands	2,704	17
Sparse conifer stands *	993	7

* Remnant conifer stands from past disturbances.

Within the North Fork section of the Eddy Gulch LSR, there are 10 known spotted owl activity centers and one peregrine falcon eyrie. There are 3 goshawk management areas and numerous sightings of marten and fisher. There have been no sightings of western pond turtles or willow flycatchers, but habitat does exist within the LSR for willow flycatchers. For a complete list of known or suspected species that utilize late-successional habitats and could be found within this LSR, refer to Appendix C.

Connectivity: The ability to move across the landscape is crucial to the long-term persistence and viability of animal species. This is of critical importance to late-successional dependent species including the northern spotted owl. According to the President's Forest Plan ROD, the movement or dispersal of late-successional dependent species across the landscape is provided by large blocks of late-successional habitat in the LSRs and movement between LSRs by a combination of land allocations, including RRs, administratively withdrawn areas, and management prescriptions within the matrix.

An assessment of soil site class, topography and the distribution of late-successional and old growth forested habitats within the LSRs and across the North Fork Watershed, shows that connectivity is provided between the LSRs and through the LSRs and wilderness areas into adjacent watersheds. From the Little North Fork LSR, connectivity is provided by the Little North Fork to the west and northwest into subwatersheds of the main stem of the Salmon River. From the Little North Fork LSR to the south and southeast good connectivity to the Eddy Gulch LSR is provided by Kelly Gulch, Jackass Gulch, Shiltos Creek, Glasgow Gulch and Jessups Gulch.

Late-mature and old growth forested habitats within the Eddy Gulch LSR, provide connectivity over Etna Summit into the Callahan Watershed and across the ridge into the Upper and Lower South Fork

Watersheds. Connectivity is limited to the north of the Eddy Gulch LSR and the east of the Little North Fork LSR.

The lack of contiguous forest cover due to poor soils and higher elevations in the Marble Mountain Wilderness Area are the problems. Dispersal habitat for late-successional dependent species is severely limited down the North Fork towards Forks of Salmon due to the large blocks of early seral stage habitat as a result of the fires in 1977 and 1987 (refer to Figure 3-6 Connectivity Map and Figure 3-7 North Fork Salmon Watershed Suitable and Noncapable Habitat).

VI. Areas with Watershed Concerns

Key Questions: a. From a watershed viewpoint, what sub-watersheds are still of concern? Are there additional areas with watershed concerns not identified during the Forest Plan process?
b. What specifically are the features and processes that influence areas with watershed concerns?

Response: Nine subwatersheds in the North Fork watershed exceeded the landslide production model's concern level. Seven of these are identified in this analysis as Areas with Watershed Concerns (refer to Figure 3-8 Areas With Watershed Concerns). This includes a significantly larger area than originally identified in the Forest Plan, due to updated information. Landslide sediment production, surface erosion, channel erosion, peak flow changes and fisheries habitat are all considered when determining an area with watershed concern (AWWC) but the landslide production is the only model used for this analysis.

Background Discussion

Considering the conditions of the watersheds and streams, the Record of Decision for the Klamath National Forest Plan (Forest Plan ROD) specifically identifies areas with watershed concerns (AWWCs). These are areas where current disturbance levels exceed a point where significant impacts to fisheries or other stream-dependent beneficial uses did or could occur. Some of the AWWCs are in the North Fork Watershed. The Forest Plan ROD requires that these areas be re-evaluated in a watershed analysis to assist with future NEPA processes implementing site-disturbing activities.

Three AWWCs identified in the Forest Plan ROD are within the analysis area (refer to Figure 3-7). They are the Sawmill Gulch area near Idlewild Campground, the hillslope north of the river between Forks of the Salmon and Little North Fork including Big Creek, Olsen Creek and several other small drainages, and the hillslope south of the river near Forks of the Salmon, including Heiney Gulch and other small streams.

The Sawmill Gulch area is an AWWC due to potential sedimentation resulting from the Nielon Fire of 1987. The Big/Olsen Creek area and the Heiney Gulch area are AWWCs due to extensive wildfires in either 1977 or 1987, or both, and the resulting stream sedimentation. The AWWCs were identified using the coarse-level Forest Plan data, realizing that updates would be necessary at the watershed scale. Current information and updated modeling are used to determine AWWCs at the watershed scale.

The Forest Plan uses 3 different models with concern levels to help determine the AWWCs. The 3 models are Landslide Production, Surface Erosion, and the Equivalent Roaded Area (ERA) methodology for assessing hydrologic disturbance levels.

The most important watershed process in the North Fork drainage is considered to be landsliding. The landslide model is generally considered to be the most appropriate of the Forest Plan models for this analysis area. The landslide model estimates the cubic yards of landslide-generated sediment added to the streams given a landslide-producing storm or series of storms similar to the 1965-75 period. Estimates are calculated for undisturbed conditions, assuming no fire or other disturbance, and for the current level of watershed disturbance. A comparison of these two values, undisturbed and current estimated landslide production, yields a "percent over undisturbed value." If the percent over undisturbed value for a given area is higher than 200%, the area is considered an AWWC.

The Forest Plan used landslide production model coefficients developed from a landslide study in Grider Creek, a drainage outside of the Salmon River sub-basin, but within the Klamath National Forest. A similar, but larger scale, study was done later for the entire Salmon River sub-basin and new coefficients were developed. For the North Fork analysis, coefficients specific to the North Fork Salmon River watershed were used. Also, the areas analyzed in the Forest Plan were compartments, divisions of land somewhat different from subwatersheds. A subwatershed division was used for the North Fork analysis. The combination of updated data, updated landslide model coefficients and revised divisions of the watershed resulted in different areas exceeding the landslide concern level than listed in the Forest Plan.

Nine of the 26 subwatersheds in the North Fork watershed exceeded a concern level of 200% landslide production over pristine, as used in the Forest Plan (refer to Table 3-14 Areas with Watershed Concerns in the North Fork Salmon River Watershed). Some of these subwatersheds are only slightly over the concern level, others are sizably over. As with the Forest Plan, the modeling breakdown provides only a rough cut of which areas may be AWWCs. Further evaluation of the each area is needed to make the final AWWCs determination.

Table 3-14. Areas with Watershed Concerns in the North Fork Salmon River Watershed.

Subwatershed Name	Level of Concern (Slight or Sizable)	Primary Cause for Concern	Final AWWCs Determination
Music Creek	Slight	Roads/harvest in granitics	Yes
Lower South Russian Creek	Slight	Road Density	Yes
Eddy Gulch	Slight	Road Density	No
Jessups Reach, No. Fk. Salmon	Slight	Roads /slump-earthflow terrane	No
Sur Cree Reach, Little No. Fork Salmon	Slight	Roads/harvest in granitics	Yes
Specimen Creek	Slight	Fire	Yes
Garden Reach, Litle No. Fork Salmon	Sizable	Roads/harvest in granitics	Yes
Olsen Reach, No. Fk. Salmon	Sizable	Fire in granitics	Yes
Big Creek Reach, No. Fk. Salmon	Sizable	Fire in granitics	Yes

Music and Lower South Russian Creek have moderate to high road densities (1.8 and 2.8 miles per square mile, respectively) and a moderate area of recent regeneration timber harvest. Roads and recent timber harvest in granitic soils are the primary concern in this area. Music Creek is prepredominantly granitic soil while Lower South Russian Creek has little granitic soil; therefore, surface erosion from the roads and harvest units is more of a concern in Music Creek. Fisheries habitat in South Russian Creek is impacted by excess amounts of fine sediment, mostly granitic sand, which is supplied in part by the disturbances in Music Creek and other parts of the South Russian drainage. Both of these subwatersheds should be considered AWWCs.

Eddy Gulch and the Jessups Gulch area both have high road densities, 3.1 and 2.5 miles per square mile respectively, although only the Jessups Gulch area has had much recent timber harvest. Roads are the primary contributer to increased potential landsliding in the model, but past experience in the area has shown the roads to be mostly stable. Granitic soils do not occur in these areas and surface erosion is generally not a concern. Slopes are generally rocky and stable except for the slump-earthflow terrane in the Jessups Gulch drainage and in Eddy Gulch. The toe zones are of the highest concern in the slump-earthflow terrane and are protected within the RRs. Eddy Gulch contains some steelhead habitat, but habitat typing data is not available. Jessups Gulch and the other small streams are not included on the fish range map, although fish may occasionally be present. Fisheries habitat in the North Fork Salmon adjacent to these streams contain lower than desired shade and pool frequency, unrelated to upslope activities in these 2 subwatersheds, and does not appear to have a fine sediment problem. Neither of these 2 subwatersheds should be considered AWWCs.

Specimen Creek has a low road density, but was highly impacted by the Specimen Fire in 1994. Elevated surface and channel erosion has been noticed in the winter of 1994-95, but is not as great as may have been expected given the intensity and extent of the fire. The rocky soils in Specimen Creek result in a relative insensitivity to disturbance except for a small area of granitic soil and other unstable areas. Specimen Creek has shown slightly high levels of fine sediment impacting the fish habitat before the fire, but overall fish habitat has been considered good. Fire impacts on stream shade and sediment yield are likely to negatively affect fish habitat quality. Specimen Creek should be considered an AWWC.

The 2 reaches of the Little North Fork, the Sur Cree Reach and the Garden Gulch Reach, have moderate to high road densities at 1.2 and 2.2 miles per square mile respectively. A combination of road construction and timber harvest in the sensitive granitic soils, combined with severe storm events, contributed to landsliding in the early 1970s. Roads remain the primary concern while the timber harvest units are at least partially recovered. The road in the Sur Cree Creek area (the Cherry Creek road) has been closed, but is still considered a sediment source. The open roads in the Garden Gulch area are of greater

concern. The Specimen Fire also burned in these areas, but not to a large extent and mostly not in granitic soils. The Little North Fork is the only fish-bearing stream included in these areas and contains detrimentally high levels of fine sediment, according to the fish habitat data. This is at least in part due to the elevated erosion levels from the roads and harvest. These 2 subwatersheds should be considered AWWCs.

The major impact to the Olsen and Big Creek reaches of the North Fork Salmon are the fires of 1977 and 1987. The granitic soils on the north side of the river are of the greatest concern, not only because of the greater land sensitivity, but also because the majority of the more recent fires burned in the granitic soils. Surface and channel erosion in Big and Olsen Creeks, along with several other small streams in granitic soils, has been very high in the first few years following the 1987 fires, but has decreased greatly in recent years (especially in Big Creek). Potential landslide rates remain very high. The south side of the river burned in 1977, but not in 1987. The older burned areas are well-vegetated by brush and small trees, much more so than the more recent burned areas, and can be considered partially recovered. Road densities within these 2 subwatersheds are moderate to high (1.5 and 2.3 miles per square mile for Olsen and Big Creeks, respectively). The roads have been constructed at different standards than in the Little North Fork--narrower with smaller cuts and fills--and have been generally stable.

Big Creek is the only tributary stream which contains fish and has a small amount of trout habitat, so the major impacts to fisheries are within the North Fork. High levels of sand in the lower North Fork are partly attributed to erosion of these granitic soils, along with sediment input from the Little North Fork. Both of these 2 subwatersheds should be considered AWWCs.

VII. Riparian Reserves

Key Question: What are the current characteristics of Riparian Reserves (RRs) within this watershed?

Response: RRs occupy 37,000 acres (29%) of the total analysis area. Current uses of the reserves include mining, grazing, roads, and private lands. Of the RRs in the analysis area, 27% have forest cover greater than 70% crown closure.

Background Information

Definition and Roles

Table 3-15 shows the acres and percent of RRs in the following categories of streams or waterbodies and the adjacent, interconnected terrestrial areas.

Table 3-15. Acres and Percent of RRs by Category

RR Type	Acres	% of RRs
Fish-bearing streams	4,675	13
Permanently flowing nonfish-bearing streams	6,900	19
Seasonally flowing streams, including ephemerals which show scour/deposition	16,525	45
Ponds and Lakes *	---	---
Wetlands **	---	---
Unstable and potentially unstable areas	8,500	23
Total	**36,600**	**100**

* Acres included with fish-bearing streams.
** Unsurveyed at this time.

Note: Unstable area acres are also included in other reserve types. Unstable areas include: active landslides, toe zones of landslide deposits, inner gorges and extremely dissected granitic terrane.

The above categories of RR types are meaningful when discussing the various roles and functions the RR must serve. Many commonalities exist between the groups. This discussion also highlights the differences of the primary roles of the various categories. An understanding of their roles will be very important when delineating RRs in the field.

Fish-bearing streams - For the aquatic species, RRs provide shade, cover, a source of food and coarse woody material (CWM). They cycle nutrients between terrestrial and aquatic systems, and filter sediment.

For terrestrial habitats, riparian areas host a multitude of species, including phreatophytic (water-loving) vegetation (alders, etc.). This deciduous assemblage of vegetation is often multi-layered and is an important for insect production, a food source for many bird species. This vegetation also moderates microclimate elements such as soil moisture and temperature, radiation, wind, and relative humidity.

An important function for terrestrial habitat is the year-round presence of water. Some other roles are the edge effect between vegetative types, usually more edges available in a relatively small area than upslope environs. Hiding, foraging, nesting and thermal cover are provided, as well as travel corridors, migration routes and habitat connectors. The latter is important for essential wildlife

movement such as dispersal of young, diurnal and seasonal migrations, and maintaining connectivity between wildlife populations.

Permanently flowing nonfish-bearing streams - provide all the same functions as above for terrestrial species and for aquatic species other than fish. Fish also depend upon this category of reserves for nutrient cycling, which maintains physical water quality. Upstream water temperature regulation, and sources for CWM and drift also come from upstream nonfish-bearing reaches.

Seasonally flowing streams - include a wide range of habitats, from those closely resembling that of perennial streams (though generally narrower), to those which are virtually undifferentiated from the nearby upslope habitat. The roles will be correspondingly similar to either that of perennial, riparian or of non-riparian areas, with infinite gradations between. Some important roles that may be less apparent, due to the lack of a diverse riparian vegetation community, are that of microclimate, connectivity and provision of special habitats for certain species.

Microclimate elements were discussed above, but it is worth mentioning that this category of reserves is often positioned higher on the slope where the microclimate becomes more distinct from the surrounding area, especially on south aspects. This is particularly true in times of temperature extremes (for example, during the heat of summer). High order intermittent streams and channels are natural source sites for CWM, rock and soil material.

Connectivity is of particular importance for this category, since they provide links between drainages by reaching further upslope. Special habitats are numerous; examples include talus areas under a forested canopy for terrestrial salamanders and CWM concentrations for marten. These elements are as important along seasonally-flowing as well as perennial streams.

Ponds and lakes - The riparian areas surrounding these waterbodies have similar features and roles as those mentioned for seasonally flowing streams. The microclimates will vary with each site, depending on the size of opening created by the waterbody and the topographic setting. It may be more or less exposed, which will control how much humidity remains in the riparian area. Ponds and lakes are often associated with wet or dry meadows, adding another layer of habitat diversity.

Wetlands - These ecosystems exist because of perennially or seasonally saturated soils. Vegetation includes an array of phreatophytes (water-loving), from small trees to grasses and forbs. In general, this category is the most vegetatively diverse of the riparian categories. It also contains a lot of variety in community type, grading from wet meadows into marshes, depending on the amount of water present, and the duration of saturation. Some unique and specialized wildlife uses wetlands, including shorebirds, waders and waterfowl.

Unstable and potentially unstable areas - These may be the most varied of all of the categories, since they involve interrelationships between both physical and biological processes. Unstable lands are those, under natural conditions, prone to mass failure (such as landsliding) and may exhibit accelerated rates of mass failure when disturbed by human activities such as road construction, and timber harvest.

Unstable lands include active landslides, toe zones of landslide deposits, inner gorges, and extremely dissected granitic terrane. Other geomorphic terranes may be potentially unstable, for example, head scarp areas of landslide and slump earthflow deposits. Unstable areas may be associated with other important RRs, such as perennial or intermittent wetlands in slump-earthflow terrane. These wetlands may be significant to hydrology of the unstable area as well as provide habitat for terrestrial, riparian and aquatic species.

In general, the primary function of identification of unstable lands as RRs is protection of downstream aquatic habitat. Some of the most important site-scale factors influencing initiation of landslides are geomorphic landform, slope steepness, soil and rock properties, vegetation type and distribution, surface hydrology, and groundwater hydrology. Land management activities in areas prone to landslides need to be carefully evaluated.

Protection of unstable lands in RRs serves several critical roles:

- maintenance and/or restoration of the natural timing, frequency and volume of sediment/debris input, storage and transport into the aquatic system;
- maintenance and/or restoration of the physical integrity of channel banks, shorelines and channel bottom configurations;
- maintenance and/or restoration of plant communities and vegetation types to promote slope and channel bank stability, and prevent accelerated surface or fluvial erosion.
- maintenance of normal patterns of evapotranspiration, overland surface water flow and infiltration, and subsurface groundwater flow and recharge.

Current Conditions and Uses

The mapped RRs in the watershed include a total of about 37,000 acres or 29% of the total watershed. This is considerably more than mapped for the Forest Plan due to updated information. The RRs include all mapped unstable and potentially unstable

lands as well as appropriate buffers on all mapped streams. Refer to Figure 3-9 Riparian Reserves Components.

Table 3-16 lists the current vegetative conditions within the RRs in the watershed. Crown closure greater than 70% will provide optimum shade to reduce or maintain summer water temperatures for aquatic species. For a list of Threatened, Endangered, and Sensitive plant species that utilize riparian areas, refer to Appendix C.

Table 3-16. Current Vegetative Conditions Within RRs.

Seral Stage with % Crown Closure	% of RRs
Pole/Mid Mature/Late Mature/Old Growth with > 70% Crown Closure	27
Pole/Mid Mature/Late Mature/Old Growth with 40-70% Crown Closure	43
Early Seral	30

Current conditions and uses of RRs are intimately linked to historic uses and conditions. This section highlights the "current" (1995 only) uses, with a more detailed description of historic disturbances in Step 4. The current uses are highlighted in Table 3-17.

Table 3-17. Current Uses Within RRs.

Current Uses	Amount
Grazing Allotments	13,100 acres
Roads	79 miles
Road Stream Crossings	73 crossings *
Private Land	800 acres
Mining	98 Claims
* National Forest System Roads only.	

VIII. Aquatics

Key Questions: a. What is the role of the watershed for aquatic species?
b. What are the current habitat conditions? (A list, by feature, will be covered in Step 5.)
c. How are aquatic species utilizing habitat?

Response: The North Fork watershed analysis area provides critical spawning, rearing and holding habitat for both adult and juvenile fish. Use by adult fish species is listed in Table 3-18. Anadromous young are found within the system year-round, steelhead remain in the system up to three years and lamprey young (ammocoetes) remain in the system up to 7 years before out-migrating to the ocean.

Background Information:

The North Fork of the Salmon River and its tributaries provide 40 miles of anadromous habitat for spring and fall run chinook salmon (*Oncorhyncus tshawytscha*), winter and summer run steelhead (*O. mykiss*), winter coho salmon (*O. kisutch*), and Pacific lamprey (*Lampetra tridentata*). There are 99 miles of habitat provided for other native species, including rainbow trout (*O. mykiss*), speckled dace (*Rhinichthys osculus*), Klamath small-scale sucker (*Catostmus rimiculus*), marbled sculpin (*Cottus klamathensis polyporus*) and Pacific brook lamprey (*Lampetra pacifica*) (refer to Figure 3-10, 3-11 and 3-12 Fish Species Range Maps, all located at the end of this document).

Summer steelhead and spring chinook salmon are Regional Forester-designated Sensitive Species. Spring and fall run chinook salmon, winter and summer run steelhead, and coho salmon have all been petitioned for listing under the Federal Endangered Species Act (ESA). The Klamath Mountain Province Evolutionarily Significant Unit of Steelhead, both summer run and winter run, have been proposed for Threatened status.

The North Fork Watershed analysis area provides critical spawning, rearing and holding habitat for both adult and juvenile fish. The presence of the various fish species in the North Fork watershed are listed in Table 3-18.

Table 3-18. Timeframe Fish Species are Usually Present in North Fork Watershed

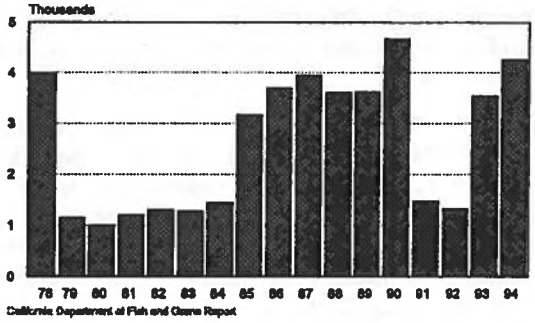
Fish Species	Months Present
Adult spring chinook salmon	From July through October
Adult fall chinook salmon	From mid-October through early December
Adult coho salmon	From mid-December through January
Adult summer steelhead	From July through May
Adult winter steelhead	From November through May
Pacific Lamprey	From April through June

Anadromous young are found within the system year-round, steelhead remain in the system up to 3 years and lamprey young (ammocoetes) remain in the system up to 7 years before outmigrating to the ocean.

Historically it was estimated that 15,000 chinook

salmon spawned in the Salmon River basin (CH2MHill, 1985). Within the last 5 years, the spawning population of chinook salmon has ranged from 1,000 to 4,000 fish (California Department of Fish and Game, 1994). Overall, coho and steelhead populations are believed to be following the same declining trends (CH2MHill, 1985). California Department of Fish and Game has estimated fall chinook salmon populations in the Salmon River from 1978 to 1994 using ongoing fall redd and carcass counts. Figure 3-13 Salmon River Chinook Escapement 1978 to 1994 shows the population trend of chinook salmon in the Salmon River Basin.

Figure 3-13. Salmon River Chinook Escapement (1978-1994).



Surveys to estimate the summer steelhead and spring chinook runs have been completed from 1980 through 1994. Table 3-19 Estimated Holding Adult Populations of Summer Steelhead and Spring Chinook shows these results. On average over half of the summer holding populations are in the South Fork of the Salmon River, about 25% are in the mainstem salmon and about 20% hold in the North Fork Salmon River.

Table 3-19 - Estimated Holding Adult Populations of Summer Steelhead (SS) and Spring Chinook (SC).

Survey Year	Mainstem Salmon		South Fork		North Fork		Total	
	SS	SC	SS	SC	SS	SC	SS	SC
1980	53	64	164	155	69	26	286	245
1981	30	57	59	159	71	3	160	219
1982	59	136	226	344	31	41	316	521
1985*	22	91	53	252	44	6	119	349
1986	25	159	76	302	33	149	134	610
1987	24	124	82	260	22	92	128	476
1988	83	310	364	822	0	54	447	1,186
1989	15	31	65	59	0	30	80	120
1990	15	56	21	98	12	15	48	169
1991	24	22	26	139	17	19	67	180
1992	24	58	59	236	15	49	98	343
1993	44	349	47	571	16	363	107	1,283
1994	68	478	79	688	22	83	169	1,249

* No counts were made in 1983 or 1984.

These same surveys show that approximately 75% of the adult spring chinook and summer steelhead holding in the North Fork utilize the reach extending from the mouth of the North Fork to the Little North Fork. The remaining holding population is spread throughout the North Fork from Little North Fork into the wilderness.

Beginning in 1988 to the present, fall chinook spawning surveys have been conducted from October to mid-December on the North Fork, South Fork and mainstem Salmon Rivers. The number of redds and their locations, along with carcass information, have been collected. These surveys show about an average of 94% of the chinook spawning in the North Fork spawn in the reach extending from the mouth of the North Fork to the Little North Fork, with about half of these spawning in the lowest reach below China Gulch.

From 1990 to present, similar steelhead spawning surveys have been conducted sporadically during the months of January to April on the North Fork, Little North Fork, Specimen and North Russian. Because the relative success of completing these surveys is highly dependent on spring flow conditions, these data are very spotty; however, steelhead are utilizing these 4 streams for spawning. The surveys completed in 1990 have the highest redd numbers: 31 for Specimen Creek, 37 for Little North Fork, 105 for North Russian and 154 for the North Fork from Whites Gulch to Deadman's Gulch. Surveys conducted in 1993 have the lowest numbers: 0 for Specimen, Little North Fork and North Russian; and

2 for the North Fork.

Physical habitat inventories and biological surveys were conducted in the North Fork, Little North Fork, Specimen Creek, North Russian Creek, South Russian Creek, Whites Gulch, East Fork of Whites Gulch and West Fork of Whites Gulch in 1989, 1990, 1991 and 1994 during summer low flow conditions. These inventories provide quantitative information of key aquatic habitat parameters and fish species and location that can be used to assess the overall suitability of stream habitat from a fisheries perspective. Important parameters for fisheries habitat included in this analysis are in-channel large CWM, CWM recruitment potential, pools, surface fines, embeddedness, substrate composition and temperature. Table 3-20 at the end of this step shows detailed summaries of habitat data by channel type and stream.

In general, all streams lack CWM. The North Fork of the Salmon, Little North Fork and South Russian Creek have some fine sediment problems, embeddedness is high, and there is a lack of pools. Specimen Creek has high fine sediment. North Russian is lacking pools and has high embeddedness values. Whites Gulch is lacking pool habitat.

Water quality, including water temperature, is also a concern for fish. Water temperatures have been monitored from 1991 to 1994, both by spot checks and continuous records. Tributary temperatures fall below lethal levels; however, the North Fork exceeds maximum recommended temperatures during the summer. This resulted in fish kills of spring chinook and summer steelhead, especially during warm summers such as 1994.

Table 3-20. Fish Habitat Data.

"Existing conditions of key physical habitat parameters, by reach for this analysis area" data was taken by differing methods throughout the summers of 1989, 1993 and 1994. These data are the best available to compare to the habitat criteria displayed in Step 4, Table 4-4 Fisheries Reference Habitat Conditions.

Reaches begin at the mouth of a stream and continue upstream. Channel types are based on Rosgen channel classification (Rosgen, 1994). Canopy closure is the percent surface shade on the stream. Surface fines represent the percent area of surface fines in pool tailouts. The substrate composition breakdowns are average percentages taken from all habitat types. Embeddedness data were gathered in runs and pool tailouts and averaged by reach. Both the instream and recruitable key large woody debris are a minimum size of 24-inches in diameter and 50 feet in length.

Stream	Reach	Channel Type (Rosgen)	Length (feet)	% Canopy Closure	Percent Substrate Composition				Channel Width/ Pool	Embed-dedness	Instream KLWM*/ 1000'	KLWM* Recruit-ment/1000'
					Fines (%)	Gravel (%)	Cobble (%)	Boulder/ Bedrock (%)				
North Fork Salmon	1	C1	32,084	6	18	17	28	37	7	16	<1	<1
	2	B2	8,311	13	10	14	27	50	9	33	0	3
	3	B3	3,845	8	12	18	29	41	20	34	0	3
	4	C2	3,595	7	15	25	22	38	37	33	0	<1
	5	B2	10,002	10	16	23	32	30	11	21	1	1
	6	C2	1,584	10	25	30	30	15	8	40	0	6
	7	B2	5,835	9	12	22	41	25	12	15	1	3
	8	B1	6,645	5	7	18	42	33	11	6	0	1
	9	C2	4,106	9	5	6	62	27	8	7	0	2
	10	B1	7,590	14	7	10	36	48	8	17	0	1
	11	B6	18,803	3	7	11	31	50	10	8	<1	1
	20	G3	13,045	43	6	19	33	43	11	33	<1	11
	21	F3	3,663	45	1	19	21	59	7	31	<1	4
	22	G3	5,923	32	4	21	20	56	9	30	0	4
	23	G2	3,369	64	0	13	28	59	20	N/A	1	13
	24	G3	8,943	69	10	22	45	23	28	N/A	<1	19
	25	A	3,987	93	N/A	N/A	N/A	N/A	36	N/A	<1	2
Little North Fork	1	B2	14,379	36	17	18	23	42	12	25	2	5
	2	A3	29,739	26	19	12	20	49	10	26	9	6
Specimen Creek	1	B2	5,132	65	19	18	18	44	4	20	15	10
	2	A2	1,333	42	15	22	16	47	4	21	10	1

Stream	Reach	Channel Type (Rosgen)	Length (feet)	% Canopy Closure	Percent Substrate Composition				Channel Width/ Pool	Embed-dedness	Instream KLWM*/ 1000'	KLWM* Recruit-ment/1000'
					Fines (%)	Gravel (%)	Cobble (%)	Boulder/ Bedrock (%)				
North Russian Creek	1	B2	28,784	49	7	13	38	43	20	38	2	6
	2	B2	953	80	8	25	37	30	32	N/A	3	0
South Russian Creek	1	C2	6,403	86	18	13	22	47	15	14	<1	4
	2	A3	2,568	99	21	7	13	60	7	50	<1	10
	3	B2	2,680	94	14	11	27	48	8	N/A	0	5
	4	A3	2,175	71	9	19	25	48	5	58	0	1
	5	A1	2,250	71	7	6	8	79	4	34	0	21
	6	A2	15,800	55	5	10	24	61	7	32	<1	19
	7	B2	5,022	46	5	5	13	77	18	N/A	0	5
	8	B3	2,984	65	36	30	11	24	4	25	0	18
Whites Gulch	1	G2	1,707	95	0	23	29	47	10	0	0	23
	2	G3	439	98	4	39	30	27	7	N/A	0	26
	3	F2	6,412	98	0	28	47	25	10	N/A	<1	5
	4	A2	1,408	100	5	51	35	10	10	0	0	12
	5	B3	535	95	17	30	25	28	8	N/A	2	46
East Fork Whites Gulch	1	A2	304	N/A	N/A	N/A	N/A	N/A	5	N/A	0	0
	2	G3	2,630	95	8	19	40	32	7	N/A	0	7
	3	A3	513	91	4	24	3	48	6	N/A	0	68
	4	G2	1,548	N/A	N/A	N/A	N/A	N/A	5	N/A	0	0
	5	B2	3,623	97	2	23	40	36	5	N/A	<1	17
	6	G2	4,828	83	0	14	13	74	6	N/A	<1	21
	7	A1	565	N/A	N/A	N/A	N/A	N/A	23	N/A	N/A	0
North Fork Whites Gulch	1	B3	789	N/A	N/A	N/A	N/A	N/A	8	N/A	0	0
	2	A3	8,672	96	2	34	44	20	9	N/A	<1	21
	3	A2	259	N/A	N/A	N/A	N/A	N/A	6	N/A	4	0

N/A = Not Available (Not Taken)

Step 4 - Reference Conditions

Introduction

This chapter describes how the existing condition from Step 3 has changed over time as the result of human influences and natural disturbances. It will attempt to develop a reference for comparison with current conditions over the period the system evolved, essentially picking a snapshot in time. This is an attempt to show how the ecosystem adapted/developed over time from historical data. The time period will vary by ecosystem feature(s), due to the fact that some features do not have data available on range and distribution. Where actual data is lacking, some historical conditions/features will be constructed from a multitude of sources, inferences and professional judgement.

As in Step 3, the reference conditions are organized to reflect the interrelationships in a hierarchical design:

I. Human and Social Dimension
II. Forest Health
III. Fire (including Specimen)
IV. Allowable Sale Quantity
V. Late-successional Reserves
VI. Areas with Watershed Concerns
VII. Riparian Reserves
VIII. Aquatics

I. Human/Social Dimensions

Key Question: What and where are human uses occurring?

Response: Humans have been an integral part of the area ecology for thousands of years. American Indians, Europeans, Chinese and Euro-Americans have inhabited the area and utilize the area for their uses (fuelwood, mining, recreation, livestock grazing, etc.).

Background Information

Humans have been an integral part of the area ecology for thousands of years. Early use and settlements that followed have been in low elevations in the river canyons and contributing streams. Access in and out of the area and remote steep mountainous terrain influenced the way life developed, as have fire and flood events. The region's past ethnographic cultures are the most complex in the United States, reflecting diverse prehistoric and historic use patterns, and human adaptations.

In the past, the Karuk, Shasta, and Konomihu Indians inhabitated the area. The number of American Indians who lived within the watershed boundaries before 1850 is not known, but is estimated to be under 1,000 people. Starting in 1850, Europeans, Chinese, and Euro-Americans moved to the area. Actual miner population figures between 1850 and 1870 are fragmented. Census figures conflict with historical accounts, which generally are higher. Statistics may not have included all outlying locales. In 1851, the watershed was made part of Klamath County, but in 1874 Klamath County was absolved to become part of Humbolt and Siskiyou Counties. By 1880, the population of Siskiyou County was estimated at 8,162. Between 1860 and 1870 the Chinese miner populations increased, while the anglo population decreased. The 1870 census estimated that there were 100 Chinese at the Forks of the Salmon and 50 Euro-American miners. The Chinese population was highest in the 1870s, but by 1900 nearly all the Chinese had returned to their homeland or relocated elsewhere.

American Indian

The North Fork still is historically significant to the Shasta and Karuk people. In pre European-contact times, area settlements were part of the largest population cluster in Karuk domain.

Most activity centered around riverine settings. Travel was either cross-country, or by a network of trails in river corridors or along ridges. In addition to village life near rivers, they secured important seasonal resources at locales in higher elevations. Trade was important, but goods and services were generally obtained locally.

American Indians suffered traumatic cultural displacement as the result of confrontations with miners. Many also died from European diseases to which they had no resistance.

Early geographers and anthropologists alluded to or described management practices by California Indians (Blackburn and Anderson, 1993). While specific historic records are unclear about the intensity of past habitat modification, the land was shaped by the American Indian.

In past consultation, tribal participants reviewing the analysis have emphasized the prevailing presence of thousands of years of careful environmental management by Native Peoples. Their continuum of use would have been highly integrated with aquatic and terrestrial ecosystem functions. They feel that even though modern land management and land change over time have reduced more readily visible land patterns maintained by local Indians, careful investigation would clearly reveal these modifications.

Those Karuk Indians consulted stress that elements of the landscape were carefully managed to provide food, shelter, tools and clothing. Foraging and gathering

stimulated growth and sustained populations of useful plants. Pruning and burning plant habitats increased productivity. Selective removal and cultivation of resources was important. Relationships with landscape configurations, the supernatural realm, prayer, social status, and everyday life were all interrelated and interwoven in how the local American Indian environment was managed.

Tribal elders cite local underburning practices as late as the 1920s, although Federal policies and increased enforcement at that time prohibited it. Burning practices discouraged fir trees near acorn bearing oaks. Fire was used to enhance wildlife habitats and resources such as beargrass, hazel or willows used for basketry. Based on consultation, local effects from Indian burning were once very apparent.

Evidence taken from Forest repeat photography, air photos and personal accounts leads to the conclusion that forest settings 200 years ago were generally more open than today. Denser stands of conifers were found on north aspects, good soils and in drainages. South aspects generally supported less dense stands of conifers with more hardwoods. Areas more intensely modified by American Indians generally are located within deep canyons adjacent to the Salmon River and secondary streams.

Traditional use, more freely practiced in the past, has been restricted by Federal and State regulations. Fish and game laws, permit requirements, land use restrictions and laws prohibiting traditional Indian burning have impeded traditional uses today. Other activities that have affected relationships between traditional use and available resources include logging and road development, mining, pollution, commercial plant uses, increased public use, and recreation development.

Indian basketry organizations support agency activities that use prescribed fire and plant pruning. In other landscapes, beargrass plant vigor has been improved by agency prescribed burning with tribal consulation.

Seasonal and permanent road closures are an issue since road use affects public and traditional use. Road management has somewhat limited gathering activities in the watershed area. Individuals and families often have their own areas where they historically gather; however, disclosure of gathering sites is discouraged by some weavers due to the limited availability of good gathering places.

Fuelwood

Woodcutting use levels in the watershed was probably directly related to population levels. Fuelwood was easily gathered from past logging areas and an abundance of hardwoods and conifers were available. Public dependancies for fuelwood is still in large demand because commercial electricity has never been available to the residences, though some homes traditionally have had generators and propane. Fuelwood probably has been in use from community inception and in American Indian cultures.

Community Stability

The area economy has progressed through several eras. In the 1800s, the economy was influenced primarily by the explorer-fur traders and gold seeking adventurers. After the turn of the century, agriculture and timber became the primary source of income.

News of the discovery of gold triggered a substantial immigration to the region in the summer of 1850. In the 1850s there were very active mining camps at the Forks of the Salmon, Bestville and Sawyers Bar. Therefore, the communities in the watershed, have historically been commodity oriented.

Bestville was established in 1850 and named for Captain Best, a sea captain, miner and trader. By 1854 there was a bowling alley, hotel and 2 stores. Later, the town was mined out and everybody moved up and across the river to Sawyers Bar.

Sawyers Bar was also established in 1850s with Trooks Flat in 1851. The buildings were built of whip-sawed lumber. Later there was a saw mill, as well as 2 churches, 3 hotels, a school, blacksmith shop, 3 stores, a post office (1858), barbershop, shoemakers, a tin smith and 6 or 7 saloons. The Sons of Temperance, Mason and Odd Fellows also had their fraternities there. Three fires destroyed most of the old town. In 1898, Sawyers Bar was the second largest voting precinct in the county with approximately 300 registered voters.

Two other communities in the watershed, Snowden and Rollin, each had established post offices. The post office in Snowden was established in 1904 and closed in 1915 after World War I started. The Rollin post office was established in 1898, and closed in 1927 around the time the Liberty Mine closed due to litigation.

By the 1920s, mining declined substantially and rural life was reduced to a core of established families. Mining activities increased slightly again during the depression years and continues to influence the local economy. The Works Progress Administration projects underway in the 1930s made road building improvements into the area, allowing better access. (More information about mining is located later in this chapter under Commodities.)

In the 1930s, the Forest Service located administrative sites at Forks of the Salmon and Sawyers Bar. Subsequent management activities contributed to community stability. Although populations were never as high during the 1850-80s, community stability was beginning to be dependent on commodity oriented industries and/or opportunities.

Logging of significant volume started in the mid- 1950s. A selective cutting system was applied in the early

stages. It was soon apparent that selective marking did not give the desired silvilcultural results in the Douglas-fir type. A gradual change over to the clearcut patch system evolved.

The next major population increase occurred in the 1960-70s when people left the cities and moved to rural areas like Sawyers Bar and Forks of Salmon. A few communes were established on old abandoned patented claims. These types of values are referred to as the New Rural Residents. For the most part, this group tends to be more interested in amenity resources (such as wildlife and open scenic places) than the long-term residents. Most moved here seeking a more healthful environment at a lower cost of living.

Water Quality

It is suspected that water quality deteriorated, upon the influx of miners, due to mining activities that began in the 1850s. The river and streams were dammed, diverted and drained for mining activities. Hydrologic mining impacts are still apparent today by bare back slopes and large tailings that still exist within the watershed. There is little to no data on the historical amounts of chemicals used to extract the gold.

Recreation

Recreation uses of the North Fork of the Salmon River Watershed have been historically light. Long distances from major population centers and difficult access to the area have all had a part in diffusing uses. Back country trails, hunting camps, logging access roads, bridges, river access roads and trails, and campgrounds are typical National Forest recreation sites. Most of the developed recreation sites were constructed within the river corridor where recreation use is highest. Remote areas away from roads and trails receive the least use.

Commodity Use

Mining

In June of 1850, prospectors found rich deposits of gold at the Forks of the Salmon and several hundred miners quickly entered the watershed. By the 1860s many miners that arrived in 1850 moved on after making quick strikes. In the 1870s, the Chinese were mining many river and stream settings. Lumber was needed for sluices, flumes, mine timber and residences. Initially, miners cut timber by hand but eventually small saw mills were built to meet the needs of the camps. For 70 years mining was important, changing many river and stream channel settings.

In the late 1800s, several small towns within the assessment area (Rollin, Snowden and Sawyers Bar) were centers of rural activity. Most miners lived outside towns on available flats in scattered gold camps in the North Fork corridor. Hard rock mining was the primary activity in 1898. Hard rock mining employed many people since it was an extremely labor-dependent process. Sawyers Bar during this time period had the second largest population in the county (the largest being Yreka).

Winter snows influenced travel. Steep topography and lack of employment has kept the area relatively untouched by industrial, agricultural and recreational development.

World War I started in 1914 and miners began to leave the area to work in war-related factories in the cities. Mining declined sharply in the 1920s and communities were reduced to a core of established families.

As the depression deepened in the country during the 1930s, many people too proud to accept charity moved back to the area to extract a living from the land and wait until economic times improved. Most residents gave considerable effort to non-monetary forms of subsistence such as fishing, hunting, gardening and animal husbandry, as well as placer mining. Placer mining can be accomplished by one or two people, so it fit well into the independent lifestyle of the 1930s.

As we entered World War II, by Presidential Order mines were closed so efforts could again be placed where needed the most. The pumps were turned off and people moved back to the cities for the war effort. As a result of this inactivity, many shafts filled with water or collasped, never to be economically feasible to re-open.

Mining from World War II to present has been sporatic and recreational-oriented. Interest from larger mining companys has been intermittent to date, due to environmental regulations limiting large-scale operations.

Livestock Grazing

Domestic livestock were brought into northern California over 150 years ago. Miners and homesteaders raised livestock to supply food for local residents. As the Scott Valley area became settled with immigrants and ranches were established, cattle and sheep were moved into the adjacent mountains to forage.

In the early 1900s, grazing was largely unregulated and livestock numbers were as much as five times higher than are currently permitted on National Forest lands. Livestock followed the snowline up the mountains. Roving bands of sheep, cattle, horses, pigs and goats utilized the area year-round. The continued high use of the mountain rangelands created degraded conditions in some areas and forage production was reduced. The Forest Reserve Act and the creation of National Forests in 1905 were largely brought about by concerns for resource degradation and the need for regulated use of public land and resources.

As part of the Forest Reserve Act, grazing lands were divided into grazing allotments. Historic users were permitted to continue grazing their livestock within traditional areas which were much larger than today. The Act established livestock numbers and seasons.

Overall, numbers were significantly reduced, with increases during both World Wars to provide meat to support war efforts. Since 1947, overall numbers have declined to provide recovery to damaged rangelands. Allotment boundaries were reduced and improvements including fencing were implemented to regulate livestock use and improve management.

Livestock use in the area is known to have occurred since 1886 when local Salmon River packers utilized forage in the watershed for packstrings. Cattle grazing began in 1888, prior to National Forest establishment. In 1893, the first recorded use was by Jenner and Roberts who ran cattle in the higher elevation meadows of the watershed.

The Forest Service issued permits for 375 head in 1905 in the Little North Fork Allotment Area. There was no restricted use of the area until 1925. Prior use was determined by weather conditions and available feed in the valley ranches. In 1925 in season for grazing was set to July 1 to October 31. This was later modified to July 15 - October 15. Early records indicate that the unrestricted season contributed to range resource damage. Actual animal use has been permitted for 250 cows and calves since the 1950s for this allotment.

Roads, Special Use Permits, and Private Land

It was not until 1892 that a wagon road was cut through the 50-mile stretch of country from Etna to the Forks. Prior travel was mostly by foot or by horse over trails. More substantial road development did not take place until the Works Progress Administration projects were underway in the 1930s. The road from the Forks of the Salmon to the Klamath River was established in 1925.

The Forest Reserve (later the Forest Service), established the Klamath National Forest in 1905. By the 1890s the need to protect public lands from over-exploitation resulted in withdrawal of unreserved lands from public entry and settlement. The Organic Administration Act followed, giving authority to the President to alter the classification of land within reserves.

Initially, the Klamath National Forest policy emphasized fire suppression, trail work and road improvement to rural communities. The focus shifted toward timber management after World War II as private land was logged.

II. Forest Health

Key Question: (None specifically identified; description for this section was developed for issue tracking.)

Background Information:

Fire Potential/Overstocking

The extent of overstocked stands in the watershed was probably much less than today. Some dense, heavily stocked stands occurred but were likely confined to areas where fire frequency and intensity were lower, such as north facing slopes and in higher elevation areas.

Pre-European fire regimes could be characterized as fires burning with low to moderate intensities in most areas, with some smaller areas burning with high intensities. Fire return intervals averaged 20 years; shorter on exposed sites and longer on sheltered sites. Fire worked as both a thinning and a decomposition agent.

Insects/Disease

Endemic levels of insect/disease infestations have probably always been present in the landscape. However, the types and amounts of these infestations probably were different prior to active fire suppression activities (circa 1910) than today. Insects/diseases which were dependent upon oak, pine and Douglas-fir were probably more prevalent, while those favoring white fir as a host were less prevalent. Also, because there was less incidence of high stocking levels, and resultant competition for moisture/nutrients, vegetation remained more vigorous overall and less susceptible to insect attacks.

III. Fire

Key Question: a. What is the fire occurrence within the watershed?
b. What were the key features affected by the Specimen Fire?

Response: Historically, this area had frequent fires and stand-replacing events were common. Studies have estimated pre-suppression fire return intervals between 10 and 25 years. The large amount of logging fuels from previous helicopter logging in the Specimen Fire area caused those areas to burn at high intensities.

Background Information:

Past Fire Regime

The past fire regime, prior to European settlement, within the North Fork Salmon Watershed generally falls into Agee's Fire Regime #2 (Agee 1981a). This fire regime is described as having frequent fires (1-25 year intervals). Lightning and American Indian burning were the causes of ignition. The steepness of the slopes and vegetation that has adapted through history to become fire-dependent contribute to the severity of fires in this watershed.

Stand-replacing events were common in the watershed, occurring when vegetative conditions were susceptible and ignition and weather opportunities were presented.

These stand-replacing events or runs of high severity were usually limited to the susceptible vegetation on exposed slopes during conducive weather conditions.

The southern exposures and drier sites tended to burn with higher severity. Fire would burn into the crowns in some locations while burning only in the ground fuels in others. This created a mosaic of vegetation types, sizes and age classes within the watershed. During this fire regime, the south slopes were usually in a more open condition. Fire-created openings were larger on south slopes than on north slopes. Also, the lower on the slope the fire started, the larger the opening created.

Lightning fires have been a source of disturbance since the development of vegetative biomass. Being influenced by the weather, vegetation and topography, lightning fires burned uninterrupted by humans until early in this century.

American Indians have used fire to influence vegetative conditions within watersheds on the Klamath National Forest for possibly several thousand years. Until the early part of this century, they ignited fires to enhance landscape values important to their culture.

Early Euro-American settlers to this area used fire to improve grazing, to expose rock and soil for mining, and to improve travel routes.

Two recent fire history studies looked at fire regimes for 2 vegetation types found in the analysis area. Wills (1991) did a fire history study on Hotelling Ridge, 4 miles to the south of the North Fork Watershed. This study revealed a pre-suppression fire return interval of 10-17 years in Douglas-fir/hardwood stands. In the Thompson Ridge area on the Happy Camp Ranger District, 35 miles north of the North Fork Watershed, Taylor and Skinner (1994) have estimated pre-suppression fire return intervals for Douglas-fir/sugar pine between 15 and 25 years.

The Klamath National Forest was established in 1905. One of the main charges for the Forest was management of the timber reserves. Uncontrolled fires were believed to be detrimental to the growing of trees. In the early years, Rangers were spread thin and fire suppression conflicted with local interests, so many fires in this watershed were allowed to burn unchecked. This practice continued until after World War I, when more personnel were made available to fight fires. After 1920, suppression of all fires was attempted, as fire suppression forces grew and with the ability to aggressively enforce fire prevention policies.

Large fires that burned in 1917 and 1918 in the watershed were mapped and entered into the District fire atlas. These perimeters were entered into the geographic information system (GIS) and the acres burned within the watershed were 6,270 and 15,660 respectively (refer to Figure 4-1 Fire History, 1917-1994).

To help develop a reference condition, the earliest aerial photos (1944) were analysed (refer to Figure 4-2 1944 Vegetative Condition). This is the snapshot in time available as a reference. This snapshot can help to develop a historical condition, but it needs to be noted that the vegetation within this watershed is and has been very dynamic. It is apparent from looking at conditions in 1944 that large fires were a common occurrence in the watershed. Recent fire scars are visible and indications of large disturbances through vegetative patterns are visible. These fires were of varying severity, but severity was obviously higher on exposed south aspect slopes and ridges, and areas of continuous herbaceous and shrub vegetation. Stands of large dense conifers were limited to the bottoms of drainages and on north and east aspects. The exposed slopes (south and west aspects) and ridges were dominated by grass, brush and hardwoods.

The fire history database for the Forest has fire starts information from 1922-1994. This database has 628 fire starts for the watershed in the 72-year period. Lightning fires have accounted for 78% of these starts, whereas human-caused fires account for 22%.

Effective fire suppression began in the 1920s and has continued through today. In recent years large fires have occurred, with much of their area being burned at a high severity. Recent large fires occurring in the watershed have been the Hog Fire (1977), the Yellow and Nielon Fires (1987), and the Specimen Fire (1994). These were all ignited by lightning. Each of these fires has been mapped for fire effects. Areas having high fire severity (greater than 70% crown kill) and areas having moderate fire severity (30-70% crown kill) were identified. The rest of the area within the fire perimeters is identified as having low fire severity. Table 4-1 gives the acreages and percentage of the areas burned by severity.

Table 4-1. Acres and % of Area Burned by Severity of the Hog, Yellow, Nielon and Specimen Fires.

Fire Severity	Total	Hog 1977	Yellow, Nielon 1987	Specimen 1994
High	7,016 (24%)	2,740 (26%)	2,925 (29%)	1,366 (16%)
Moderate	9,492 (33%)	5,685 (54%)	2,052 (20%)	1,770 (21%)
Low	12,514 (43%)	2,050 (20%)	5,252 (51%)	5,240 (63%)
Total	29,022 (100%)	10,475 (100%)	10,229 (100%)	8,377 (100%)

The area of the Hog Fire that reburned in the Yellow Fire showed some interesting characteristics. Much of the area that had burned with high severity during the Hog Fire, again burned at high severity in the Yellow Fire. A

primary factor for this intensity is due to the fuels component. Those areas within the Hog Fire that experienced high severity, experienced high stand mortality. This added tremendous amounts of dead fuel component as the stand fell apart, allowing the Yellow Fire to burn with a much higher intensity. These areas have experienced a complete stand replacement and now consist of planted mixed conifers and early seral brush, grass and forbs.

Most of the the Hog Fire area that had burned with low severities reburned with low severity in the Yellow Fire. Again, this is primarily due to the available fuels. Since mortality of the stand did not occur, effects of the fire were mostly a reduction in ground fuels. The fuels were reduced in the Hog Fire, thus reducing the fuels available for the Yellow Fire.

Specimen Fire Effects

The Key Question regarding the key features affected by the Specimen Fire is also addressed in Steps 3 and 5. This step will identify management activities that have occurred in the area and contributed to the severity of the fire.

In the mid-1970s, much of the timber harvested in the Specimen Fire area was done with helicopter logging. Utilization was poor, meaning that much of the felled timber was left in the units. The activity fuels created in these units was left untreated. The Specimen Fire started within one of these units. These areas (units) burned with high intensities (see Table 4-1) during the Specimen Fire and increased the fire behavior in adjoining stands.

IV. Allowable Sale Quantity

Key Question: How does the Forest Plan timber targets become refined at the watershed level?

Response: Historically, the annual potential timber yield for the Forest was set by the Forest's Timber Management Plan with certain assumptions. Today, several of the assumptions have changed, reducing the amount of land where timber may be harvested. Table 4-2 shows this shift of acres of silvicultural prescriptions by decade.

Background Information

Previous management direction was provided in the Klamath National Forest Timber Management Plan (TMP) and Environmental Impact Statement (EIS) signed September 30, 1974. This plan was amended several times to reflect recommendations for forest lands. This plan set an annual potential timber yield for the Forest, based on timber inventories completed in the 1960s.

Additional direction was provided in the 1974 Salmon River District Multiple-Use Plan. Multiple-Use Plans designated special resource areas as well as areas for intensive timber harvest. The National Forest Management Act of 1976 (NFMA) required National Forests to do an assessment of lands for capability, availability and suitability for growing trees at 20 cubic feet per acre per year of wood fiber.

Today, several assumptions which the TMPs based their potential yield calculations have changed. New laws, regulations and policy changes have reduced the amount of land where timber may be harvested. Intensive timber management practices have been further restricted by the need to provide for other resource objectives.

Timber harvesting began on the Forest in the early 1900s. Most of this early logging was done by railroad to remove high value pines from the most accessible lands. Concern for a planned timber harvest schedule and sustained yield of timber prompted an inventory and mapping of the Forest in 1919. Another forest inventory was completed by permanent plots installed in the late 1940s. The first formal timber management plans were developed in the 1950s following the 1940s inventory of the Forest lands.

Starting in the 1960s, timber harvest became an increasingly important activity on National Forest lands. Land management was to be in compliance with the Multiple Use/Sustained Yield Act of 1960 and NFMA.

Timber harvest operations, including clearcutting, increased during the 1950s and was at its peak in the late 1970s and early 1980s. Except for the major wildfire salvage after the 1987 fires, the amount of timber offered for sale has decreased since the mid-1980s.

Timber harvest has occurred in the analysis area since the 1960s under the Salmon River Multiple Use Plan. Acres available in this Plan for commercial harvest were approximately 48,000. Consequently, many of the secondary roads were constructed under these timber sales.

Green timber sales occurred in the 1960s, utilizing mainly yarder and ground-based equipment in Whites Gulch, Eddy Gulch, Kellys Gulch, Music Creek, Little North Fork and the North Fork. Additional conventional harvest methods continued during the 1970s in Little North Fork, on Blue Ridge, and in Whites, Heiney and Jessups Gulch areas. Continuance of harvest in the 1970s also introduced helicopter yarding to many areas of the North Fork. In the 1980s, Jessups, Eddy, Whites and Counts Gulch areas and Blue Ridge, Shiltos and North Russian Creeks areas were harvested. Areas around John's Meadow and Music Creek were harvested in the 1990s. Most acres harvested in these areas used clearcutting as the predominate harvest method.

Beginning in the late 1970s, salvage of fire-killed trees began in the Picayune Ridge, Hieney Gulch and Pollocks Gulch areas as a result of the Hog Fire. As the salvage efforts expanded in the 1980s, road access was completed to the Big Creek area for additional conventional and helicopter salvage. Salvage logging occurred in many of these same areas as a result of the Yellow Fire of 1987. Roadside hazard salvage occurred along the Sawyers Bar Road in the early 1990s. In the last three and a half decades, 1,475 acres have been precommercially thinned. Therefore, about 30% of the acres planted have been thinned.

Table 4-2. Acres of Silvicultural Prescriptions by Decade.

Clearcuts in patch & strips (*some of these acres include wildfire salvage*):	
Decade	**Acres**
1960	1,178
1970	1,908
1980	3,918
1990-95	1,459
Total	**8,463**
Shelterwood & Overstory Removal:	
Decade	**Acres**
Unknown	349
1970	71
1980	98
1990-95	22
Total	**540**
Precommercial Thinnings (*didn't usually contribute to the ASQ in the past*):	
Decade	**Acres**
Unknown	635
1970	635
1980	19
1990-95	294
Total	**1,465**
Individual Tree Selection (*Commercial Thins*):	
Decade	**Acres**
Unknown	142
1960	77
1970	103
1980	131
1990-95	20
Total	**473**

V. Late-successional Reserves

Key Question: (None specifically identified; description for this section was developed for issue tracking.)

The best available reference to the conditions that were found in the LSRs prior to recent human activity is the interpretation of the 1944 aerial photos of the watershed (refer to Figure 4-2). These photos show little sign of human activity upslope from the river corridor.

Based on the interpretation of these photos, the LSR areas in this watershed were characterized by large blocks of moderately dense mixed conifer forest, on the north and east facing slopes dominated by Douglas-fir. These mixed conifer stands graded into ponderosa pine and hardwoods on the south and west facing slopes and into true fir stands above 5,200 feet in elevation. The areas of poorer soil supported open stands of live oak and montane brush with very few conifers.

The understory in all these stands was relatively open, with few sapling and pole-sized trees or brush. This was due to frequent fires clearing the understory vegetation. Some sites escaped the influence of frequent fire, especially on north aspects and moist sites, where a thicker understory of shade-tolerant vegetation was often present. Southern aspects, especially at lower elevations, had much less coarse woody material (CWM) and fewer snags than are found on these sites today.

Because of the influence of fires, there were many small openings in the forest canopy. These small openings provided a diversity of habitats and a mosaic of seral stages across the LSRs. Although the fires were more frequent and generally less intense than today, high intensity large fires did burn through the area. When this occurred, even the most mesic stands were reduced to an early grass/brush seral stage. Based on the 1944 photo interpretation and the soil site capability, it appears that approximately 70-85% of the capable sites in the LSRs were in late seral habitat in the earlier part of this century.

Connectivity: The analysis of the 1944 photos shows the same connectivity and dispersal conditions as there are available today. The same drainages provide dispersal habitat to the ridge tops and across into the adjacent watersheds. The same limits to dispersal--high elevation and open country in the wilderness and large blocks of early seral stage vegetation down the North Fork--were evident in 1944. It is apparent from the analysis of the 1944 photos and the map of current distribution of late seral habitats that the general pattern of late-successional conifer forest is very similar in this watershed from 1944 to the present.

VI. Areas With Watershed Concerns

Key Question: (None specifically identified; description for this section was developed for issue tracking.)

Background Information

The subwatersheds within the North Fork Watershed were rarely undisturbed. Fires have burned in the area frequently prior to European settlement. Stand-replacing fires occurred, but fires in general were more frequent but lower intensity than recent fires (refer to the Fire section earlier). The effects of these pre-settlement fires is difficult to quantify, but these fires definitely impacted historic watershed conditions.

Landslides and other forms of erosion are natural processes which formed the landscape long before European settlement. The extent of hillslope erosion has been dependent on the complex interactions of fires, climatic conditions, seismic events, tectonic uplift and stream adjustment, and the natural sensitivity of the rock and soil to erosion. Floods and landslides have periodically occurred. The streams in the North Fork drainage have experienced periodic channel scour, although the extent and frequency of such events is not known with any certainty (refer to the Riparian Reserves section later).

During the twentieth century, most of the landslide derived sediment (75%) which entered the stream system was associated with flood and storm events that occurred from 1964-75. This time period includes the 1964 flood and other significant storm events during the following 10 years. Roads produced landslides at a rate much higher than undisturbed land. Harvested or burned areas produced landslides at a rate much lower than roads, but still higher than undisturbed lands.

With the discovery of gold and the beginning of large-scale mining in the 1850s, the main North Fork stream channel and some tributaries were impacted directly by hydraulic mining. The stream channels were greatly disturbed but the hillslope conditions remained similar to pre-settlement, except in the mined areas. Fire suppression decreased the extent of hillslope disturbance by the mid-1900s but timber harvest, road construction and wildfire increased hillslope disturbance levels since the 1950s.

A review of the 1944 air photos shows disturbed stream channels in the areas impacted by hydraulic mining. In addition, a considerable amount of landslides with channel scour is visible in higher elevations of the watershed, above about 5,000 feet elevation, with smaller amounts of channel scour in the lower elevations. Later stream scour events (the floods between 1955 and 1974) show different patterns with most landslides at lower elevations. The reasons for the differences are probably strongly tied to climatic variables with a secondary consideration of disturbance history. Channel scour affected many of the streams in the North Fork drainage during this time period, many of which have since recovered. However, South Russian Creek and the Little North Fork have not yet recovered.

Roads and timber harvest are associated with higher landslide rates than the undisturbed lands during the 1965-1975 period. This is especially true in the Little North Fork, although road- and harvest-related landslides also occurred in the Jessups and Eddy Gulch area. Most of the roads in the Music Creek area were constructed in the late 1970s and 1980s and have not yet experienced a severe storm event.

Fires in 1977, 1987 and 1994 have impacted several of the subwatersheds in the North Fork, as discussed in Step 3. These fires burned at higher severity than they would have in the pre-fire suppression era. Though no known landslides have been documented in the fire areas, debris torrents and accelerated surface and channel erosion have occurred in the burned granitic watersheds in response to winter storms and intense summer thunderstorms.

VII. Riparian Reserves

Key Question: How have past disturbances/ processes influenced RRs in this watershed?

Response: Much of the disturbance in Riparian Reserves resulted from road and harvest related landslides in the Little North Fork, associated with road construction and harvest which occurred in the early 1970s.

Background Information

Agents of disturbance have always influenced the riparian ecosystem in the North Fork. Previous to European settlement, the primary disturbances included floods with associated landslides and stream scour, and fire. After European settlement, mining, grazing, road construction and timber harvest also became important riparian disturbances.

Natural Disturbances

Floods and Landslides

Widespread stream channel modification occurs in response to floods and intense storms, which cause landslides, debris torrents and stream scour. Modifications include channel scouring, widespread riparian vegetation removal, aggradation of the channel by sediment, and stream channel migration. The loss of riparian vegetation is a major impact itself, but the destabilizing of the stream channel often results in slow recovery of the riparian vegetation, causing long-term impacts to the RRs.

Information from historical accounts indicates that there

were major floods in 1861-62 and again in 1889-90 (McGlashan and Briggs, 1939). The flood of 1861 was apparently larger than the 1964 flood. There were impacts on the riparian zones from these floods, but the extent of these impacts in the North Fork are unknown.

Analysis of the 1944 aerial photos reveal that at that time, most stream channels were fully vegetated with a mixture of conifer and hardwood species. The 1964 flood had major impacts on many of the stream channels of the watershed resulting in major stream channel widening and modification. Long segments of stream reaches in Little North Fork, Taylor, Music, Olsen, Big and Kanaka Creeks were scoured down to the confluence of the North Fork. In addition, the entire length of the North Fork was modified and stripped of riparian vegetation.

Few of the landslides that occurred during the 1964 flood were associated with roads, harvest or other disturbance, primarily due to the small extent of these disturbances at the time. The storms between 1965-1975 resulted in additional re-scour of channels in Little North Fork, the headwaters of the North Fork, Big, Olsen and Kanaka Creeks. Much of the damage in Riparian Reserves resulted from road and harvest related landslides in the Little North Fork, associated with road construction and harvest which occurred in the early 1970s.

Total scoured channels mapped from the 1944 to 1988 air photos includes a total of 62 miles, or about 240 acres, of scoured riparian area. The total includes channels that were scoured at one time and re-scoured later, and represents 10% of the total stream miles. There are about 8 miles of freshly scoured channels visible on the 1944 photos, 40 miles of freshly scoured channels visible on the 1965 photos, and 12 miles on the 1975 photos.

Fire

Fire has always been a part of the ecosystem in the North Fork, including the riparian ecosystem. Generally, fires burned at low intensities in riparian areas previous to fire suppression and were about as frequent, but of a lower intensity than the upslope areas. Since the early 1900s, about 39% of RRs (14,406 acres) have been burned by fire, although intensities have not been mapped for the older fires. Within the last 18 years there have been 3 large fires within the North Fork Watershed: the Hog Fire of 1977, the Yellow Fire of 1987 and the Specimen Fire of 1994. About 2,600 acres of RRs were burned by both the 1977 and 1987 fires. Significant acres of RRs, including unstable lands in Big Creek, Olsen Creek and the lower reaches of the North Fork, were burned with moderate and high severity in both fires. Riparian vegetation recovery in these largely granitic terranes is a slow process, taking approximately 80 years for the establishment of large conifers within the RRs. The historic fire data also suggests a trend towards increased acres of fire and larger fires of greater severity.

Nearly 600 acres of mapped RRs burned with high and moderate intenstity in the 1994 Specimen Fire. Some of this area is in dissected granitic terrane, upland seasonal channels and areas along the main channels of Specimen Creek. Most of the ground vegetation and canopy cover of large trees was consumed (Specimen Bare Area Environmental Report, Botanical Resources report, 1994). Vegetative recovery will be slow in upland riparian areas along intermittent streams with shallow, rocky soils.

Human-Influenced Disturbances

Livestock grazing, mining, timber harvest and road construction are human-influenced disturbances which have affected the RRs. Grazing has affected the largest acreage, but the other activities have more intensive and longer lasting impacts. Table 4-3 displayes the acreage impacted or potentially impacted by past activities.

Table 4-3. Human-Influenced Disturbances Within RRs

Disturbance Description	Acres in RRs	% of RRs
Grazing (based on current range allotments)	13,100	36
Mining (extensive placer & hydraulic mining only)	273	<1
Timber Harvest (1950-present total)	2,991	8
- 1950-1974	703	2
- 1975-1995	2,288	6
Existing Roads *	381	1

* Road miles were converted to acres assuming a 40-foot wide road prism for all roads.

Livestock Grazing

There are currently 4 range allotments which are at least partially in the North Fork watershed. They are the Little North Fork, Shelly Meadows, Etna Creek and South Russian allotments. Each of these has been used for many years with some changes in allotment boundaries, cattle number and seasonal grazing period. Generally, the alloments cover extensive areas with impacts concentrated in wet meadows and riparian stringer meadows along low gradient (less than 5% slope) streams which produce herbaceous forage, water and shade. Generally, less than 1% of the North Fork RRs are accessible and suitable for livestock grazing.

The Little North Fork allotment includes the English Peak area. Due to the geomorphic and soil characteristics, this area has been a concern since the 1940s or earlier. It has granitic soil located in an area where snow melt and summer thunderstorms concentrate run-off, causing gullying in the bare soil.

Natural plant cover is low due to excessively drained soils and southern exposure. Records from 1959 show heavy grazing use which may have contributed to gullying in the area. By 1962, the records indicate the area was improving and in 1973 there was a significant amount of plants re-establishing. The records contained a note stating that red fir was invading the dry meadows. The permittee has mostly kept cattle out of the area since the 1970s, and presently cattle rarely travel through the area. The pristine condition of the area is unknown, but it was probably quite dry with little plant cover.

The Shelly Meadows allotment contains the headwaters of the Right Hand Fork over to Grant Creek. Bug Gulch and Cabin Gulch have received heavy grazing in the past due to poor cattle distribution on the allotment. This allotment is difficult to manage due to long distances between feed areas and steep passes with primitive trails.

The Etna Creek allotment is located in the area of Etna Summit. The boundary has remained similar throughout the years, with the exception of Paynes Lake which was added in 1954. The allotment was permitted 120 cow/calf pair in 1945, with a season of July 16 through October 15. The permit was reduced to 110 pair in 1948 and to 90 pair in 1949. The railroad lands within the allotment were aquired by the United States in an exchange in 1950. Since 1950, the permittee has not used the Etna-Mill and Pointers Gulch portion of the allotment. The largest increase in forage availability has been on the logged lands in the Taylor Hole area. Much of this area is private land. This increased forage and a reduction to the presently permitted 50 cow/calf pair have eliminated any overuse problems on the allotment. The Taylor Lake, Hogan Lake and Twin Lakes units are the only portion of the allotment contained within the North Fork watershed area.

The South Russian allotment is a portion of a larger historic allotment which contained the French Creek unit. The original allotment ran 75-150 head of cattle for a 6 month season. The season was shortened to 4 months in 1920. The French Creek unit was dropped and the Sixmile-Trail Creek unit was added to the allotment in 1946. On the South Russian unit, 50 head were run and 75 head in the Sixmile-Trail Creek unit. From 1947-1952 non-use was taken on the allotment. The Jackson Creek unit was added in 1956, completing the boundary of the present-day South Russian Allotment. Today, 40 cow/calf pair are permitted on the allotment from July 15 to October 15 or when the range is ready for grazing. Only the South Russian drainage is in the North Fork watershed area. Conditions in this unit of the allotment have improved since the 1940s.

Mining

Mined areas have disturbed a small percentage of the RRs. However, the disturbances are long-lasting and usually occur along reaches of fish-bearing streams. Mined areas are most extensive along the main stem of the North Fork and the lower reaches of Eddy Gulch, Whites Gulch, and North and South Russian Creeks. In the mined areas, vegetative recovery has been slow. The effects of mining have been proportionately higher than the acreage would indicate due to the slow vegetative recovery and continued channel instability.

Roads

Roads have altered about 1% of the RRs. There are about 79 miles of road within RRs, out of total of 1,035 miles in the watershed, with over 73 road stream crossings. Roads constitute a permanent disturbance to the RRs unless obliterated, although the impacts of individual roads has varied. Roads have provided access for other riparian disturbances such as river access, camping, timber harvest, firewood cutting and mining.

Timber Harvest

Timber harvest has been a more extensive activity than both mining and road construction, having occurred in almost 3,000 acres of RRs. Much of the timber harvest has been associated with fire salvage from recent fires, although extensive areas have been harvested in green timber sales in the dissected granitic terrane (included in the RR) of the Little North Fork. More recent green timber harvest activities have avoided harvest within riparian areas. Timber harvest, while impacting riparian areas in the short-term, generally is a low impact activity compared with roads and mining. This is because of the rapid regrowth of vegetation.

VIII. Aquatic

Key Question: What is the role of the watershed for aquatic species?

Response: Existing habitat conditions in the watershed have been, and will continue to be, shaped by ecological processes and events such as fire, floods, landslides and drought, as well as past and present management activities. Reference conditions for the 5 components important within the aquatic, semi-aquatic and surrounding riparian area in the watershed are listed in Table 4-4.

Background Information

Historic Fisheries

It is difficult to determine the historical population size of salmon and steelhead in the Salmon River; however, fish numbers were sufficient to supply the primary subsistence food and be the basis for the economy of the indigenous people prior to 1850. After 1850 and the

discovery of gold in the area, fish populations were subject to additional human impact including mining, commericial timber harvest, water diversions and dams, artificial propagation and other historical activities.

Stocks and species of salmonids that existed at the time of cannery development on the Klamath in 1912 included spring and fall run chinook salmon, coho salmon and steelhead trout. Three fish canneries were operating at the mouth of the Klamath River, which was heavily fished for salmon with no limits. Steelhead trout were an incidental catch since migration times coincide with the salmon.

Both Snyder and R.D. Hume in Snyder's (1931) report state that historically, the spring run of chinook salmon was the "main run" of salmon and the population was very pronounced. "These spring salmon may be caught in the smaller streams fed by melting snow at the headwaters of Salmon River during the month of June" and have "now come to be limited" and "practically extinct" while the fall run was reduced to "very small proportions" (Snyder 1931). Suggestions during the early 1930s to determine the decline of the spring run chinook included mining operations, overfishing both in the river and ocean, irrigation, and the building of Copco Dam.

Little, if anything, is known about fish habitat conditions prior to mining operations. It is assumed the habitat was in good condition to support the salmon and steelhead populations that are exclaimed to exist by miners and R.D Hume in Snyder's (1931) report. The extent of damage mining had on the physical characteristics of the streams (including pools, fine sediments, riparian vegetation and stream channels) is unknown, but can probably be considered extensive since the stream bottom was moved across the valley as river terraces and stream substrates were mined for gold.

The maximum water temperature recorded during the summer of 1934 was 77.5°F. During this time period, the streams were lower than they had been during the previous decade and hydraulic mining was still occurring on the Salmon River. Water quality conditions were considered fair and had "improved over 1933 when the Salmon River was at times very badly polluted" (Taft and Shapovalov 1935), and Moffett and Smith (1950) state that the Klamath River and many of its tributaries "ran silty."

Mining also had other impacts to the Klamath fishery. "During the period of placer mining, large numbers of salmon were speared or otherwise captured on or near their spawning beds, and if credence is given to the reports of old miners, there then appeared the first and perhaps major cause of early depletion" (Snyder 1931). Taft and Shapovalov (1935) studied occur-rence of benthic invertebrates and found mined areas had consistently fewer organisms than non-mined areas.

Many dams were built in the Klamath system to divert water for mining, agriculture and domestic use. These dams and diversions blocked salmon and steelhead from more than 200 miles of spawning and rearing habitat along Klamath River tributaries (CDWR, 1960, in CH2M Hill, 1985). Unscreened or poorly screened water diversions and ditches resulted in a significant loss of juvenile fish in which Taft and Shapovalov (1935) reported as the "most serious present loss of trout and salmon." During their review of Klamath River ditches, most were found to contain juvenile fish. In a survey of diversions in the Salmon River basin, 6 diversions had a history of screens (working or not), 37 diversions needed screens, and 21 diversions were reported as not needing screens.

In the North Fork watershed, several dams were migration barriers. The most significant was the Bonally Mining Company Dam, built in the early 1900s about 6 miles above the mouth of the North Fork of the Salmon River. It was a log-crib structure, 177 feet long and 11 feet high and had a wooden fish ladder constructed in 1914 leading into the flume (Handley and Coots 1953). Taft and Shapovalov (1935) described the fish ladder as "entirely inadequate," stating it "plugs up in the natural manner but is also often plugged up by local inhabitants to secure fish." The dam was removed by dynamite on October 7, 1946. Since the Handley and Coots (1953) report, 3 other crib dams that existed on the North Fork of the Salmon River have been removed or washed out. These were located near Eddy Gulch, 0.8 miles below Robinson Gulch, and 0.5 miles above Finley Camp (Taft and Shapovalov 1935).

The Smith Dam was located on Whites Gulch, about 0.2 miles below the forks. It was a barrier about 8 feet high and 25 feet long. After it was blasted out on September 14, 1949, steelhead were reported spawning in the section of stream above the old dam (Handley and Coots 1953).

Other dams and their locations that existed in the analysis area are: Little North Fork, 2.3 miles above the mouth, Big Creek, 1 located at the mouth and 1 0.25 miles above the mouth, Shiltos Creek, 0.1 miles above the mouth, Jackass Gulch, 0.25 miles above the mouth, South Russian, 0.5 and 1.75 miles above the mouth, North Russian 0.1 miles above the mouth, and Taylor Creek at the mouth (Taft and Shapovalov 1935).

Artificial propagation began within the Klamath River Basin in 1896 when eggs taken from a tributary to the Sacramento were raised to fry and introduced into the upper Klamath River. A total of 4,950,000 eggs from the Sacramento River were taken in 1907, 1911, 1913 and 1917. These fry were also released into the Klamath River. A small hatchery was established at the mouth of the Klamath River in the 1890s that released fry originating from the Rogue River. After Copco Dam was established, a hatchery was developed at Fall Creek (Snyder 1931). The effects these historic hatcheries and resulting fish had on the Salmon River is unknown. A

hatchery was also built to mitigate the effects Iron Gate Dam would have on the salmonid fishery. Releases of Irongate hatchery fish within the North Fork analysis area were 56,000 chinook in 1975, 169,000 steelhead in 1971, and 100 coho in 1970. Since 1991, no fish plants have occurred in the Salmon River because of increasing concern over genetic pollution of the wild fish and competition for food and space between hatchery and wild stocks.

Watershed restoration activities have taken place within the analysis area, primarily focused on riparian planting and landslide stabilization along roads. Instream habitat restoration activities of complex log cover structure, and underwater log ledges have been constructed. These efforts have met with a variable level of success.

Reference Conditions

Existing habitat conditions have been, and will continue to be, shaped by ecological processes and events such as fire, floods, landslides and drought, as well as past and present management activities. Factors affecting habitat quality may vary from stream to stream. However, the overall quality of fisheries habitat can be broken into 5 components. These components are important within the aquatic, semi-aquatic, and surrounding riparian area. They are also continually changing as ecological processes within the watershed modify and reshape the habitat. These components include:

1) Overall watershed condition,
2) Water quality and quantity,
   a. water temperature
   b. sediment levels
   c. instream flows
   d. stream nutrient levels
3) Stream channel integrity,
   a. bank stability
   b. sediment transport, aggredation and scour.
   c. substrate composition including fines, sediment and embeddedness
   d. habitat composition including primary pool frequency
   e. water table level
4) Vegetation.
   a. plant communities and interactions
   b. CWM and recruitment potential
   c. stream canopy cover
   d. riparian area ground cover
5) Animal communities, populations and interactions.

Habitat reference conditions have been identified for the measurable elements associated with these habitat components. These reference conditions are displayed in Table 4-4 Fisheries Habitat Reference Conditions.

Table 4-4. Fisheries Habitat Reference Conditions.

Element	Condition
Water Temperature	Maximum summer temperature should be below 70°F
Instream Flows	Flows should maintain aquatic ecosystem processes.
Nutrient Levels	Nutrients hould be maintained at background levels determined by wilderness streams or other suitable reference waters.
Stream Channel	Stream channel integrity and channel processes should protect aquatic resources.
Fines	Fines should not exceed 15% area-weighted average in spawning habitat.
Embeddedness	Embeddedness should not exceed 20% area-weighted average in riffle areas.
Pool Frequency	One pool every 3 to 7 bankfull widths should be maintained.
Plant Communities	Native and desired non-native plant community diversity and productivity should be maintained or restored.
Coarse Woody Material	An average of 20 pieces of large wood per 1,000 lineal feet (or site potential) should be maintained or restored in perennial and fish-bearing streams. Westside minimum large wood size is 50' length and 24" diameter.
Stream Canopy Cover	80% stream surface shading in summer or achieve site potential.
Riparian Ground Cover	85 trees/acre with a minimum basal area of 250 square feet/acre of which at least 90% are conifers or site potential should be maintained or restored.

The determination of desirable levels of each criteria is based on a 1988 Draft Proposal for Managing and Monitoring Streams for Fish Production by James Sedell, Pacific Northwest Range and Experiment Station, local data and current literature. Sedell's proposal was intended to provide direction for forest plan application in Oregon and Washington Forests in the Columbia River Basin (Klamath NF Final Forest Plan, 1995). These criteria may be adjusted as additional local data is collected and analyzed.

Step 5 - Interpretation

Introduction

The purpose of this step is to compare existing, historical and reference conditions of specific ecosystem elements within the watershed and to explain significant differences, similarities and trends. Also, this step will identify the capability of these ecosystem elements to achieve key management plan objectives identified in Step 2 Issues and Key Questions.

Step 5 will: integrate and interpret information from the the previous 4 steps; identify current management direction and objectives relevant to the issues and key questions; and identify differences in range, frequency and distribution of historic, current and desired conditions. This will lead to the identification of management opportunities.

I. Human Social Dimension
II. Forest Health
III. Fire (including Specimen)
IV. Allowable Sale Quantity
V. Late-successional Reserves
VI. Areas with Watershed Concerns
VII. Riparian Reserves
VIII. Aquatics

I. Human and Social Dimension

Key Question: What perceived uses/demands are not being met?

Response: Perceived uses/demands not being met include: sustainable ecosystem management or landscape restoration for traditional American Indian uses, fuelwood for local community(s), employment derived from local resources to maintain rural lifestyles (i.e., timber-related jobs).

Background Information

Humans will continue to be an integral part of the area ecology. The communities in the watershed area are currently dependent upon the Forest natural resources for much of it's social and economic well-being. This resources link can affect the lifestyles, population and quality of life. Issues relating to nearly all aspects of Forest Management are also the focus of social concerns. Three main issues that define the social climate are: 1) protect the environment, 2) economic and community stability and 3) protection of American Indian contemporary values.

American Indian

As more is learned about indigenous land management, and tribes continue to play a significant role in Federal land management planning, there will be more opportunities for collaborative ecosystem management at the professional level. Modern land managers are now gathering more information on indigenous stewardship and what might be gleaned from the past. Further studies on aboriginal use may benefit ecosystem management through a better understanding of the behavior of natural ecosystems and how they were modified. Knowledge on Indian land management philosophy and attitudes may also prove useful. Restoring the landscape to the same condition as modified by hunter-gather societies may not necessarily meet the diverse social demands of todays society. However, there are now indications that indigenous practices, such as underburning to open up the forest floor, enhances patterns that resemble images of more healthy forests.

Local American Indian religion continues to depend on and be illuminated by sacred landscapes. Interruptions affecting the integrity of use include: unnatural modification to environments near religious sites, interference during use as noise interference and unwelcome contact with the public during vision quests. Surrounding sounds and sights must have the right integrity to promote a sense of sacredness. Scenery around sacred sites should appear natural.

Inadvertent or deliberate degradation to village, grave and ceremonial sites continues to be a problem in the Klamath National Forest. Although the agency and the local Tribes monitor known surface disturbances in sensitive areas, visitors vandalize sites or impact sites unknowingly. In the past, some American Indians have been reluctant to reveal locations of resources because it increases awareness creating a greater risk of disturbing sites. However, increased levels of forest use have raised the potential of inadvertent disturbance through various kinds of activities. Currently American Indians are working more closely with agencies officials to protect sites. Public disclosure of archaeological resources is avoided by tribal and Federal agencies. Any information related to the watershed is currently unknown due to lack of data from the tribe.

Trends

As future demands are placed on lands there will be concern that resources may decrease. Traditional American Indian use is anticipated to continue to increase and not decrease. Recreation, logging and other landscape activities will increase the potential for disrupting areas of traditional use.

Activities that enhance resources that have disappeared or were once more plentiful will be substantial, such as underburning to enhance beargrass plants. Careful utilization of prescribed fire around established oaks and

gathering sites, protection of archaeological sites and ample supplies of mushrooms are important to the American Indians.

As more ethnographic research is completed and traditional use areas are better defined, it is anticipated that co-operative land steward partnerships with Native Americans will increase.

Future activities that restrict American Indian use should be clearly defined through cooperative tribal efforts. Forest policies may need to be reviewed and possibly revised to mitigate conflicts. Close tribal consultation will be essential in order to protect the viability of traditional use. Agency partnerships in the future are anticipated to benefit traditional use. As tribal members renew interest in traditional values and the population increases, there will be an increased demand on traditional use areas.

Other issues will relate to uncontrolled poaching, predation and public impacts to animal and plant life. The agency can contribute to favorable habitat for salmon runs by managing activities in the vicinity drainages.

Poaching also occurs in the North Fork watershed. Several cases of poaching are reported each year, although the extent of the illegal catch is unknown. It is believe that during years with very small runs of anadromous fish, poaching significantly affects the numbers of spawning fish. Years with larger runs are less impacted.

The desired condition for American Indian values are enhanced, protected or sustained in harmony with other social values/concerns. Gathering sites are enhanced to improve traditional values and resources.

Fuelwood

Fuelwood can be provided from matrix lands. Future opportunities may also be presented in the form of thinning of overstocked pole stands in the matrix and LSRs. Traditional fuelwood opportunities are restricted to matrix lands.

Future opportunities will exist or be developed as areas are delineated for fuel reduction or forest health needs. Since stand densities have increased in the last century, there is an abundance of excessive wood fiber that could be utilized for personal fuelwood consumption or co-generation plants (electrical plants operated by green fuel consumption i.e., needles and small branches/poles). Access and distance to utilization plants will be the biggest barrier in the watershed for commercial chip markets.

Trends

Economics come into play since there is virtually no local market for pre-commercial materials. There is no profit to be made from yarding pre-commercial sized white fir or hardwoods by helicopter for co-generation plants, let alone personal firewood use.

The desired condition for fuelwood is to be perpetuated over time as needed by the public. Accessible areas are designated within the watershed for all users. Thinning areas and areas with high fuel loading will provide a source.

Community Stability

In the 1970s, the arrival of individuals seeking an alternative "country" lifestyle created a new level of population pressure on available home sites and mining claims. This resulted in problems constricting access to isolated claims and cabins. People within the landscape have a strong opinion of the Federal government's role as land managers within the watershed.

In the late 1980s, the Forest Service began to take action on illegal occupancies. The removal of illegal occupancies coupled with enforcement of mining claim requirements have resulted in fewer residences on National Forest lands.

Currently, the automation of the timber industry and lack of timber sales from National Forest lands are cause of concern in local communities. The result of these actions is heightened tensions in small communities which lack economic diversity. National Forest resources use, such as logging, mining and scenic beauty, has a direct link to the community's quality of life.

Because of the limited time allowed for analysis, social well-being is lacking in actual data. To make useful and insightful qualitative assessments of all the variables that contribute to social well-being would encompass more site-specific research.

Regarding the focus of community stability, it in itself may not be an end but one possible means of achieving community adaptability. Community adaptability concept assesses which communities will thrive in the rapidly changing world. Levels of human capital, the imagination of community leaders, the ability to access information, and the availability of a flexible, diverse resource base are variables that will likely influence community adaptability.

Trends

Rural development is the management of human, natural, technical and financial resources needed to improve living conditions, provide employment opportunities, enrich the cultural life and environment of rural America. The Klamath National Forest is currently working with Siskiyou County on developing natural resource-based opportunities and enterprises. These opportunities may not contribute to the economic and social well-being of the communities within the watershed.

A co-generation plant at Sawyers Bar has been mentioned and could provide some local jobs to

community members, but would be dependent on outside grants or funding to initiate or cover start-up costs. Once it was up and running, the amount of excess fuel in the watershed could operate the plant for at least several decades to help reduce the fuel loadings and generate electricity for the Sawyers Bar community.

The desired condition for Community Stability/ Adaptability could be enhanced with economic diversity. Rural Development may provide alternate employment opportunities as it works with Siskiyou County. Community Stability would improve relationships with local residents. The Forest Plan and sustained harvest levels from matrix land will provide economic stability by setting a firm harvest level for the next decade. Social well-being would be harder for the Forest Service to provide since there are so many community-dependent variables.

Water Quality

Management direction and law recognize the interdependence of fisheries resources and water quality. The Clean Water Act and its subordinate implementing regulations require that clean water and fisheries are protected.

Some residences along the North Fork get their water supply from the river. These are domestic uses only and other residences are supplied from small springs or tributaries to the river. The impact to the aquatic resources from these diversions is minimal.

More discussion on water quality and inter-relationships with other terrestrial resources is discussed under those resources.

Trends

The local requirements preclude introducing sediment or other materials into streams that would significantly reduce water quality, thus affecting the fisheries resource.

Water quality is generally high except directly after storms and peak flow events. Turbidity levels increase for short durations.

The desired condition for water quality is improvement which will enhance fisheries habitat, recreation and domestic use.

Recreation

Dispersed recreation including both day-use and camping takes place along the the North Fork of the Salmon River in many undesignated locations. These uses may cause damage to riparian vegetation and affect water quality from surface erosion and lack of toilet facilities.

Trends

While traditional activities in the watershed, such as scenic drives, camping, swimming and waterplay, fishing, hiking and hunting will remain popular, kayaking and mountain biking are expected to increase.

As the rural lifestyle and associated natural setting prevalent to the watershed become increasingly rare, recreational opportunities in this area will increase in value, including the value of unroaded areas.

As recreation use increases, so will the volume of traffic in this area. This will increase the need to actively coordinate with other agencies to manage the road system for its recreational value and public safety.

Desired condition for recreation and facilities are provided which meet the demand and use is managed in concert with demand and/or resource capability.

Commodity Use

Following the depletion of gold in the late 1800s, alternative sources of income were locally developed. Cash income was obtained through small locally owned logging operations and sawmills, or seasonal fire-fighting and forestry work. The depression drew many men to the area who were able to live in comparative comfort from mining activity. With World War II, many left again to support war-related industries. Following the war, fewer people were willing to live by the local rural standards. Through the 1940s and 1950s, a few retirees moved onto existing private lands.

Controversy over land management practices will continue amongst the various interest groups. Land management practices that may cause controversy include timber harvesting, increased recreational development, grazing, burning, fire suppression, etc. Controversy will be primarily based on personal beliefs and values for specific areas.

Trends

Local interest (both personal and commercial use) in special forest products will increase, thereby placing more demand on available resource supplies. Some special forest products include, but are not limited to, mushrooms, princes pine and floral supplies.

Agency expectations for timber harvest outputs will increase with the recent completion of the Forest Plan. The matrix lands in the North Fork watershed represent 34% of the total available to the Salmon River Ranger District. Within the North Fork, 10% of the area is in the General Forest Management Area.

Future employment opportunities are predicted to be limited, given social norms and current Forest Plan direction. Limited opportunities may be developed as the Forest begins an intensive fuel reduction program. The amount of fuel accumulation is currently too high to consider prescribe burning in some areas. Some fuels will need to be removed so ecologically sound prescribed burns can be completed, thus creating

commodities and employment opportunities.

Livestock Grazing

The discussion for this subject was better suited under the actual resource, so livestock grazing use/interpretation is found under Section VII - Riparian Reserves in this step and also in Step 6 - Recommendations.

Mining

Since 1851 and continuing through the turn of the century, mining has impacted the area. Miners exposed river bars and river and stream channels in search of gold. Placer, hardrock and hydraulic mining methods were utilized. Hydraulic mining activities from the late 1800s to the mid-1900s discharged millions of cubic yards of sediment causing major channel and riparian vegetation modification. This amount of sediment probably exceeds the sum of natural sediment delivered from 1944 to 1993 (de la Fuente and Haessig, 1993). Mining declined by the 1920s but has continued to contribute to the area's local economy to a limited degree.

The goal is to manage mineral exploration and the protection of surface resources and where possible to maintain environmental quality. Locatable mineral deposits within the North Fork watershed are placer deposits within ancient streambed channels and hardrock mines. Current mining operations are generally comprised of a limited amount of seasonal dredging from July 15 to September 15.

Studies of the biological impacts of dredging have identified localized effects on invertebrates and fishes which are influenced by species-specific habitat requirements (Harvey 1986; Griffith and Andrews 1981). The affects to aquatic species from dredging in the analysis area is unknown; however, dredges operating outside of the normal season could be locally impacting subgravel salmon and steelhead eggs, alevin and fry.

Trends

The number of mining operations is expected to remain about the same, unless market conditions change dramatically. The proposal to reopen the Liberty Mine has the potential to provide employment, gold and impact area resources.

Local community residents will continue to be actively involved in Federal land management issues affecting their area.

Local community populations will stay about the same, because of the geographical remoteness of the area, as well as a decline in historic timber harvest levels.

There will continue to be a seasonal influx of people into the area as a result of mineral prospecting activities.

Desired condition for commodities derived from traditional resources are enhanced and perpetuated overtime to contribute to community stability, improve living conditions and maintain environmental quality.

Roads

Roads provide access to the watershed for various purposes including recreation, gathering of special forest products, timber harvest and other consumptive uses, and for administrative activities such as fire suppression. While roads provide access benefits, they also cause some resource concerns such as increased erosion, wildlife harrassment and poaching, and impacts to visual quality.

Roads increase the potential for mass wasting and channel scour by altering the flow of water and decreasing slope stability. The cut and fill slopes with steepened slopes and lack of vegetation contribute to slope failure. The road surface increases runoff and reroutes water, causing increased flow during storms. The increased runoff from roads contributes to mass wasting and channel scour.

Roads also greatly increase soil erosion. Factors which influence the erosion rates from roads are: inherent soil erodibilty, road surfacing, drainage, road width, the condition of the cut and fill slopes, road gradient and wet weather usage of native or gravel-surfaced roads. Roads which have particular erosion concerns include the Little North Fork and South Russian systems.

Trends

Since the North Fork watershed is a Key Watershed, new road construction will be limited, with management constraints on new road construction. Reconstruction, decommission and closure of roads may lessen resource impacts from roads.

The desired condition is that roads are maintained to minimize surface sediment production into streams. Roads needed for human access into the area are maintained for gathering areas, woodcutting, recreation and administrative access.

II. Forest Health

Key Question: Can specific stand conditions or areas be identified as high risk areas?

Response: Overstocked stands, when combined with drought, create high risk areas for insect and disease infestations. True fir stands are most susceptible, as well as the upper two-thirds of hotter, drier slopes.

Background Information

Fire Potential/Overstocking

In pre-European times, stands were more open, with

more grass, forbs and shrub understory. Stocking levels of mature trees were less than what we have today due to the frequent fires that thinned stands, thereby reducing fire hazard as well. Native Americans also utilized fire, burning areas to increase productivity of bear grasses, acorns, etc. Consequently, numbers of trees were less with a higher percentage consisting of shade-intolerant species.

Trends

Large castrophic fires have added more early seral stage in large blocks, thereby reducing vegetative diversity.

Stands that haven't burned continue to increase in vegetative biomass putting them at risk to fire, insects and disease.

Areas of dense stands will continue to expand in Wilderness due to the lack of fire.

There is a high likelihood that many of the "N" stands (as defined on the Timber Type map developed in 1976) may currently be or are becoming overstocked.

Insects and Disease

Insects and diseases create dead and down material and recycle nutrients into the ecosystem. Insects and disease can increase the potential for high intensity fires by increasing the amount of dead and down fuel. This can have secondary effects on sediment production, and changes in vegetative character, landslides and atmospheric conditions.

The removal of fire has allowed insects and disease to replace fire as the primary disturbance process operating in the area. This has exacerbated the fire behavior potential on many sites.

Trends

The combination of drought and increased stand densities creates favorable conditions for insect and disease infestations. These infestations will continue to magnify in intensity until either one or both conditions change.

The upper two-thirds of hotter, drier slopes (east- to west-facing) are more susceptible to insect and disease infestations because of reduced moisture/ nutrient levels available.

True fir stand's susceptibility to insect and disease infestations will upsurge over time because of increased stand density.

Comparison of 1993 and 1994 aerial surveys for mortality indicate a five-fold increase in total acres of mortality in 1994. A trend of increased acres of mortality can be expected to continue.

The desired condition of forest health is to maintain healthy ecosystems consistent with the objectives of the management area. As the objectives of these areas vary considerably, so do the levels of concern for the various factors which affect forest health. These factors include such things as overstocking, insects/disease and fire. Table 5-1 attempts to identify the level of concern for these factors based on management objectives. These concerns may affect the design and implementation of management activities to maintain forest health.

III. Fire

Key Questions: - Are there High Risk areas in or bordering High Fire Behavior Potential areas?
- Where will the occurrence of a predicted high intensity fire be a concern (priority areas)?

Response: No high risk areas were identified in this analysis. High Intensity fires will continue to be a concern for all areas. By overlaying resource concerns with areas of predicted High Fire Behavior Potential, priority areas can be identified. These may become priority areas for fuels treatment or protection from fire.

Background Information

Risk

Risk is based on historical fire starts. The fire start data base for the Forest has 628 fire starts within the watershed during the period 1922-1994. Using a formula to calculate a risk rating, this number of starts equates to a moderate risk. A moderate risk rating projects one fire every 11-20 years per thousand acres. Human-caused fires have been a high occurrence along the North Fork of the Salmon, but in recent years, with a decrease in the number of residents along the river and an effective prevention program, these starts have been on the decline. This analysis identified no areas of high risk.

High Fire Behavior Potential

Complete information on Fire Behavior Potential modeling is contained in Appendix F Risk/Fire Behavior Potential Analysis. This analysis identified 49,000 acres of High Fire Behavior Potential, 38% of the watershed. High Fire Behavior Potential can occur in all of the fuel models identified in this analysis, except for fuel model 8. This analysis identified 40,600 acres of fuel model 8.

The majority of the vegetation layer used for this analyis was developed from data that is 20 years old. Some stands modeled as fuel model 8 have progressed to fuel model 10 conditions. Fuel model 10 is in a High Fire Behavior Potential condition on south and west aspects, also on north and east aspects where slopes are greater than 65% and the stands have greater than 70% crown closure. The analysis identified 41,000 acres of fuel model 10. Project-level analysis will provide closer vegetation and fuel model identification.

Table 5-1 Forest Health Levels of Concern by Management Area					
Management Area	**Presence of Overstocking**	**Presence of Insects/Diseases**	**Large Blocks of Mortality**	**Exclusion of Natural Fire**	**Comments**
Wilderness	Low	Low	Low	Moderate	Complete Wilderness Management Plan
LSR	Moderate	Low	Moderate	Moderate	Move towards self-sustaining conditions
Riparian Reserves	Low	Low	Moderate	Low	Move towards self-sustaining conditions
Partial Retention	Moderate	Low	Moderate	Moderate	Co-emphasis with wood fiber production
Recreational Rivers	Moderate	Low	Moderate	Moderate	Emphasize protection of outstandingly remarkable values
Retention	Moderate	Low	Moderate	Moderate	Co-emphasis with wood fiber production
General Forest	High	High	High	High	Wood fiber production is primary emphasis

Fire and Fuels Management Direction

The goals described in the Klamath National Forest Land and Resource Management Plan (1995) are to manage wildland and prescribed fire to reduce unacceptable fuel buildups, which will reduce the severity of future wildfires. Use of prescribed fire, either by itself or in conjunction with other fuels reduction methods, is considered the appropriate method in all management areas. Prescribed natural fire is appropriate in Wilderness and LSRs.

The analysis area has about 49,000 acres (38%) of High Fire Behavior Potential. By overlaying identified resource concerns with the Fire Behavior Potential Map (Figure 3-1), management opportunities aimed at reducing fuel loadings and fire severity may be identified (priority areas). With proper use of prescribed fire and other fuels reduction methods, High Fire Behavior Potential can be reduced, resulting in greater assurance of long-term maintenance of the desired conditions, increased safety to firefighters and increased effectiveness of fire suppression efforts.

Interpretation

Within the watershed fire regime conditions have changed. With effective fire suppression and a wet weather pattern during much of this suppression era (Hughes and Brown, 1991), duff layers have increased in depth, accumulations of available fuels in all size classes have increased, and the amount of vegetative biomass has increased. Areas that had few conifers are now heavily stocked. Prior to fire suppression the stands were open and tree crowns were separated. Areas with continuous conifer overstory were limited to the north and east aspects, and riparian areas which are less influenced by fire. The affects of these changed conditions include increases in dead and live fuel, development of fuel ladders and a closed canopy that can sustain a crown fire. At the 90th percentile weather the ground fuels easily burn, with flame lengths greater than 4 feet. These flame lengths will cause torching of the understory vegetation, which preheat and cause torching of the larger trees that were previously resistant to fire. Combining tight canopies with steep slopes, light winds and dry conditions, this individual torching will advance to running crownfires and create large stand-replacing events.

The fire season for this watershed typically lasts from June until the end of September, although fires do occur earlier and later in the year. Conditions most conducive for fires exist in July, August and September. Between 1922 and 1994 there have been 628 fire starts in the watershed area, 78% of these were started by lightning, 22% are attributed to human causes. Analysis of all the starts indicates that they have occurred throughout the elevational range of the watershed. Table 5-2 shows even distribution of fire starts throughout the watershed, with the area burned the 2,000-4,500 foot range standing out as the area with the majority of the area burned.

Table 5-2. Distribution of Fire Starts in the North Fork of the Salmon River Watershed.			
Elevational Range	% of Watershed	% of Starts	% of Area Burned
Above 4,500'	54	56	1
2,000-4,500'	44	40	96
Below 2,000'	2	4	3

Of the total watershed, 44% is in the elevational range between 2,000 and 4,500 feet, with 96% of the mapped area burned by fires occurring in this range. The watershed contains 44,409 acres of south aspect. A total of 64,641 acres of the watershed has burned since 1917. Of these acres, 55,874 have burned from fires that were ignited on south aspects. This includes repeat or acres that have burned more than once during the period. This indicates that fires starting on south aspects between 2,000 and 4,500 feet have higher rates of spread and are more resistant to control than less exposed areas.

For this analysis, the hottest aspect was identified as the 120 degrees of south aspect used in the Forest Inventory and Analysis User's Guide. Table 5-3 shows the descriptions of the aspects used in the guide and this analysis.

Table 5-3. Aspect Descriptions Used in this Analysis.	
East	70-130 degrees
North	310-70 degrees
South	130-250 degrees
West	250-310 degrees

The fire effects of the Hog Fire (1977), the Yellow and Nielon Fires (1987), and the Specimen Fire (1994) were mapped. Areas having high fire severity (>70% crown kill) and areas having moderate fire severity (30-70% crown kill) were identified. The rest of the area within the fire perimeters is identified as having low fire severity. Table 5-4 shows the severity by aspect, indicating the significance of aspect to fire intensity.

Table 5-4. Severity by Aspect in Acres and Percent (%).					
Fire Sever-ity	East	North	South	West	Total
High	1,545 (22%)	1,470 (21%)	**3,268 (47%)**	733 (10)	7,016 (24%)
Moder-ate	2,150 (23%)	1,537 (16%)	**4,777 (50%)**	1,028 (11%)	9,492 (33%)
Low	2,504 (20%)	2,976 (24%)	**4,961 (40%)**	2,073 (16%)	12,514 (43%)
Total	6,199 (21%)	5,983 (21%)	**13,006 (45%)**	3,834 (13%)	29,022 (100%)

Trends

The High Fire Behavior Potential areas will continue to increase. The occurrence of high intensity fires is expected to remain constant. Refer to the Trends section under Specimen Fire Effects for more specific trends relating to that area.

Specimen Fire Effects

Regarding the Key Question concerning the trend for the key features affected by the Specimen Fire, interpretation indicates that the Marble Mountain Wilderness Area is at a higher elevation than the other areas and tends to have more of the area burned at low severity. A portion of the Riparian Reserve (RR) in the Specimen Fire area burned at a higher severity than what is considered a normal burn in RRs. However, much of the RR burned at a low severity. The RR is important for filtering out sediment from upslope run-off. In areas where both the upslope and RR have burned with high and moderate severity, streams and fisheries will be impacted by increases in sedimentation. More sight specific information on sedimentation from the Specimen Fire are located in the section on Areas with Watershed Concerns (AWWCs).

Trends

Much of the area that burned with high severity was replanted in the spring of 1995 with mixed conifers (600 acres). These areas are also regenerating with grass, forbs, brush and hardwoods that have sprouted from seed and root crowns. As seen in other fire areas within the Salmon River drainage, these areas will become very dense and susceptible to a severe fire in the near future. This will set back the development of Late Successional Habitat (LSH). These areas should be managed for the development of LSH as promptly and sustainable as possible. Areas with standing and falling dead trees that exceed the requirements for LSH should be looked at for opportunities to remove some of these future large fuels and treat the slash created. This should be done to a level that will reduce the future fuel loading and still provide snags and course woody material (CWM) for LSH. This will reduce the intensity of future fires in the area, which will enhance the establishment of future stands with LSH. Within the Late Successional Reserve (LSR), most of this area lies within the Specimen Creek drainage.

Another high concern is the areas that have been burned at moderate severity. Without treatment, the standing dead trees in these areas will fall and, over time, increased amounts of dead and live fuel will set the area up to burn at a high severity. These areas should also be managed for development of LSH as promptly and sustainable as possible. There are opportunities in these areas for reducing the likelihood of a complete stand replacement fire. Removing the standing dead trees that are in excess of what is needed for LSH and treating the slash will protect the remaining live trees and the needed

snags and large downed wood from future fire. This will also buffer the area of the LSR that has functioning LSH and promote sustainable growth in these burned areas.

Areas burned at low severity will be less of a concern, and the burn may even increase the resiliency of the stands in those areas. Although most of the overstory in these areas is intact, much of the understory has been killed. These smaller (4-10 inch diameter breast height [dbh]) trees are and will be falling over in the near future, developing a fuel loading that will increase the intensity of the next fire. These areas should be considered for natural prescribed fire. Prescriptions should be developed that will indicate the conditions that a low severity fire will be allowed to burn. When these opportunities present themselves, fuel loads in these areas can be reduced with minimal expense.

Fire severity of the past regime is believed to have been mostly low intensity in the riparian areas. In the Specimen Fire area the analysis of the fire severity shows some high and moderate severity in the RR. Removing the standing dead trees that are beyond the guidelines of the Aquatic Conservation Strategy will reduce the likelihood of a high severity fire and enhance the development of sustainable LSH.

High concerns outside of the burn area are maintaining connectivity of LSH through the area between Little North Fork Creek, north and west to the wilderness boundary. This is the area within the LSR that contains most of the suitable LSH. It is now bordered on the east side by the Specimen Fire which, without treatment, will increase in flammability as time goes by. To the southwest is an area that has had repeated burns and maintains a highly flammable brush on a hot south aspect. Between this brush and the suitable LSH is an area identified as having high mortality from insects and disease, setting it up for an intense burn. Treatment of fuels in this area needs to be accomplished prior to a fire burning into or ignited within this high mortality area. The consequences of a fire burning through this area could be a loss of much of the suitable LSH that is left in this LSR. Opportunities exist to treat fuels within and around the area containing suitable LSH. This will help to sustain the habitat for a long period of time. Buffer, or possibly fuel break, opportunities exist in the areas within or between the flammable brush and the high mortality areas.

Plantations throughout the watershed, including the LSRs, contain thick mature brush and conifers. In their present condition they are susceptible to stand replacement fire. Opportunities for fuels reduction exist for these plantations which will help in promoting added and replacement sources of suitable LSH.

IV. Allowable Sale Quantity

Current timber management direction is guided by many laws, regulations, and resource plans. The Klamath National Forest Land Resource Management Plan (Forest Plan), signed July 5, 1995 provides management direction and also the Northwest Forest Plan ROD, signed April 13, 1994, provides management direction to the Forest Plan.

Based on the Order 3 Soils Survey of the Klamath National Forest, approximately 56% of the matrix land is capable of supporting commercial conifer stands where intensive timber management would be applicable. The remainder of the matrix area consists of harsh site (5,000 acres) and low productivity site (6,000 acres). Areas delineated as harsh site are incapable of producing 20 cubic feet of wood fiber per year and should not be considered for timber management activities. Areas with low site capability, due to shallow soils or marginally plantable ground, are capable of producing wood fiber but should not be considered for intensive timber management. These areas are more applicable to stand health types of treatments, sanitation and salvage. The remaining 18,300 acres of matrix are capable of intensive timber management treatments.

The desired condition for matrix lands, depending upon management area designation, are to provide an attractive forested setting where management activities remain visually subordinate to the landscape, enhance outstanding values, prevent degradation of resources, and provide a programmed flow of timber products, sustainable through time. Also, a programmed, sustained harvest of wood products should be managed in areas capable, available, suitable and appropriate for timber management. The levels of timber harvest will vary from year to year, based on ecological process.

An analysis was completed to give an approximation of the level of green tree retention that would be required in order to provide a sustained level of harvest over time. It must be remembered that the data used was gross data from the Forest Plan data base and that projections are approximate and should be used as a starting point. Ground verification and more site-specific analysis needs to be completed at the project-level. The following assumptions were made during the analysis: 1) on the average, Regulation Class 2 land would be managed on a 120-year rotation. This would require approximately 7% of the land base to be regenerated every decade; 2) between 25% and 44% of the existing matrix land currently has unmapped RRs; 3) regeneration openings will have clumps of green trees on at least 15% of the area. Based on this analysis, a sustained level of timber yields would require approximately 600 - 800 acres to be regenerated every decade, once desired ranges were met.

Table 5-5 shows the desired condition for matrix lands in the North Fork Watershed.

Table 5-5. Desired Condition for Matrix Lands (Regulation Class 2, Partial Retention and General Forest Management Areas)

	Desired Condition	Current Condition	Current % Existing
Early (0" to 6")	5-20%	4,600	25% *
Pole (6" to 12")	15-35%	3,500	19%
Mid-mature (12" to 25")	20-50%	5,200	28%
Late Mature (25"+)	20-35%	5,000	27%

* An evaluation of these early seral stands needs to be done on the older plantations. Many of the 20-30 year old plantations may actually fall into the pole classification.

Trends

Within matrix lands, harvesting will occur for commodity production, probably from existing road system. Within matrix, primarily General Forest and Partial Retention Management Areas, some vegetative changes will occur and retain 15% of the existing stand. The matrix lands will continue to provide a forested setting where management activities remain visually subordinate to the landscape and provide a programmed flow of timber products that are sustainable through time.

Timber harvesting will occur in land designated other than matrix. Harvesting in other land designations will be completed to improve and/or maintain other resource values and objectives; i.e., maintenance of habitat diversity or protect resources from large-scale disturbances.

Based on comparisons of existing and desired conditions, assumptions can be made. During the first decade, green tree retention harvesting will probably be limited in scope until some of the early seral stands transition into pole-size stands. Regeneration harvesting will be concentrated in areas with high levels of decadence and mortality. Harvesting for stand health and maintenance will be emphasized during this first decade. Commercial thinning and sanitation/salvage of stands will be the primary focus.

Harvesting in other areas will concentrate on improving and/or maintaining other resource values and reducing the risk from large-scale disturbances, especially in the Specimen LSR. The ASQ can be provided from the matrix lands and accomplish connectivity for LSRs. This analysis shows that connectivity needs can be met with dispersal corridors through matrix lands.

V. Late-successional Reserves

Key Questions:

- What are the short-term and long-term trends of the LSR processes and features?
- How can we sustain the viability of the LSRs over time?

Response: The short-term trend of increased conifer stand density on all sites and aspects is good for many late-successional associated wildlife species. In the long-term, however, this presents risks to the maintenance of the late seral habitat from increased inter-tree competition, etc. especially in times of stress. Through specific management activites, the ability to sustain the viability of the LSRs over time will be achieved.

Background Information

The past vegetative management practices and fire suppression activities have lead to the habitat conditions found in the LSRs today. With a generally wet past century and the suppression of all fires, the vegetative biomass has increased on all sites. The increase in the distribution and density of the understory is responsible for almost all of the increase in biomass. This is most apparent on south- and west-facing slopes. This increase has lead to increased conifer stand density on all sites and aspects. In the short-term, this increased stand density is good for many late-successional associated wildlife species, but in the long-term, it presents risks to the maintenance of the late seral habitat. The high stand density found on many sites can lead to increased inter-tree competition for water and nutrients, especially in times of stress (drought). This can leave the trees in a weakened condition and vulnerable to insect and disease outbreaks. If left untreated, these types of outbreaks can destroy large blocks of forest. The increased understory and accumulations of woody debris have created a mixture of conditions in the LSRs that make the late seral conifer stands susceptible to large-scale stand-replacing fires. The fuel models and fire behavior potential for many of the late seral conifer stands show a high probability of stand-replacing fires burning in them in the future.

Another result of past and present management practices, is the replacement of fire-adapted conifers (ponderosa pine and sugar pine) and hardwoods (black oak and pacific madrone) with shade-tolerant non-fire adapted conifers (white fir) in the understory. Shade-tolerant vegetation now makes up most of the understory on all sites, even the normally more open and dry south and west aspects. The lack of younger pines and hardwoods means that as the larger trees fade out, there will not be replacements. Also white fir is not as long-lived as pines, and pure white fir stands do not provide as diverse wildlife habitats as pines and hardwoods. The ever increasing density and size of the understory, without the natural thinning from fire, has made much of the late seral timber stands less suitable for larger species such as northern goshawks, which need a more

open understory.

Past timber harvest activities have left the LSRs with 3,280 acres of conifer plantations from 1-30 years old. Growing these plantations to late seral habitat is very important to the continuing function of the LSRs. As the plantations grow to a large tree character, they will help fill in much of the fragmentation of late seral habitats and provide replacement for existing late seral conifer stands that are lost to fires, insects and disease. These plantations were planted at a fairly high density. To grow them into late seral habitat with a large tree character will require some form of vegetation management, such as thinning, underburning or release from competing vegetation. Without management, it is doubtful that the existing plantations will grow to large tree late seral habitat. Many of the plantations in the LSRs were planted with a single conifer species or predominantly a single species. In the Taylor Creek area of the Eddy Gulch LSR, off-site pine from the McCloud area was planted in the 1960s. To provide the multi-species and multi-storied late seral habitats, all of these plantations will need vegetation management such as thinning and replanting with different tree species.

What is the desired condition for habitats within the Specimen Fire area?

In 1994, the Specimen Fire burned 3,046 acres in the Little North Fork LSR. In the area burned, 787 acres were late seral habitat and 769 acres were plantations. Re-establishment of a conifer forest on these sites and protection of the adjacent late seral conifer stands are important to the continuing function of this LSR. To meet a desired condition of dense mixed conifer on good sites with pines and hardwoods on the drier sites, several management activities should take place:

1. Reduce the fuel loading in the burned areas to prevent a future reburn. Maintain large sound snags and course woody debris.
2. Remove concentrations of standing dead trees that pose a risk to plantations and adjacent late seral stands. Some of these concentrations are less than 10 acres in size, but the risk of future loss is high enough to warrant removal of these concentrations.
3. Create a fuel break on the ridge between Specimen Creek and Little North Fork to protect the large block of late seral habitat in the Little North Fork.
4. Replant the good site with mixed conifer, heavy to Douglas-fir on the north and east aspects and heavy to ponderosa pine on the south and west aspects. Promote hardwoods on all sites to increase diversity.

Connectivity

For the most part, movement or dispersal of late-successional dependent species depends on the distribution of late seral habitats across the landscape. The greatest barrier to dispersal are large blocks of unsuitable habitat. Late-successional dependent species generally avoid these areas due to a greater risk of predation. Within this watershed, barriers to dispersal exist in areas of catastrophic fire (Hog Fire and Yellow Fire) and natural harsh site conditions (i.e., Tanners Peak). Dispersal habitat within the analysis area has been assessed at the quarter township level using 50-11-40 analysis. The 50-11-40 analysis determines whether at least 50% of the capable lands support tree canopy closure of 40% with conifers of greater than 11-inch dbh. All or portions of 39 quarter townships occur within the analysis area; of these, 5 have less than 50% of the capable lands available for dispersal. These quarter townships are on the west end of the analysis area within the Hog fire and Yellow Fire areas. For the 50-11-40 analysis of the entire North Fork analysis area, refer to Appendix G Spotted Owl Habitat/50-11-40 Analysis.

The connectivity corridor between Little North Fork LSR and Eddy Gulch LSR received a more in-depth analysis because of its importance in providing dispersal habitats between the 2 LSRs in the watershed. There are approximately 5,800 acres of capable site in the corridor of which 3,900 acres (68%) is now in dispersal habitat. Table 5-6 shows the dispersal corridor habitats by management area. Refer to Figure 5-1 Connectivity Between Little North Fork and Eddy Gulch LSRs.

Table 5-6. Acres of Dispersal Corridor Habitats (capable site only)

Management Area	Suitable Dispersal Habitat	Potential Dispersal Habitat
Mapped Riparian Reserves	622 ac: (16%)	105 ac. (6%)
Administratively Withdrawn	210 ac. (5%)	111 ac. (6%)
Matrix*	3,065 ac. (79%)	1,648 ac. (88%)

* Includes Recreational River, Partial Retention and General Forest Management Areas.

Desired Conditions for the Late-successional Reserves

Within the LSRs, the desired condition of the habitat will depend on the site capability, aspect and elevation. In general terms, 70 to 85% of the capable site would be in late seral habitat while 15 to 30% would be in small blocks of early and mid seral habitats. Snags, CWM and deformed trees would be prevalent in all stands on all aspects. The number of snags and the amount of CWM would vary depending on the site condition and aspect. On south and west aspects, snags and CWM amounts would approximate the low end of the Forest Plan standards and guidelines; north and east aspects would approximate the high end.

In the mid-elevation mixed conifer zone on capable site, the composition of the desired forest is a function of aspect. On north and east aspects, the desired forest would be predominantly Douglas-fir with some pine and

a few hardwoods. Crown closure would run from 70 to 90% with a moderately dense understory. In the bottom of drainages and in areas that have not burned for a long time, areas of dense understory will be found. On south and west aspects, the stands would have 40 to 70% crown closure and be composed of ponderosa pine with a large hardwood component (mostly black oak and pacific madrone). With a higher return frequency of low intensity fires, the understory is much more open, composed mostly of grass, forbs and brush with scattered pines and hardwoods.

At higher elevations, the true firs (red fir and white fir) are the dominant tree species. The desired forest would have 70 to 95% crown closure of a single species. The stands would range in size from 10 to 100 acres, be even-aged and have almost no understory.

Trends

The short-term trend for the LSRs is for more dense conifer habitat on all slopes and aspects. This is providing more habitat for some late-successional species. Over the long-term, many of these dense stands cannot be maintained and will be lost to fire, insects and disease. The conifer plantations within the LSRs will need some form of vegetation management to grow into late-successional habitat.

To sustain the long-term viability of the LSRs, the late-successional conifer stands will need to be protected from large-scale disturbance such as stand-replacing fires and insect and disease outbreaks. The plantations will need to grow to late-successional habitat to reduce fragmentation and allow maintenance of the connectivity of late-successional habitat between the LSRs.

VI. Areas with Watershed Concerns

Key Questions:

- Are these watershed concern features recovering?
- What actions could speed up recovery?
- What processes could prevent recovery of the concern features?
- What would signal that the watershed is no longer an AWWCs?

Response: The fire and timber harvest disturbances are recovering, but some roads with design problems will continue to negatively effect watershed conditions unless repaired. Recovery can be enhanced through planting or other activities which promote vegetation establishment and growth, especially trees. Recovery can be prevented through additional watershed disturbance, most likely wildfire. A watershed is no longer an AWWC when either the modeled sediment production value drops below the concern value or a site-specific evaluation determines that an area is not of concern.

Background Information

Recovery of AWWCs is highly dependent on the specific characteristics of the areas. However, some general comments on recovery are useful. Strictly from a modeling viewpoint (a model was used to provide a rough cut of AWWCs), a recovery curve is used to account for expected watershed recovery. The landslide production model assumes a 50% recovery after 20 years for fire and harvest units and no recovery indefinitely for roads unless a road is obliterated. The effects of the Hog Fire of 1977 are still accounted for the same as the 1987 fire. But in 1997, areas impacted by the Hog Fire will have a reduced landslide production estimate to account for recovery. As with all modeling assumptions, recovery curves are only coarse measures used to account for actual processes.

Recovery of hillslopes from the perspective of landslide production generally results from the re-growth of vegetation and re-establishment of slope stabilizing root structure and evapotranspiration rates. Slope stability actually decreases for a short time following vegetation death from fire or timber harvest as dead roots rot, then increases with vegetation re-growth. Recovery time can be decreased, with planting and other measures of enhancing vegetation growth, although time is the primary factor. Large, deep-rooted trees are the best for stabilizing slopes, much better than grass and better than brush on capable sites, so enhancing tree growth may improve slope stability. Roads are less subject to landsliding with increased vegetation on the cut and fill slopes and with design features which improve stability, such as adequate stream crossings, good drainage and compacted fills. Benefits of improved design features are difficult to quantify and are not part of the landslide production model.

Surface erosion recovery happens much more quickly on disturbed hillslopes than does landslide recovery. The growth of vegetation and accumulation of surface cover generally happens within a few years following disturbances, depending on site-specific conditions. Seeding with species which quickly form ground cover, such as grasses, speeds the recovery process although natural vegetation establishment often occurs almost as quickly. Exceptions occur at locations where site limitations and continuous erosion impede the natural establishment of vegetation. These include unstable cut slopes and other similar situations that may benefit from active seeding or planting of vegetation. Road surfaces, unlike the cut and fill slopes of roads, do not recover over time because of continued maintenance, use and soil compaction. However, actions such as road closure, road surfacing, limiting wet weather use and allowing for road drainage help minimize road erosion.

Channel erosion is increased through increases in peak flows or disturbance of the stream channel and riparian zone. Recovery of streams and riparian areas is discussed in the Riparian Reserve section. Recovery of peak flow increases is similar to recovery of slope stability, fully recovered in about 30 years with 85% recovery in about 20 years. Roads generally do not recover unless obliterated, although improved road design can lessen the hydrologic impacts of roads. Burned or harvested areas have increased peak flows, primarily during rain-on-snow storms, due to the increased snow accumulation, wind velocity and subsequent melt rates. Recovery from this condition occurs when the tree canopy becomes dense and large enough to decrease snow accumulation.

Recovery of an AWWC can be prevented if an additional disturbance effects an area which has had vegetative re-growth. Typically the additional disturbance will be moderate or high intensity wildfire, either re-burn of an older burn, wildfire through a plantation, or wildfire through previously undisturbed ground. Additional management disturbance is prohibited without further analysis and will not impede recovery.

The current condition of subwatersheds in the North Fork drainage is different than pre-European conditions. Many subwatersheds in the wilderness have not been burned for 40 years or more and have not had other significant disturbances. These areas likely have lower disturbance levels than historical, although future disturbance from wildfire is a possibility. On the other hand, other subwatersheds have some combination of large, recent stand-replacing fire, high road densities and recent timber harvest. These areas probably have higher disturbance levels than historical. It is very difficult to determine with any reliability a pre-settlement watershed disturbance level, therefore an AWWCs determination is a rough approximation of areas with higher disturbance levels than pre-settlement.

The determination of this analysis is that 7 subwatersheds should be considered AWWCs. This includes about 31,000 acres of the 130,000 acre North Fork Watershed, compared to about 16,000 acres identified in the Forest Plan. The desired condition of the AWWCs is to provide for healthy watershed function so that the underlying land allocations become the primary management emphasis. This includes a stable and non-eroding road system where roads are necessary, hillslopes which have adequate soil cover and vegetation to minimize erosion, slope stability problems, and peak flow changes, stable stream channels and are not of high risk from wildfire.

The Music Creek and Lower South Russian subwatersheds are considered AWWCs. The primary concerns for these areas are increased landslide potential and erosion from the road system, especially in the granitic soils. Some road work has been completed to correct some of the erosion problems although more potential road improvements exist. The primary road through Music Creek provides access to a trailhead but some of the spur roads have potential for road closure. Since the public lands portion of the subwatersheds are within Wilderness or LSR Management Areas, additional programed timber harvest will not occur. Activities which improve late-seral habitat or are otherwise necessary may occur as long as the impact on watershed health is minimal.

Specimen Creek is considered an AWWC due to fire effects. Recovery of the watershed has been slightly enhanced through tree planting but will require more time for full recovery. The watershed is in Wilderness or LSR Management Areas, so programed timber harvest is not an option. However, the removal of dead trees to protect from future wildfire is a priority as long as the increased disturbance caused by this activity is small compared to the long-term benefit.

The other AWWCs within the Little North Fork drainage have primarily road concerns in the granitic soils. Past road work has improved stability along some roads, although there are additional opportunities for road improvements. Programed timber harvest is not an issue in these 2 subwatersheds because they are almost entirely within Wilderness or LSR Management Areas. However, projects which improve late-seral habitat and reduce fuels are considered minor impacts to watershed health and are appropriate.

The Olsen and Big subwatersheds have been heavily impacted by fires over the last 20 years. The areas burned by the Hog Fire and not reburned in 1987 are recovering well from a watershed perspective. However, fuel hazards are high due to the stocking density of brush and small trees. The 1987 fire area has been treated and planted and will need many more years for recovery. Since the area is mostly Matrix and Riparian Reserve, the desired condition is improved tree growth for future harvest in the Matrix and reduction of fire hazard where appropriate. Additional regeneration harvest is not appropriate in this area until many more years of recovery have occurred.

The priority activities for improving watershed health in the short-term are road stabilization and obliteration in the granitic soils of South Russian Creek and the Little North Fork. For long-term watershed health, fire hazard reduction is the most important activity, especially in the Specimen Fire area, the brushfields created by the Hog Fire, and other areas appropriate for fuel reduction.

Trends

Watershed health and fisheries habitat may improve some in the South Russian drainage, with the revegetation of the recent harvest units, as long as flooding or wildfire do not impact the subwatersheds. If a landslide-causing storm does occur, elevated rates of landsliding and debris scour from the road system would impact the stream channels.

The Specimen Creek drainage will slowly recover from the fire. However, as trees and brush killed by the fire accumulate on the ground, the fire hazard will increase, increasing the possibility of the subwatershed reburning.

The Sur Cree and Garden Gulch reaches of the Little North Fork will continue to contribute granitic sand to the Little North Fork, although at lower levels than in the past given similar climatic conditions. Road improvements have decreased sediment production from some roads but other roads will continue to be sediment problems.

The Olsen and Big Creek reaches of the North Fork Salmon will continue to recover from the recent fires, resulting in less sediment delivered to the North Fork. Some areas have a high risk of hot reburn in the near future, especially the older brushy areas burned in the Hog Fire and not in the 1987 Yellow Fire.

VII. Riparian Reserves

Key Question: How do Riparian Reserves characteristics and processes respond to disturbance? What are their trends?

Response: The North Fork Riparian Reserves have been highly impacted by channel scour from landslides, debris torrents and placer mining. Riparian vegetation has been lost, stream channels destabilized and recovery sometimes very slow. Roads have also impacted the Riparian Reserves with variable impacts depending on the specific road. Fire and/or timber harvest has impacted large acreages of the RRs through the loss of large trees, but has not had the more severe impacts of other disturbances, except where fire has increased the effects of debris flows. Grazing has occurred over large areas, but impacts to riparian areas have not been extensive. Currently the riparian vegetation consists of fewer stands of large, dense conifers than previous to European settlement, mostly due to effects of recent fires. Generally, disturbed riparian areas are recovering. Future disturbances are inevitable, but proper management can minimize impacts.

Background Discussion

Floods, Landslides and Debris Scour

Floods with landslides and debris scour strip a streamside of riparian vegetation, decrease stream habitat complexity by filling pools and often destabilize the stream banks. Floods are natural, unpredictable events; however, most riparian damage from floods occurs through landslides and debris scour which sometimes can be related to management. Therefore, the unstable and potentially unstable geomorphic terranes of active landslides, inner gorges, highly dissected granitic terrane and toe zones of dormant earthflows are within RRs. Future disturbances are inevitable, but proper management can minimize effects. Refer to Appendix J North Fork Riparian Reserves.

Recovery from a debris scour event occurs in stages and along variable timelines. Initial recovery occurs when short-lived riparian species, usually grasses, forbs, willows and alders, are established enough to provide bank stability and integrity. Full recovery includes the growth of long-lived trees, generally conifers, up to sizes and stocking levels similar to before the disturbance. Generally, initial recovery occurs relatively quickly, from less than a decade to a few decades, but full recovery can take 100 years or more.

A review of 3 analysis area streams scoured in the past shows variable recovery. The main stem of the North Fork shows only 20% initial recovery since 1964, the Little North Fork about 20% recovery since 1975, and the Left Hand Fork of Specimen Creek about 80% recovery since 1944. In general, larger streams recover more slowly than smaller streams due to the larger surface area effected by the scour and larger streamflows acting on this surface. Also, streams made unstable by the scour events have a poorly defined primary channels and recover slowly due to frequent re-disturbance by subsequent high flows. Stable channels recover more quickly. Of the many North Fork streams scoured in the recent past, only the main stem of the North Fork below Idlewild, the Little North Fork and South Russian Creek show a low level of initial recovery.

Fire

A low intensity fire in riparian areas causes little impact to the riparian ecosystem. Large trees generally survive and top-killed riparian shrubs quickly re-sprout. The cool, moist conditions in riparian areas promote slow fire spread and tend to retard fire intensities, although fire behavior in steep narrow canyons, side drainages and upslope headwater areas is less influenced by cool, moist conditions. Fire intensities in riparian areas are usually low, previous to fire suppression, but increased fuel accumulation has increased the potential fire intensity.

A moderate or high intensity fire which kills the overstory vegetation and riparian shrubs while consuming the large wood causes a much greater impact. Stream channels are often destabilized following a high intensity fire, as was the case in Olsen and Kanaka Creeks after the 1987 fires. Re-sprouting riparian shrubs usually re-occupy burned sites within a few years unless a debris scour event follows the fire. Full recovery, the re-establishment of large trees, can take 100 years or more, although elevated landslide risk decreases more quickly (refer to the AWWCs discussion earlier). Riparian

areas are have mostly achieved initial recovery from the Hog and Yellow Fires, except for some severely burned areas in Olsen and Kanaka Creeks, but are only minimally recovered in the Specimen Fire area.

Mining

Mining in riparian areas can severely effect riparian conditions. Placer mining previous to 1950 removed the vegetation and topsoil and left behind little more than bedrock and cobble. This has a long-term impact on North Fork riparian areas, not only the removal of pre-existing riparian vegetation but also inhibiting vegetation regrowth. Some of these areas are still barren after 100 years or more, although some areas with more fine soil left after mining are much more recovered. The mined areas have affected the stability of stream channels and magnified the effects of past floods.

More recent placer mining operations strip riparian areas of vegetation, but post mining revegetation requirements lessens the long-term impacts. Suction dredge mining, the primary mining method used currently in the North Fork, destabilizes the bed of channels and may affect aquatic species directly. The effect of suction dredging may be short-term.

Roads

Roads represent a long-term impact to RRs. The road surface is permanently removed as a growing site for riparian vegetation as long as the road is open. However, the total percentage of roads in the North Fork RRs is small, about 1%. The greatest concerns with roads in riparian areas is at stream crossings and other locations where a road is immediately adjacent to a stream. These locations have direct impacts on the stream channel, banks and stream shading and stabilizing vegetation. Roads increase sediment input to streams, as discussed in the AWWCs section. This is particularly true in RRs with a combination of slope stability concerns and direct access to streams. Also, culverts not large enough to pass storm flows and associated debris may overtop and jam, often causing mass failure of road fills, affecting the channel and riparian area for many miles downstream.

Grazing

Plant community types and spatial relationships have changed some in comparison to historic grazing conditions; however, it is impossible to know how these communities have changed since the pre-domestic livestock grazing period. Condition and trend (C&T) transects have been kept since the 1950s. These records, along with new methods of plant community status measurements, are used to determine rangeland conditions.

Rangelands in the watershed have improved on average in recent years since grazing seasons have been shortened and livestock numbers have been reduced to fall in line with allotment capacities. The average feed area within an allotment in this watershed is meeting direction provided in the Aquatic Conservation Strategy (ACS) and the Forest Plan. There a few areas where utilization standards listed in the Forest Plan are exceeded and a few areas where riparian areas do not have the plant species composition and structure called for in the ACS. These areas are discussed below.

In the Shelly Meadows allotment, better distribution over the last 5 years has improved end of season conditions in the Bug and Cabin Gulch areas. Previously, over-utilization has been a concern. Willow stands are healthy with less than 12% of each year's growth browsed.

In the South Russian allotment, the top meadow is of concern. The top meadow is wet and has good diversity and ground cover, but has been used beyond Forest utilization standards for several years. Last year this was due to recreational and administrative packstock. The permittee has been working on the problem. Due to the location and attractiveness of the meadow to cattle, high use continues in the area.

Timber Harvest

Timber harvest and fuel treatment affects the RR similar to fire. The primary effect of green tree harvest is the removal of trees which help stabilize the ground against mass wasting and shade streams. Timber harvest, both green tree and salvage, also removes logs which may have served as large wood recruitment to streams. Skidding logs by tractor or skyline increases erosion potential by exposing soil and channeling overland flow. Fuel treatments after harvest, broadcast burning or tractor piling, removes soil cover which increases erosion, but decreases the likelihood of a future high intensity wildfire.

In the North Fork Salmon analysis area, over 2,000 acres of RR has been harvested to various degrees. The majority of this has been fire salvage, so fire was the primary riparian impact, but there has also been green tree harvest. These harvested areas are along the main stem or tributaries to Eddy Gulch, Jessups Gulch, Whites Gulch, Little North Fork, Kelly Gulch and North and South Russian Creeks. Salvage harvests following the Hog Fire in 1977 removed mostly dead trees, but some green trees were also removed from what is now RRs. Salvage harvest after the 1987 fires left the majority of the green trees and much of the dead trees in the RRs.

Table 5-7 displays the current (1995) and past (1944) vegetative conditions (refer to Figure 4-2 1944 Vegetative Condition). The typing was not done exactly the same way for each data source so care must be taken with interpretation; however, some useful information can be derived. The percentage of stands dominated by large, densely stocked conifers has decreased between 1944 and 1995 while the percentage of early seral stands has increased. This is primarily due to wildfire effects, but timber harvest and debris scour have increased the amount early seral vegetation at the expense of the other

2 types.

Table 5-7. Vegetative Conditions in the RR.

Vegetation Type	Percentage Typed In 1944	Percentage Typed In 1995
Pole/Mid Mature/ Late Mature/Old Growth w/ > 70 % cover	34%	27%
Pole/Mid Mature/ Late Mature/Old Growth w/ < 70 % cover	51%	43%
Early Seral	15%	30%

Much of the RR in the North Fork is incapable of growing dense stands of large trees due to site limitations, about 36% of the RR according to the available soils information. Other areas typed as early seral may be suitable for growing large trees but instead contain stable meadow/shrub complexes. A review of riparian conditions by subwatershed shows roughly the same proportions of vegetative conditions as the average for the whole watershed. Noticeable fluctuations occur in higher elevation subwatersheds where the amount of natural meadows and barren areas is high and in the heavily burned subwatersheds with high amounts of early seral vegetation.

The 1944 vegetative conditions provide a reasonable approximation of reference riparian conditions. Fire suppression had not changed the landscape a great deal by this time, and the effects of other human activities was limited to the hydraulicly mined 1% of the RRs.

Trends

- The riparian vegetation will continue to recover from past floods and fires, at various rates depending on site conditions. Sites continuously disturbed, such as recreational accesses, will not recover fully to site-potential vegetation.

- Natural disturbances such as floods and fire will continue to impact riparian areas. Subwatersheds with the highest disturbance rates will suffer the greatest riparian disturbance from future landslides and debris torrents from flood and storm events. High fuel loadings in riparian areas may contribute to more riparian damage from wildfire than would have occurred under a more frequent fire regime.

- The size of future runs of anadromous fish is unknown and dependent on many variables outside of this analysis area. However, fisheries habitat should improve or remain the same in this area, given no major disturbances. Improved habitat could occur with increases of instream large wood and recruitment potential in all streams, although reaching the Forest Plan desired condition is not likely. Increased pool frequency and decreased fine sediment could occur in some streams, especially Specimen Creek as it recovers from recent fire effects. Increasing riparian vegetation would also benefit stream shade and potentially stream temperatures.

- Future floods with large sediment inputs to the streams would decrease pool frequency, increase surface fines and impact riparian vegetation. Future wildfires could impact riparian vegetation and increase erosion, affecting stream substrate composition.

- The habitat of riparian-dependent species should remain the same, except for improvement of riparian conditions along streams recently affected by fire or channel scour. The habitat conditions could be degraded by future wildfire or floods.

The desired condition for the RRs is the presence of healthy plant and animal communities living in an environment where physical and biological processes are maintained within a range similar to that under which these communities evolved. Table 5-8 displays the desired vegetative conditions within the RRs.

Table 5-8. Desired Vegetative Conditions within the RRs

Vegetative Type	Percentage Desired Within RRs
Pole/Mid Mature/Late Mature/Old Growth w/ >70% cover	30 - 40
Pole/Mid Mature/Late Mature/Old Growth w/ <70% cover	45 - 55
Early Seral	10 - 20

The vegetative conditions will also supply CWM that is managed for an average of 20 pieces of large wood per 1,000 lineal feet or to grow conifers to site potential.

Low intensity prescribed fire is encouraged within the RRs for added resiliency to future high intensity fires.

In the North Fork analysis area, intermittent streams on south aspects underlain by shallow soils should include manzanita, live oak, knobcone pine, ponderosa pine and other drought-resistant species. The floodplains of major streams should include a multitude of species, such mixed conifers and other upland species as well as lowland species such as maples, alders and willows. In unstable areas, the desired plant communities would depend on local site conditions with attention to deep-rooted species capable of providing root support to the slope.

In meadow areas, overhanging banks with herbaceous and/or shrubby vegetation providing canopy cover should be present. RRs should provide shade, thermal buffering, large wood, organic matter, habitat, nutrient

cycling, bank stability and sediment filtration as appropriate to site capability. Wildlife habitat needs should play an important role in desired plant communities in most reserves. Emphasis should be placed on native species, but in some situations non-native species may be desirable.

VIII. Aquatics

As mentioned in Step 3, important parameters for fisheries habitat included in this analysis are in-channel CWM, woody material recruitment potential, pools, surface fines, embeddedness, substrate composition and temperature.

Large wood provides a source of cover and habitat diversity for fish through a range of flows and seasonal conditions. Wood also plays a role in maintaining healthy stream channels. Following the 1964 flood, the U.S. Forest Service and State agencies removed large amounts of wood from the Salmon River basin. Key woody material recruitment potential (measured in standing stems with the potential to fall into the stream channel) and occurrence of instream key wood (24-inch dbh by 50-foot length minimum) were assessed during habitat surveys.

Cool, deep pools in the North Fork analysis area are critical for summer holding and rearing habitat. Spawning occurring in the North Fork takes place in the deposited gravels in pool tailouts. Pools can also be highly sensitive indicators of changes in watershed condition (EPA, 1991). Mainstem Whites Gulch and the West Fork of Whites Gulch fall just short of pool numbers. Three reaches have a pool every 10 channel widths, 2 reaches every 8 channel widths and 2 reaches meet the criteria. The East Fork of Whites Gulch meets pool frequency criteria in 6 out of 7 reaches. North Russian Creek is lacking pools in both reaches, and South Russian meets pools criteria in 6 out of 8 reaches. Specimen Creek meets the pool frequency criteria with 1 pool every 4 channel widths. Little North Fork does not meet the pool criteria in either reach. The North Fork meets pool frequencies in 2 out of 17 reaches.

The composition of material in the stream bed influences the flow resistance in the channel, stability of the bed and quantity, as well as quality, of aquatic habitat available to developing eggs, small fish and invertebrates (Olson and Dix, 1993). Streambed quality measured by percent of surface fines and percent embeddedness was estimated in the surveyed streams. Fourteen out of 15 reaches in Whites, East Fork Whites and West Fork Whites meet the fine sediment criteria. Embeddedness information on these streams is inadequate. North Russian Creek meets fines criteria in both reaches, and South Russian meets the criteria in 5 out of 8 reaches. Both North and South Russian Creeks do not meet embeddedness criteria with the exception of the lowest reach of South Russian Creek. Specimen Creek and Little North Fork exceed fines levels in all reaches. These 2 streams also have poor embeddedness values. The North Fork does not meet fines criteria in the lowest 7 reaches (below Little North Fork). Fines levels drop dramatically in the reaches above Little North Fork, where all 10 reaches meet the criteria. Embeddedness levels in the North Fork follow the same trend as fines levels, with the exception of high embeddedness above the Right Hand Fork.

Summer water temperatures are a concern in the Salmon River basin. Stream temperatures are related to water temperatures in headwater streams, solar radiation, air temperature, stream gradient and flow. The amount of solar radiation hitting the stream is influenced by the amount of vegetative and topographic shade. The percent canopy cover in the entire Whites Gulch drainage meets the 80% stream surface shading criteria. The upper reach of North Russian has adequate shade, as do the lowest 3 reaches of South Russian. Specimen Creek and Little North Fork do not meet shade criteria, probably due to the Specimen Fire. Shade is a problem in the entire length of the North Fork with the exception of the upper-most reach.

Water temperatures have been monitored in the North Fork and several tributaries from 1991 to 1994. Both spot temperatures and continuous temperatures were taken. All tributaries were significantly cooler than the North Fork by 4 - 6°C; however, their cooling effect on the North Fork was 1 - 2°C early in the summer and no effect later in summer. The Little North Fork had the largest cooling effect (2°C) on the North Fork due to its significant flow contribution. Generally, the tributaries met the temperature criteria, although temperatures sometimes approach the maximum. The North Fork consistently exceeds the temperature criteria throughout its length.

Trends

The amount of large woody debris in the stream channels of the North Fork Watershed will be maintained or increased over time. Pool frequencies will be maintained or decreased in the long-term.

The composition of the streambed material (surface fines and percent embeddedness) over time will be maintained at present levels.

Step 6 - Recommendations

The purpose of this step is to identify management opportunities that will move this watershed towards the desired conditions, or management objectives, derived from the Klamath National Forest Land and Resource Management Plan (Forest Plan), as modified by the ROD for the President's Plan. This step will also bring the results of all previous steps to conclusion, focusing on outcomes, not outputs.

Comparisons were made between existing and desired conditions to show how close the watershed was to achieving the desired conditions. Management opportunities were then identified which would either maintain the desired condition, or move the watershed toward the desired condition.

Management opportunities were broken out by the following issues: Human/Social Dimensions, Forest Health, Fire, Allowable Sale Quantity, Late-successional Reserves, Areas with Watershed Concerns, Riparian Reserves and Aquatic. These are displayed in Tables 6-1 through 6-8.

It is important to note that identified opportunities are general in nature; specific "how-tos" will be determined later during project development and implementation at the District level. Projects will then be evaluated on a site-specific basis following the procedures according to the National Environmental Policy Act.

Management considerations have been identified, when appropriate, for various opportunities. Comments found under management considerations should be regarded during the development and implementation of site-specific projects.

To assist with establishing work priorities for project development, an "emphasis rating" was created. Other less tangible factors, such as management emphasis, partnerships, available funding, etc., still need to be taken into consideration. The following criteria were used for rating individual opportunities:

1 - Are there consequences, in terms of resource damage, of not doing an opportunity? Are there resources at risk if this opportunity does not occur?
2 - Is the opportunity an immediate need? Does the opportunity provide a linkage towards achieving the desired condition? (How far will it get you towards the desired condition?)
3 - Are there amenity or commodity resources that benefit from doing the opportunity?
4 - Does the opportunity have implications for other resources outside of this watershed?

Each opportunity was given an emphasis rating by the analysis team, and were assigned a value of high, medium or low in response to the 4 questions listed above. These 4 values were averaged to establish the overall emphasis rating shown in Tables 6-1 through 6-8. When an across-the-board rating of high was given, it was referred to as a "red flag" opportunity and given a special notation on the appropriate map legend on Figures 6-1 through 6-4. "Red flag" opportunities identify resources or conditions which need prompt attention.

Table 6-1. Human/Social Dimensions Management Opportunities					
Existing Condition	**Desired Condition**	**Management Opportunity**	**Benefitting Resources**	**Management Considerations**	**Emphasis Rating**
1- Many Karuk descendants still live in the county today. Although they have no reservation land, their ties are close to the area's land and its management.	Desired condition for Human/Social aspects of the watershed depends on a variety of diverse expectations. Since many uses are in themselves a conflict to another use, the desired condition is broken into users: 1- American Indian values are enhanced, protected or sustained in harmony with other social values/concerns. Gathering sites are enhanced to improve traditional values and resources.	1- Work closer with Tribes for concerns and possible gathering sites. Utilize completed ethnographic research. Develop cooperative projects with Tribes.	1- Cultural Resources.	1- None identified at this level of analysis.	1- L, 2. M, 3. M, 4. M Average: "M-"
2- Census data indicates the majority of residents in the watershed heat with firewood.	2- Fuelwood is perpetuated over time as needed by the public. Accessible areas are designated within the watershed for all users.	2- Develop a fuelwood program that fits demand. Utilize over-stocked stands and identified high fuels areas.	2- All.	2- There are opportunities within LSRs. Thinning areas and areas with high fuel loading will provide a source of fuelwood.	2- M, 2. H, 3. H, 4. M Average: "H-"
3- Community stability has been influenced by the limited opportunities or employment in the analysis area. The majority of the residents are dependent on resource extraction industries.	3- Community stability is enhanced with economic diversity. Rural development provides alternate employment opportunities as it works with the County. Relationships are improved with local residents through community stability.	3- Rural development to be active within the watershed; cogeneration feasibility study. Sustained programs in timber, range, minerals and watershed restoration could provide employment opportunities.	3- Human uses.	3- None identified at this level of analysis.	3- M, 2. H, 3. H, 4. H Average: "H-"
4- There are no known water quality impacts from past mining-related chemicals, although some impact had been detected from natural and disturbance-related sedimentation.	4- Water quality improvement will enhance fisheries habitat, recreation and domestic use.	4- Investigate potential water quality point sources. Target identified point sources of sedimentation for improvement.	4- All.	4- None identified at this level of analysis.	4- H, 2. M, 3. H, 4. H Average: "H-"
5- Recreation use is limited in the area, with actual numbers unavailable. The majority of use is from visitors going into the wilderness.	5- Recreation and facilities are provided which meet the demand. Use is managed in concert with demand and/or resource capability.	5- Survey existing river access points; develop access plan and implement.	5- Recreation, Riparian and Aquatic.	5- Riparian Reserves.	5- M, 2. M, 3. H, 4. M Average: "M"

Table 6-1. ...an/Social Dimensions Management Opportunities					
Existing Condition	**Desired Condition**	**Management Opportunity**	**Benefitting Resources**	**Management Considerations**	**Emphasis Rating**
6- Roads currently play an important role for humans in the watershed because they allow access. Some roads may no longer be needed.	6- Roads are maintained to minimize surface sediment production into watershed streams. Roads needed for human access into the area are maintained for gathering areas, woodcutting, recreation and administrative use.	6- Complete and implement an access management plan.	6- All.	6- Refer to the transportation analysis (Appendix D) for a complete listing of management concerns.	6- H, 2. H, 3. H, 4. M Average: "H-"
7- Previous activities have created visual impacts that vary from "not noticeable," to "very noticeable." In some areas these impacts are not consistent with Visual Quality Objectives.	7- Previously disturbed areas meet desired VQOs.	7- Develop and implement management strategies for areas of concentrated use to rehabilitate landscapes that do not currently meet the desired VQOs. Prioritize rehabilitation efforts based on criteria found in LMP; refer to Appendix I - Visual Quality Improvement Opportunities.	7- Scenery.	7- None identified at this level of analysis.	7. L, 2. M, 3. M, 4. M Average: "M-"

Table 6-2. Forest Health Management Opportunities.					
Existing Condition	**Desired Condition**	**Management Opportunity**	**Benefitting Resources**	**Management Considerations**	**Emphasis Rating**
8- Current risks to forest health include vegetative stocking density, insects and disease. Overstocked stands are found throughout the watershed and represent 12,400 acres.	8- Stands are healthy and resilient to wildfire, insects, and disease. Provides a range of habitats for species and human social amenities.	8a- Survey and thin dense stands to improve stand health and vigor. 8b- Increase thinning program of plantations that are within past fire areas. 8c- Pursue aquatic conservation strategy needs for vegetative manipulations. 8d- Implement prescribed fire to thin trees and reduce accumulations of forest fuel loading. Implement prescribed fire to manipulate desired vegetative variations. 8e- Actively pursue removal of insect/diseased and dead/dying trees.	8- All.	8- None identified at this level of analysis.	8a- 1. H, 2. H, 3. H, 4. H Average: "H" 8b- 1. H, 2. H, 3. H, 4. H Average: "H" 8c- 1. M, 2. H, 3. M, 4. H Average: "H" 8d- 1. H, 2. H, 3. H, 4. H Average: "H" 8e- 1. H, 2. H, 3. H, 4. H Average: "H"

Table 6-2. Forest Health Management Opportunities.

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
9- A variety of insects and diseases are found in the area. A 1994 aerial survey identified a total of 13,800 acres of scattered tree mortality.	9- Stands are healthy and resilient to wildfire, insects and disease. Provides a range of habitats for species and human social amenities.	9a- Survey and thin dense stands to improve stand health and vigor. 9b- increase thinning program of plantations that are within past fire areas. 9c- Pursue aquatic conservation strategy needs for vegetative manipulations. 9d- Implement prescribed fire to thin trees and reduce accumulations of forest fuel loading. Implement prescribed fire to manipulate desired vegetative variations. 9e- Actively pursue removal of insect/diseased and dead/dying trees.	9- All.	9- None identified at this level of analysis.	9a- 1. H, 2. H, 3. H, 4. H Average: "H" 9b- 1. H, 2. H, 3. H, 4. H Average: "H" 9c- 1. M, 2. H, 3. M, 4. H Average: "H" 9d- 1. H, 2. H, 3. H, 4. H Average: "H" 9e- 1. H, 2. H, 3. H, 4. H Average: "H"

Table 6-3. Fire Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
10- Partial to complete stand-replacement fires in mature stands of conifer and hardwoods can be expected from the current fire regime.	10- Fire is allowed to fill its natural role in the watershed, as both a thinning agent and one of decomposition. Unacceptable fuel buildup is reduced, stand health is increased, shrub and timbered stands are resilient and future wildfire severity is reduced.	10- Develop a fire regime of less severity and strategically locate treatments to protect high value resources areas from stand-replacing fires.	10- All.	10- Air Quality, Cultural Resources.	10- H, 2. H, 3. H, 4. H Average: "H"
11- High fire behavior potential is predicted for 49,000 acres (38%) of the watershed.	11- The amount of high fire behavior potential and the size and severity of future fires in the watershed is reduced.	11- Assess stand and fuels conditions. As per Forest direction, develop and implement fuels and vegetation management plans to reduce the likelihood of the stand being lost to wildfire.	11- All.	11- Consider the use of prescribed fire and prescribed natural fire to develop a fire regime of less severity.	11- H, 2. H, 3. H, 4. H Average: "H"
12- Fire-adapted and shade-intolerant species are not regenerating because of the increased shading and lack of fire to create openings.	12- The establishment and growth of fire-adapted, shade-intolerant species, (i.e., sugar pine, ponderosa pine, black oak) is promoted.	12- Using prescribed fire and other silvicultural treatments, develop stands that include fire-adapted, shade-intolerant species.	12- All.	12- Silvicultural treatments, including prescribed fire.	12- H, 2. H, 3 M, 4. M Average: "H"
13- Early seral vegetation from past fire activity occurs in large homogeneous blocks and is very susceptible to rapidly spreading fire.	13- Promote growth and reduce flammability of these areas.	13- Use prescribed fire and prescribed natural fire to develop a fire regime of less severity. Using prescribed fire and other silvicultural treatments, develop stands that include fire-adapted, shade-intolerant species.	13- All.	13- Silvicultural treatments, including prescribed fire.	13- H, 2. H, 3. M, 4. M Average "M+"

Table 6-3. Fire Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
14- Areas harvested during the past 4 decades currently have an increased fuel loading due to lack of slash treatment.	14- Fuel loadings are reduced and growth is promoted in these areas.	14- Survey, develop and implement treatment plans for these areas.	14- All.	14- Silvicultural treatments, including prescribed fire.	14- H, 2. H, 3. M, 4. M Average "M+"
15- There are 41,000 acres of fuel model 10 identified in this analysis. Due to the current fire regime, fuel model 10 has developed on south and west aspects, between 2,000-4,500 foot elevation.	15- The amount of fuel model 10 on south and west aspects between 2,000-4,500 foot elevation is reduced and the north and east aspects at higher elevations are maintained.	15- Develop a fire regime of less severity. Develop stands that include fire-adapted, shade-intolerant species. Use vegetation management and timber harvest to make the watershed more resilient to catastrophic fire at an acceptable level and lessen excessive dead fuel component by controlling stocking levels in timbered stands.	15- All.	15- Silvicultural treatments, including prescribed fire.	15- H, 2. H, 3. H, 4. H Average: "H-"
16- Of the potential northern spotted owl habitat involved in the Specimen Fire, within the LSR, 76% burned with high and moderate fire severity.	16- Growth of potential habitat is promoted to late-seral habitat as soon as possible. These areas are maintained in a fire-resilient condition.	16- Develop a silvicultural and fire program for these areas that will ensure development through to a late-mature condition. Protect existing habitat and accelerate regeneration of destroyed habitat.	16- All.	16- None identified at this level of analysis.	16- H, 2. H, 3. H, 4. H Average: "H-"
17- Fires starting on south aspects between 2,000-4,500 foot elevation have higher rates of spread and are more resistant to control than less exposed areas.	17- Low fuel loads are maintained in these areas. During fire season, these areas are identified as needing a full suppression response.	17- Use prescribed fire and prescribed natural fire to develop a fire regime of less severity; consider mechanical means. Develop a fire suppression plan.	17- All.	17- None identified at this level of analysis.	17- H, 2. H, 3. H, 4. M Average: "H-"
18- Human-caused fires have been on the decline in recent years, due in part ot an effective fire prevention program.	18- Human-caused fire starts continue in a downward trend.	18- Continue an effective fire prevention program.	18- All.	18- None identified at this level of analysis.	18- M, 2. M, 3. M, 4. M Average: "M"

Table 6-4. Allowable Sale Quantity Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
19- Allowable sale quantity (ASQ) is limited for various administrative and legal reasons. Most of the program has been salvage with little green harvest in the 1990s.	19- ASQ is designed to maintain the desired conditions of the watershed with ecologically sustainable commodities program.	19- Develop 5-year wood fiber plan that addresses the desired condition and Forest Plan's projections for a sustainable timber program (including green stand treatments).	19- Rural Development, Fire.	19- None identified at this level of analysis.	19- M, 2. H, 3. H, 4. H Average: "H"

Table 6-5. Late-successional Reserve Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
20a- Increased distribution and density of the understory has lead to increased inter-tree competition, leaving stands vulnerable to insect and disease attack. **20b-** The late-seral conifer stands are now more susceptible to large-scale stand-replacing fires.	**20a-** Stand density is appropriate for the site and aspect. Late-seral conifer stands can be maintained over time. **20b-** Late-seral conifer stands are more resistant to insects, disease and high intensity fires.	**20a&b-** Thin very dense stands, treat fuels, use prescribed burning to reduce fuels buildup, construct fuel breaks where appropriate.	**20a&b-** All.	**20a&b-** Threatened and Endangered considerations, sediment sources.	**20a-** 1. H, 2. H, 3. H, 4. H Average: "H" **20b-** 1. H, 2. H, 3. H, 4. H Average: "H"
21- Fire-adapted tree species (ponderosa pine and black oak) are being replaced by shade-tolerant conifers (white fir).	**21-** Fire-adapted trees, conifer and hardwood, are dominant on south and west facing slopes.	**21-** Thin south and west slopes, saving pines and hardwoods. Open up the understory by mechanical means or prescribed fire.	**21-** All.	**21-** None identified at this level of analysis.	**21-** H, 2. H, 3. H, 4. H Average: "H"
22- An increase in the size and density of understory trees has lead to less habitat for some species, such as goshawks.	**22-** Large areas have open understory for species such as goshawks.	**22-** Manipulate the vegetation in the former goshawk management areas to reestablish suitable goshawk habitat (use Forest Plan standards and guidelines).	**22-** Fire, Wildlife, Commodities.	**22-** None identified at this level of analysis.	**22-** M, 2. M, 3. M, 4. M Average: "M"
23- Past timber harvest plantations are not growing to large tree character.	**23-** Past timber harvest plantations are at the proper density to grow large trees as quickly as possible.	**23-** Thin and release plantations, treat fuels.	**23-** Fire, Wildlife, Commodities, Forest Health.	**23-** None identified at this level of analysis.	**23-** H, 2. H, 3. M, 4. M Average: "M+"
24- Single conifer species plantations are not providing diversity.	**24-** Plantations are multi-species and in various size classes.	**24-** Thin plantations selecting for diversity, plant created openings with mixed conifers.	**24-** Wildlife, Jobs.	**24-** None identified at this level of analysis.	**24-** M, 2. M, 3. M, 4. M Average: "M"
25- Off-site pine plantations in the Taylor Creek area are not growing to large tree character.	**25-** All plantations are growing trees adapted to the site.	**25-** Inventory off-site plantations.	**25-** Forest Health, Commodities.	**25-** None identified at this level of analysis.	**25-** M, 2. M, 3. M, 4. M Average: "M"
26- High fuel loading in the Specimen Fire burned area creates a high risk of a reburn.	**26-** Fuel loading is low enough to reduce the risk of reburn while meeting standards and guidelines for snags and course woody material.	**26-** Salvage the Specimen Fire area to reduce fuels; plant the good sites with mixed conifers.	**26-** Forest Health, Fire, Wildlife, Fuel Loading.	**26-** Spacing of trees in plantations, early thinning.	**26-** H, 2. H, 3. H, 4. H Average: "H"

Table 6-5 -successional Reserve Management Opportunities					
Existing Condition	**Desired Condition**	**Management Opportunity**	**Benefitting Resources**	**Management Considerations**	**Emphasis Rating**
26a- Within the Specimen Fire area, pockets of standing fire-killed trees next to late-seral habitat and plantations put those areas at greater risk of catastrophic fire.	**26a-** Late-seral habitat and plantations are buffered from intense fire activity.	**26a-** Remove pockets of standing dead trees, treat fuels and, where appropriate, construct fuel breaks.	**26a-** Fire, Wildlife.	**26a-** None identified at this level of analysis.	**26a-** H, 2. H, 3. H, 4. H Average: "H"

Table 6-6. Areas With Watershed Concerns Management Opportunities					
Existing Condition	**Desired Condition**	**Management Opportunity**	**Benefitting Resources**	**Management Considerations**	**Emphasis Rating**
27a- Road erosion and instability problems are affecting Music Creek and South Russian Creek. **27b-** Elevated road erosion and sensitive geomorphic terranes in the granitic portion of the Little North Fork drainage impact stream and fisheries conditions.	**27a&b-** The road system is stable, non-erosive and adequate for needs.	**27a&b-** Repair problem areas on the road system and close excess roads where appropriate.	**27a&b-** Fish, Watershed, Late Seral Habitat, Recreation, Access Management Plan.	**27a&b-** Adequate open roads for management and recreation.	**27a&b-** H, 2. H, 3. M, 4. M Average: "H"
28- Specimen Creek has elevated erosion rates due to recent fire. High fuel loads, which may lead to reburn, will accumulate as dead trees fall over.	**28-** There is a reduced intensity of future wildfire. Fuel loading is low enough to reduce the risk of reburn, while meeting standards and guidelines for snags and course woody material.	**28-** Treat fuels created from recent fire.	**28-** Fire, LSR, Fish.	**28-** Encourage the growth of late-seral habitat.	**28-** H, 2. H, 3. H, 4. H Average: "H"
29- Recent fires (1987) in granitic soils of the Big/Olsen Creek area have resulted in elevated erosion and landslide potential. Other drainages to the lower North Fork which burned in 1977 still have increased landslide potential but the primary concern is potential reburn of aging brushfields.	**29-** The watershed is recovered from recent burns and is resilient to future wildfires.	**29-** Treat fuels where appropriate in large brushfields and remnant stands.	**29-** Fire, Fish, Soil, Future ASQ.	**29-** Future harvestable timber yields. Identify heavily dissected inner-gorge on mountain slopes.	**29-** H, 2. H, 3. M, 4. M Average: "M+"

Table 6-7. Riparian Reserve Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
30- Riparian Reserves (RRs) have been impacted by natural disturbances of floods, fires and debris scour. Human-caused disturbances have caused loss of vegetation from roads, placer mining and timber harvest. Recovery of the RRs has been slow, with both small and large disturbances occurring over time.	30- The primary goal is for the maintenance of a healthy, functioning ecosystem where the aquatic and terrestrial components are properly linked. RRs are used to maintain riparian structures and the functions of the aquatic system, provides benefits to riparian-dependent and associated species, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of habitats within the watershed. The RRs will also serve as dispersal corridors between the LSRs.	30- Increase vegetation on segments that are below desired levels. Introduce prescribed fire for fuels reduction and fire resilience. Redesign or decommission roads that are not meeting the Aquatic Conservation Strategy. Develop an access management plan. Identify RRs on the ground, on a case-by-case basis, utilizing criteria established in this report (refer to Appendix J).	30- Riparian-dependent resources.	30- None identified at this level of analysis.	30- H, 2. H, 3. H, 4. H Average: "H-"

Table 6-8. Aquatic Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
31- Low stream shading in Specimen Creek, Little North Fork, North Fork and portions of North Russian and South Russian Creeks.	31- Where site capability allows, stream shading is 80%.	31- Survey, identify and revegetate.	31- Riparian-dependent resources.	31- None identified at this level of analysis.	31- H, 2. H, 3. M, 4. H Average: "M+"
32- The North Fork of the Salmon River experiences lethal summer water temperatures for fish. Tributary streams periodically approach lethal temperatures.	32- Summer water temperatures are maintained below 69°F.	32- Revegetate where capable; assess cobble bars for rehabilitation.	32- Riparian-dependent species.	32- Threatened and Endangered species.	32- H, 2. H, 3. M, 4. H Average: "M+"

Table 6-8. ...atic Management Opportunities

Existing Condition	Desired Condition	Management Opportunity	Benefitting Resources	Management Considerations	Emphasis Rating
33a- Low pool frequencies, high embeddedness values and high amounts of fine sediment exist in the Little North Fork and the North Fork, especially below the confluence of Little North Fork. **33b-** High embeddedness values and high amounts of fine sediment exist in Specimen Creek and South Russian Creek. **33c-** High embeddedness values and low pool frequencies exist in North Russian Creek.	**33a,b&c-** Fine sediment is maintained at levels to maintain 1 pool every 3 to 7 channel widths, and do not exceed 15% fines and 20% embeddedness.	**33-** Survey and evaluate remaining streams in area. **33a-** Protect and enhance good quality fisheries habitat. **33b-** Reduce current and future sediment inputs to Specimen Creek and South Russian Creek. **33c-** Minimize sediment inputs to North Russian Creek from future management activities.	**33a,b&c-** Riparian-dependent species.	**33a,b&c-** Assess effects of any site-disturbing activities in these drainages to fisheries habitat values.	**33a,b&c-** H, 2. H, 3. H, 4. H Average: "H-"
34- Good fisheries habitat conditions exist in portions of the Whites Gulch drainage.	**34-** Good habitat is maintained.	**34-** Protect and enhance good quality fisheries habitat. Assess roads and maintain stable road system.	**34-** Riparian-dependent species.	**34-** None identified at this level of analysis.	**34-** H, 2. H, 3. M, 4. H Average: "H-"
35- According to Sedell's criteria, there are low levels of instream wood and recruitment in all streams. The validity, and hence appropriateness of using Sedell's criteria for the analysis area has not been completed.	**35-** There is high quality fisheries habitat in all streams, with adequate amounts of large wood in the streams where site capability allows.	**35-** Evaluate the validity/applicability of Sedell's criteria for use on-Forest. Based on above results (if necessary), increase instream wood and improve site conditions which promote the growth of large trees in capable areas.	**35-** Riparian-dependent species.	**35-** None identified at this level of analysis.	**35-** M, 2. M, 3. M, 4. H Average: "M+"

Appendix A - Endangered Species Act and Other Species Considerations Questions/Answers

Current direction as developed by BLM and USFS (June 1994 memo, Appendix C, page C7-12) requires that the following questions are to be answered through watershed analysis. The resulting baseline information will then be available for use in planning and subsequent Section 7 consultation and monitoring of these species.

Northern Spotted Owl

1. Are spotted owl activity centers located within the watershed?

Yes

a. If so, how many and in what ROD land allocations are they located?

There are 16 owl activity centers. Two are in wilderness (#1054 and 4064). Twelve are centered within Late-successional Reserve (LSR). These are #1043, 1052, 1053, 1034, 1029, 1030, 1258, 1039, 1040, 1041, 1046, 1047. The other 2 (#4042, 0233) are in the Matrix and Riparian Reserve.

b. Which of these are currently above "take" thresholds and which are below?
c. When were the activity centers located?

At the 0.7 mile-radius level, 1 of 15 territories is above the incidental take threshold of 500 acres of suitable habitat. At the home range 1.3 mile-radius level, 4 territories have more than 1,336 acres required to preclude incidental take allowance. Only 1 territory meets both thresholds (#1043). One territory (#1258) has not had the acreage calculations done. Refer to Table A-1 for specific information on the number of acres in the 0.7 and 1.3 mile radius-levels and what year the activity centers were located.

Table A-1. Acres in 0.7 and 1.3 mile-radius level and what year the activity centers were located by owl number.

Owl #	Acres in 0.7 Circle	Acres in 1.3 Circle	Year Located
1053	404	1,074	1990
4064	332	688	1990
1043	570	1,542	1987
1052	207	485	1988
1053	333	1,140	1988
1034	356	1,365	1980
1029	333	1,373	1989
1030	402	1,281	1991
1039	383	1,471	1988
1040	308	1,011	1981
1258	N/A*	N/A*	1991
1041	343	1,046	1980
1046	217	594	1985
1047	319	793	1985
4042	400	1,079	1991
0233	292	1,180	1991

* N/A= Not Available; Two-thirds of home range is within LSR.

d. Describe the reproductive history.

Refer to Table A-2. Reproductive History by Owl Number.

Table A-2. Reproductive History by Owl Number.		
Owl #	Years Pair Verified	Years Young Verified
1054	1990	
4064	1990	1990
1043	1987, 1988	1988
1052	1988	1988
1053	1989	
1034	1980, 1985-87, 1989-92	1980, 1991, 1992
1029	1989, 1992-TS only	
1030	1986, 1987, 1988	1986
1258	1991	1991
1039	1988-1992	1989, 1989, 1992
1040	1981, 1988	
1041	1980, 1983-1989, 1991, 1994	1980, 1986, 1988, 1991, 1992
1046	1985, 1986	1985
1047	1985-1991	1985, 1988, 1991
4042	1985-87	1985, 1987
0233	1991	

2. Has a 100 acre core area seen designation around each activity center located in matrix lands?

Yes, both matrix territories have a 100 acre core delineated.

3. How many acres of nesting, roosting and foraging (NRF) habitat are there in the watershed?

There are 36,762 acres of suitable owl habitat including foraging habitat in the watershed.

a. What percentage of the watershed is this?

Suitable habitat is provided over 26% of the watershed.

b. Which of these stands have been surveyed to protocol? (2 years)

c. Which were not?

Within about 57% of the watershed, surveys have been performed to protocol for calling routes, SOHAs, timber sales, and ecosystem management areas from the mid-1980s to 1994. More importantly, over 90% of the suitable habitat has been surveyed. The remainder of the area (43%) is within the Marble Mountain Wilderness. Of this, about 16,078 acres are suitable. About half of this habitat was surveyed in 1989-90 and 2 owl pairs were located.

4. What is the amount of NRF habitat in each ROD land allocation within the watershed?

Refer to Table A-3. Acres of Suitable Habitat (NR) by ROD Allocation.

Table A-3. Acres of Suitable Habitat (NR) by ROD Allocation.	
ROD Allocation	Acres
LSR	13,123
Matrix	7,561
Wilderness	16,078

5. Does any portion of the watershed contain LSRs?

Yes, a 7,658 acre portion of LSR RC347 in within the landscape and a portion of LSR RC345 is within the landscape, 26481 acres.

a. What percent of the total watershed is this?

The LSR land totals 34,139 acres, or 26% of the watershed.

b. What are the current totals of NRF habitat and capable habitat in the LSR?

19,657 acres, or 58% of the LSRs.

6. What is the amount of dispersal habitat (11-40 and above) in each ROD land allocation within the watershed?

This figure is included within the totals given for NRF habitat within the watershed. Timber type size/density class "3G" and larger are considered to be suitable habitat. Size/density class "3N" meets dispersal standards, at least 11" and 40% cc, and some may meet suitability. For calculation purposes, 3N was included in the NRF figures. Size/density classes smaller than 3N are not considered dispersal habitat.

7. Is distance between LSRs (those over 10,000 acres) greater than 4 miles?

No

a. If so, then what is the amount of dispersal habitat on Federal lands for all 1/4 townships between the LSRs?

Not applicable.

b. What percent of the total Federal lands in these 1/4 townships is this?

Not applicable.

c. How much (% and total) of the dispersal habitat is in Riparian Reserves, Admin. Withdrawal (which provide long-term protection), Congressionally Reserved, 100 acre cores, and smaller (<10,000 acres) LSRs?

Not applicable.

d. Is this total greater than 50%?

Not applicable.

e. Describe, if present, the natural barriers to dispersal.

Open hardwood and shrub stands on southfacing slopes. The western portion of the watershed is occupied by a large burn, which is highly deficit in dispersal habitat.

f. Is connectivity, or dispersal habitat, sufficient to allow movement?

Connectivity is sufficient within the landscape and from this landscape to most adjacent areas. The large burned area may present a barrier to dispersal.

8. How much critical habitat has been designated within the watershed?

In the watershed, 25,037 acres are within CA-25, 8030 acres are within Critical Habitat Unit CA-22.

a. How much of this total overlaps with LSRs?

All but about 2,508 acres or 7.6% is within an LSR.

b. For areas that do not overlap, how much is currently NRF habitat?

The suitable habitat outside of LSR 345 is 531 acres, the habitat outside of LSR 347 is about 448 acres.

And how much is capable?

There is about 195 acres outside of LSR 345 and 241 acres outside of LSR 347 that are capable to become NRF at a later time.

c. How many activity centers are located in this non-overlap area of CHU?

None.

d. How many are currently above "take"? How many below? (use acres established by FWS for 0.7 and 1.3 mile radius)

Not applicable.

e. What role does this non-overlap critical habitat play in this watershed in relation to the reasons for the designation of the CHU?

In the future, the non-overlap portion of CHU CA-22 will act as a dispersal habitat connector between the two portions of LSR RC-347, the Little North Fork portion (in this watershed analysis) and the Crapo portion, which is in the Mainstem Watershed Analysis. Currently, this area is mostly devoid of habitat, as it was heavily burned and logged. The CHU associated with RC-345 is described by legal subdivisions rather than the topographic features describing the LSR. Little additional habitat is provided.

Bald Eagle

1. Are occupied bald eagle activity areas (nesting, foraging, winter roosts, or concentration areas) located within the watershed?

No. Eagles are occassionally seen within the watershed, usually during the fall and winter. These are single, scattered observations. The number of sightings has been slowly climbing over the past few years.

a. If so, what type?

Not applicable.

b. How many?

Not applicable.

c. What ROD land allocations are they located in?

Not applicable.

d. Describe reproductive history based on monitoring data.

Not applicable.

e. Has a final site-specific protection/management assessment been developed for each site?

Not applicable.

f. Does this watershed analysis corroborate the findings of the management assessment?

Not applicable.

2. Has an assessment been made as to whether there are potential bald eagle activity areas (nesting, foraging, winter roosts, or concentration areas) located within the watershed?

Nothing of detail has been done, but looking at fish population levels, there is not a fisheries large enough for a food base. Chinook salmon and steelhead trout are in the watershed, especially during the fall. These runs are greatly depleted and of short duration. There are no large natural or man-made bodies of water within the watershed, which would provide a food base. There are suitable stands for winter roosts within short distances of the larger streams.

a. If so, what type?

Not applicable.

b. How many?

Not applicable.

c. What ROD land allocations are they located?

Not applicable.

d. Have these areas been surveyed to protocol to determine they are unoccupied?

Not applicable.

3. Describe historical bald eagle occurrence and nesting within the watershed.

There is no known historic occurrence or nesting in the watershed.

4. What is the status of the watershed as it relates to the Recovery Plan? (target territories, including beyond watershed boundaries)

a. Does the watershed and the surrounding area meet objectives of the Recovery Plan?

Yes. The watershed is in Zone 23 (California/Oregon Coast) of the Pacific States Recovery Plan. The main threats previously listed for this zone are shooting, logging, human disturbance and loss of anadromous fish. The proposed management direction listed is to restore anadromous fish populations and increase the nesting population. This zone is rated at the 75% occupancy level according to the California Fish and Game update 9/7/94. In total of all the zones within the Forest, the Forest is currently below its target nesting pair levels recommended as recovery goals. The Klamath National Forest has 2 known nesting pairs.

b. If not, then are there capable eagle activity areas located within the watershed?

No, there are no capable activity areas since there is not an adequate fisheries food base. Even in the future with salmon recovery, the watershed may only serve as a secondary foraging and nesting area.

c. If capable activity areas are present, what type are they?

Not applicable.

1) How many?

Not applicable.

2) What ROD land allocations are they located?

Not applicable.

d. What type of project or enhancement could develop sites into potential or occupied sites?

Restoring anadromous fish runs during all seasons of the year. Development of a large resevoir in the North Fork drainage. Restoration goals for the watershed will contribute to increase habitat quality for steelhead trout and salmon in the future.

5. If present, describe significant habitat within the watershed that is not under Federal ownership.

Private lands do not have significant habitat for the eagle.

Amphibians

1. Have any amphibian inventories been done on a project or watershed level?

There has been some inventory done for tailed frog by PSW Redwood Science Lab researchers. Tailed frogs were located in Taylor Creek. It suspected they occur elsewhere in the watershed.

a. What species does the literature suggest may be present?

The home range of several frogs and salamanders are within the watershed:

Northwestern salamander
Pacific giant salamander
Southern torrent salamander
Rough-skinned newt
Ensatina
Black salamander
Western toad
Tailed frog
Pacific tree frog
Northern red-legged frog
Foothill yellow-legged frog
Bullfrog?

2. Are Sensitive species and ROD Table C-3 species present or possibly occur?

No surveys have been completed for either the Siskiyou Mountain or Del Norte salamanders, but other surveys on the Forest have located the Siskiyou Mtn. salamander. These new sightings have expanded the known range of this species. It is possible that either or both of these species could occur.

3. Have intensive or extensive inventories been conducted in adjoining drainages/sub-watersheds?

Yes, by researchers from PSW, Redwood Science Lab, looking for tailed frogs. They were located in other drainages within the Salmon River.

a. If so, can those inventories be extrapolated to this watershed?

Yes, the tailed frog is within the watershed, located in Music Creek. It has also been located in an adjoining drainage, Crapo Creek.

4. Are endemic species known to occur in the general geographic region?

No.

5. Are exotic species known or suspected to be in the

watershed (e.g. bullfrogs)?

Bullfrog populations are a possibility since there are observations on the Klamath Forest, but there are no known recordings. Small ponds, used in mining operations, along the North Fork are the best possibilities.

Peregrine Falcon

1. Are any cliffs located within the watershed? (rock wall >50 feet)

Yes, there are several cliff areas outside of wilderness, many more within the wilderness.

2. Are any cliffs present that are historic (pre-1975) or traditional (post-1975) peregrine eyries?

There is 1 traditional eyrie in the landscape. Data is unavailable to determine whether these cliffs or others are historic.

3. For past projects near historic cliffs, have mitigation measures for habitat been considered?

Not applicable.

a. At these historic cliffs, have surveys to protocol (Pagel 1992) been accomplished for at least 2 years prior to the activities?

Not applicable.

4. For traditional cliffs, have surveys/monitoring been conducted to determine nest site occupancy and reproductive status?

Refer to Table A-4. Peregrine Falcon Results for Miners Rock (NI84).

Table A-4. Peregrine Falcon Results for Miners Rock (NI84).

Survey Year	Site/Results
1990	active/eggslaid/failed
1991	occupied/birds present
1992	occupied/birds present
1993	active/failed
1994	unknown

b. Has a draft or final site management plan been created?

No.

1) Is this plan based on site specific and PNW sub-population nesting ecology?

Not applicable.

5. Have the cliffs located been rated or monitored for falcon potential or presence?

No other cliffs have been examined for potential or presence.

6. If cliffs are un-rated, have surveys been accomplished to protocol?

No.

7. Describe site habitat variables within a 3 mile radius of historic and traditional nest sites. (cliff parent material, distance to water/riparian, vegetative habitat, seral stages, human activities.)

The Miners Rock eyrie is on a very large southfacing cliff made up of weathered, fractured limestone rock. The East Fork of Whites Gulch is about 1,500 feet in elevation below; the cliff faces into a moderate sized drainage that is largely unroaded or harvested. It is within a large LSR. Access to the site is difficult and human disturbance is minimal. The mine to the north of the eyrie has been inactive for years, and if did become active would not be a disturbance. Habitat is a mosiac of live oak, brush and ponderosa pine on a south-facing slope, and mixed conifer of various age classes on the north slopes. The surrounding high country is a mixture of red fir and rocky outcrops; the Russian Wilderness is 3 miles east.

Gray Wolf

Not applicable. Species not in the State or province.

Grizzly Bear

Not applicable. Species not in the State or province.

Marbled Murrelet (Zone 1 & 2)

Not applicable. The watershed is beyond the Zone 2 boundary.

Appendix B - List of Analysis Area Maps

The following information is a listing of maps contained in this document and also maps that are in the North Fork Salmon Map Atlas located at both the Salmon River Ranger District in Etna and the Supervisor's Office in Yreka, CA. The Map Atlas includes all the maps listed here.

Maps in Document

Klamath Basin Vicinity Map (Figure 1-1)
No. Fk. Salmon River Watershed Vicinity Map (Figure 1-2)
Land Management Plan Direction (Figure 1-1)
No. Fk. Salmon Watershed Base Map (Figure 1-2)
Management Opportunities:
- Human/Social Dimensions (Figure 6-1)
- Forest Health (Figure 6-2)
- Fire Management (Figure 6-3)
- LSR & Aquatic Management (Figure 6-4)

Fuels/Fire:
Fire Behavior Potential (Figure 3-3)
Fuel Models (Figure 3-4)
Fire History (1917-94) (Perimeters) (Figure 4-1)

Vegetation:
Timber Mortality (1993-95) (Figure 3-1)
Existing Vegetative Condition (Figure 3-2)
Late-successional Habitat-L. No. Fk. LSR (Figure 3-5)
Habitat Connectivity (Figure 3-6)
No. Fk. Salmon Watershed Suitable & Non-capable Habitat (Figure 3-7)
1944 Vegetative Condition (Figure 4-2)
Connectivity Between L. No. Fk. & Eddy G. LSR (Figure 5-1)

Areas With Watershed Concerns (Figure 3-8)
Riparian Reserve Components (Figure 3-9)

Aquatic:
Fish Species Range (Figures 3-10, 3-11 & 3-12)
(Individual species range)

Additional Maps in Map Atlas

(Includes those in document)

Fuels/Fire:
Fire History (Starts)
Hog, 87 & Specimen Burn Intensities
1944 Fuel Models

Resources:
Geomorphic Terranes
Bedrock
Historic Mining Activities (Bureau of Mines data)
Released Roadless Areas
Recreation Features
Road Maintenance Levels & Closures
Road Densities

Vegetation:
Soil Erosion Hazard (Order III Soils)
Soils Site Class (Order III Soils)
Timber Types
Plantations
Suitable NSO Habitat
Low Site Inclusions
Sensitive & C-3 Plants

Visual Quality:
Existing Visual Condition
Visual Quality Objectives
Visual Quality Improvement Opportunities

Vegetative Condition Within the Riparian Reserve
Riparian Reserves & Fish Species Distribution

Aquatic:
Fish Range (Anadromous/Resident)

Appendix C - Late-successional and Old Growth Forest Associated Species

The following amphibian, mammalian, avian and plant species were identified in the Final Supplemental Environmental Impact Statement as being closely associated with late-successional forest on Federal lands within the range of the northern spotted owl, based on criteria developed by FEMAT (1993). Included here are those known or suspected to occur within the North Fork Salmon Watershed. Known to occur are starred (*). ROD Appendix J-2 and C-3 species are noted with a '+.' Forest Land Management Plan Management Indicator Species are noted with a '#.' Threatened, Endangered and Sensitive species are noted with a '$.'

Amphibians (Aquatic)

+Black salamander
Northwestern salamander
Pacific giant salamander
Rough-skinned newt
+Southern torrent salamander
+#Tailed frog

Amphibians (Terrestrial)

Clouded salamander
+Del Norte salamaner
+Siskiyou Mountain salamander

Birds

Barred owl
*Brown creeper
*Chestnut-backed chickadee
*+Common merganser
*Flammulated owl
*Golden-crowned kinglet
*#Hairy woodpecker
Hammond's willow flycatcher
*Hermit thrush
*Hermit warbler
Hooded merganser
*Northern flicker
$Northern goshawk
*Northern pygmy owl
*$Northern spotted owl
*#Pileated woodpecker
Red crossbill
*Red-breasted nuthatch
*#Red-breasted sapsucker
*Varied thrush
#Vaux's swift
*Warbling vireo
Western willow flycatcher
*White-breasted nuthatch
#White-headed woodpecker
Williamson's sapsucker
*Wilson's warbler
*Winter wren
Wood duck

Mammals

*Deer mouse
*Douglas squirrel
*Dusky-footed woodrat
*#Elk
*+$Fisher
*+$Marten
*Northern flying squirrel
*Shrew-mole
*Chipmunk complex
Western red-backed vole

Bats

Big brown bat
California myotis
+Fringed myotis
Hoary bat
Little brown myotis
+Long-eared myotis
+Long-legged myotis
+Pallid bat
+Silver-haired myotis
Yuma myotis

Plants

*$Salmon Mt. wake robin
*$Marble Mt. catchfly
*+Clustered ladyslipper
*+Mountain ladyslipper

Appendix D - Transportation System

Interpretation

Roads have and will play an important role within the watershed. Roads allow humans to access many areas of the watershed for different reasons. Even though most roads were constructed for the purpose of managing the timber resource, benefits to other users exist, such as: private landowners, permittees, firewood collection, grazing, and access for the various recreational opportunities that exist, fire management, and other administrative uses.

How roads interact with other resources depends on a number of attributes. They include:

1. Design criteria used for construction (inslope versus outslope, etc.).
2. Soil types.
3. Road gradient.
4. Drainage structures (their location and storm capacity).
5. Road density,
6. Open road density.
7. Road maintenance or (lack of), including winter maintenance, encroachment of vegetation.
8. Road management strategy.
9. Road surface type.
10. Amount of area disturbed.
11. Road location (stable location or not, slope stability, slope location, history)
12. Wet weather use both private and administrative.
13. Amount of traffic.
14. Road widths.
15. Unauthorized use.
16. Signing/visitor information.

Roads

The North Fork Watershed contains approximately 218.7 miles of road. There are 32.0 miles under Siskiyou County jurisdiction, 172.5 miles under Forest Service jurisdiction (including temporary roads), and 14.0 miles under private jurisdiction.

County roads provide primary access to the watershed, and most were constructed near main stream courses. These roads are maintained throughout the year for user comfort and safety. Road construction standard for most of the miles was single lane, ditched, chip seal surface and fair alignment, resulting in larger cut and fill slopes.

Private roads provide access to residences and mining claims and are maintained by those individuals. These roads were generally constructed as low standard, native surface roads.

Forest Service system roads within the watershed were constructed for the administration of National Forest Lands. Public use has been allowed by the Secretary of Agriculture on most roads. Travel access management strategies are used within the watershed to minimize resource-use conflicts. These conflicts may include special wildlife considerations, erosion-related water quality concerns, or public safety. Historically, most of the roads are managed to provide year-round access.

Table D-1 displays miles of road by management activity.

Table D-1. Travel Access Management Mileages.

Management Activity	Miles
Year-round Closure	23.2
Seasonal Closure	52.4
Open	143.1

Temporary roads are those roads on National Forest land which were constructed to provide access for a single use, such as to a residence, mining claim, water source, disposal site, harvest unit, etc.

Majority of the Forest system roads were constructed under timber sale contracts with the use of purchaser credits. Roads also provide for other Forest use and management activities, such as recreation, mining, law enforcement, and fire prevention and suppression.

These roads often traversed steep side slopes (50%) within dioritic rocks, granitic rocks, metasedimentary rocks, metavolcanic rocks and metavolcaniclastic sedimentary rocks. Side casting (i.e., excavate and side cast without compaction) was the normal technique used during construction. The earlier dated roads were generally constructed 14-16 feet wide, inslope or crowned, unsurfaced, with turnouts, ditched, and with drainage structures. With years of use the road template has change to outslope. The later dated roads were generally constructed to 14 feet wide, out sloped, unsurfaced and with minimum drainage structures.

Table D-2 displays miles of road by road template and surface type.

Table D-2. Road Miles by Road Template and Surface Type.

Road Template	Surface Type	Miles
Outslope	Chip Seal	26.2
Outslope	Native	175.1
Crown	Native	11.9
Crown	Pit Run	4.8
Crown	Crushed	0.4
Crown	Chip Seal	0.3

In order to reach the desired road location that met management objectives, grades often ranged between 4-16% with occasional short pitches exceeding 14%.

Forest system roads are categorized into 3 functional classifications: arterial, collector and local. The main County road which travels through the watershed is considered an arterial. Forest system roads within the watershed are either classified as collector or local roads.

Table D-3 displays miles of road by function classification.

Table D-3. Functional Classification.

Functional Classification	Miles	Jurisdiction
Arterial	26.5	County
Collector	3.7	County
Local	1.9	County
Collector	71.8	Forest Service
Local	87.7	Forest Service

Forest Service road maintenance is grouped into 5 maintenance levels (a Road Maintenance Levels and Closures Map is contained in the map atlas). Most roads within the watershed are maintained to Level 2 or Level 3 standard. Level 2 roads are those roads maintained for high clearance vehicle use, while Level 3 roads are maintained for passenger car traffic. Level 1 roads are those roads closed to vehicle travel on a permanent basis. Maintenance levels higher than 3 are assigned to roads that have paved or aggregate surface, fair alignment and with high volume of traffic.

Road maintenance is accomplished through timber sale contract requirements, Forest Service road crews and service contract. The amount of maintenance accomplished each year within the watershed is declining because of reduced maintenance budgets, inflation and reduced timber sale activity.

Table D-4 displays miles of road by maintenance level.

Table D-4. Road Maintenance Level.

Level	Miles
1 (Closed)	23.5
2 (Close Seasonal) (High Clearance)	49.7
2 (High Clearance)	44.9
3 (Passenger Car)	41.1
4	0.0
5	32.0

Many of the roads within the watershed have stabilized over the years, both cut slopes, and fill slopes may be vegetated. Erosion is limited to the road surface and is generally considered minor. Often erosion is triggered by intense seasonal thunderstorms, however severe erosion problems associated with roads maybe chronic, and generally can be traced to one or several causes (e.g., geometric design of the road, road grades, surface type, soil type, road location, steepness of terrane, inadequate drainage structures, road location, lack of maintenance or vehicle use during wet weather conditions). For detail listing of existing road status in the North Fork Watershed, refer to Table D-5 Numeric Listing of Roads and Their Status in the North Fork at the end of this appendix.

Road Issues, Concerns and Resource Concerns

Russian and Music Creek Area

Some roads within this area are closed seasonally (during wet weather or for wildlife) or closed year-round (to avoid road surface problems). The other road systems, including temporary spur roads, are open to the public. There is a history of small fill slope failures, sedimentation to some streams, cut bank raveling and road surface erosion. Vegetation is encroaching upon the travelway.

List of roads within this drainage area and the LSR:
41N18* 41N38 41N23 41N19
41N13 40N54* 40N54A 40N54B
40N54D 41N22 40N54G* 40N35
40N35A 40N35B 41N43 41N36
40N07 Temporary Spur Roads
County Road 1C01

List of roads within this drainage area and outside the LSR:
40N47* 40N58 campground
* = Trailhead Access

Issues and Resource Concerns by Discipline

Wildlife

Issues:
- Designated as a Late-successional Reserve (LSR).
- Open road density and habitat fragmentation.

Resource Concerns:
- Manage access to protect and enhance condition; serves as habitat for LSR.
- Reduce open road density by considering decommissioning roads 41N13, 41N19, 41N22, 41N36, 41N38, 40N35A, 40N54B and most temporary roads.

Fire

Issues:
- Fire management access (key location for strategic fire management).
- Vegetation encroachment on roads (loss of fuel breaks).

Resource Concerns:
- Critical roads to be maintained and accessible during fire management season 41N18, 41N23, 40N54, 40N54A, 40N54D, 40N54G, 40N35, 40N43 and 40N47.
- Develop an active program to manage vegetation encroachment.

Cultural Resources

Issues:
- Potential disturbance of historic/pre-historic properties through road construction or maintenance.
- Protect known sites that are on the National Register of Historic Places.

Resource Concerns:
- Further surveys needed.

Visual Quality

Issues:
- Visibility of roads (including cut/fill slopes, and location) from visually sensitive view points.

Resource Concerns:
- Further surveys needed.

Law Enforcement

Issues:
- Current Uses.

Resource Concerns:
- Need to determine if current uses should be encouraged or restricted.
- Other users that should be analyzed are snowmobilers.
- Maintain access for private land owners (Roads 41N18, 40N07, 40N54, and spur road off 40N54 [Section 20]).

Timber
Issues:
- Management of plantations and vegetation manipulation for other resource concerns.

Resource Concerns:
- Maintain existing road system for access.
- Most of the temporary road system should be maintained for access.

Recreation
Issues:
- Trailhead access (Roads 41N18, 40N54 and 40N47).
- General users (hunting and wood collection).
- Vegetation encroachment on roads.

Resource Concerns:
- Continue seasonal access to trailhead.
- Provide access for other users.
- Provide and maintain trailhead access road system for assigned maintenance level.
- Reduce vegetation encroachment.
- Provide access for mountain bike (Road 40N47).

Fisheries/Hydrology/Soils
Issues:
- Road density, proximity to streams, sedimentation from Roads 41N18, 41N19, 41N22, 41N23, 41N36, 40N07, 40N35, 40N35A, 40N35B, 40N43, 40N47, 40N54, 40N54A, 40N54B, 40N54D, 40N54G and temporary roads.

Resource Concerns:
- Minimize sedimentation from roads.
- Identify problem areas and prioritize correction or mitigate adverse impacts.

Lands and Minerals
Issues:
- Access to private lands and temporary roads off County road.

Resource Concerns:
- Determine if current use should be encouraged or restricted.

Range
Issues:
- Access to drop-off points for livestock within the watershed (Road 40N54A).

Resource Concerns:
- Maintain access and increase size of turnaround to drop-off point.

Road Management
Issues:
- Roads that are not needed for management of the National Forest.
- Reduce road maintenance.
- Traffic management for travel access.
- Management of aggregate source.

Resource Concerns:
- Analyze roads and decommission those no longer needed.
- Identify roads that require permanent or seasonally closures.
- Assign appropriate maintenance level to all roads.
- Identify and correct problems that contribute to high maintenance cost.
- Install and maintain signs that correspond with the Forest visitors map, and provide for adequate direction and users' safety.
- Need to look for and investigate future aggregate source that would be more environmentally sound (Road 40N54 mile post 2.99).

Whites Gulch and Eddy Gulch Drainage Area

Some roads within this area are closed seasonally (during wet weather or for wildlife) or closed year-round (to avoid road surface problems). The other road systems including temporary spur roads are open to the public. There is a history of small fill slope failures, sedimentation to some streams, cut bank raveling and road surface erosion. Vegetation is encroaching upon the travelway.

List of roads within this drainage area and the LSR:
39N58* 39N27 39N62 39N62A 39N59
39N60* 39N66 39N66A 39N15 39N15B
40N61* 40N61A 40N72 40N72A 39N61
39N58B 40N38 Temporary Spur Roads
County Roads 2E001, 2E002, 1C01

List of roads within this drainage area and outside the LSR:
39N27A 39N60 39N66A 39N27A
Temporary Spur Roads
39N53 Lookout Access
* = Trailhead Access

Issues and Resource Concerns by Discipline

Wildlife
Issues:
- Designated as a LSR.
- Open road density and habitat fragmentation.

Resource Concerns:
- Manage access to protect and enhance condition, serves as habitat for LSR.
- Reduce open road density by considering decommissioning roads 39N27A, 40N61A and most temporary roads.

Fire
Issues:
- Fire management access (key location for strategic fire management).
- Vegetation encroachment on roads (loss of fuel breaks).

Resource Concerns:
- Critical roads to be maintained and accessible during fire management season 39N15, 40N61, 39N62, 39N60, 39N27, 39N53 and 39N66, 39N58, 39N14.
- Develop an active program to manage vegetation encroachment.

Cultural Resources
Issues:
- Potential disturbance of historic/pre-historic properties through road construction or maintenance.
- Protect known sites that are on the National Register of Historic Places.

Resource Concerns:
- Further surveys needed.

Visual Quality
Issues:
- Visibility of roads (including cut/fill slopes and locations) from visually sensitive view points.

Resource Concerns:
- Further surveys needed.

Law Enforcement
Issues:
- Current Uses.

Resource Concerns:
- Need to determine if current uses should be encouraged or restricted.
- Maintain access for private land owners (Roads 39N59, 39N61 and 39N62).

Timber
Issues:
- Management of plantations and vegetation manipulation for other resource concerns.

Resource Concerns:
- Maintain existing road system for access.
- Most of the temporary road system should be maintained for access.

Recreation
Issues:
- Trailhead access (Roads 40N61, 39N60 and 39N58).
- General users (Hunting and wood collection).

Resource Concerns:
- Continue yearly access to trailhead.
- Provide access for other users.
- Provide and maintain trailhead access road system for assigned maintenance level.
- Reduce vegetation encroachment.
- Provide access for mountain bikes (Roads 39N14, 39N27, 39N60 and County Road 2E001).

Fisheries/Hydrology/Soils
Issues:
- Road density, proximity to streams, sedimentation from Roads 40N61, 40N61A, 40N72, 40N72A, 39N59, 39N15, 39N15B, 39N27, 39N27A, 39N62, 39N62A, 39N61, 39N61A, 40N38, County Roads 2E001, 2E002 and temporary roads.

Resource Concerns:
- Minimize sedimentation from roads.
- Identify problem areas and prioritize correction or mitigate adverse impacts.

Lands and Minerals
Issues:
- Access to private lands, temporary roads off County and Forest roads.

Resource Concerns:
- Determine if current use should be encouraged or restricted.

Range
Issues:
- Access to drop-off points for livestock within the watershed.

Resource Concerns:
- Maintain access to drop-off points.

Road Management
Issues:
- Roads that are not needed for management of the National Forest.
- Reduce road maintenance.
- Traffic management for travel access.

Resource Concerns:
- Analyze roads and decommission those no longer needed.
- Identify roads that require permanent or seasonally closures.
- Assign appropriate maintenance level to all roads.
- Identify and correct problems that contribute to high maintenance costs.
- Install and maintain signs that correspond with the Forest visitors map, and provide for adequate direction and users' safety.

Blue Ridge Area

Some roads within this area are closed seasonally (during wet weather or for wildlife) or closed year-round (to avoid road surface problems). The other road systems including temporary spur roads are open to the public. There is a history of small fill slope failures, sedimentation to some streams, cut bank raveling and road surface erosion. A few roads have landslides above or below the road prism. Vegetation is encroaching upon the travelway.

List of roads within this drainage area outside LSR:

40N46	40N46A	39N54	39N65
39N44	39N24	39N27	39N27B
39N21	39N21A	39N21B	39N12
39N22	39N22A	39N22B	39N28
39N28A	39N28B	39N28C	39N28F
39N35	39N35A	10N22	10N22A
10N22B	10N22C	39N41	10N01

40N57 Guard Station
40N55 Campground Access
County Road 1C01

Issues and Resource Concerns by Discipline

Wildlife
Issues:
- Open road density and habitat fragmentation.

Resource Concerns:
- Reduce open road density by considering decommissioning Roads 39N21A, 39N21B, 39N28A, 39N28B, 39N28F, 39N54, 40N46, 40N46A and most temporary roads.

Fire
Issues:
- Fire management access (key location for strategic fire management).
- Vegetation encroachment on roads (loss of fuel breaks).

Resource Concerns:
- Critical roads to be maintained and accessible during fire management season (Roads 40N46, 39N27, 39N21, 39N28, 10N01, 39N41, 40N55 and 39N12).
- Develop an active program to manage vegetation encroachment.

Cultural Resources
Issues:
- Potential disturbance of historic/pre-historic properties through road construction or maintenance.
- Protect known sites that are on the National Register of Historic Places.

Resource Concerns:
- Further surveys needed.

Visual Quality
Issues:
- Visibility of roads (include cut/fill slopes and locations) from visually sensitive view points.

Resource Concerns:
- Further surveys needed.

Law Enforcement
Issues:
- Current Uses.

Resource Concerns:
- Need to determine if current uses should be encouraged or restricted.
- Maintain access for private landowners (Roads 39N28, 39N35, 39N27, 39N60 and 39N41).

Timber
Issues:
- Management of plantations and vegetation mani-

pulation for other resource concerns.

Resource Concerns:
- Maintain existing road system for access.
- Most of the temporary road system should be maintained for access.

Recreation
Issues:
- General users (hunting and wood collection).
- Access to campground.
- Vegetation encroachment on roads.

Resource Concerns:
- Improve or provide access to campgrounds.
- Provide access for other users.
- Provide and maintain trailhead access road system for assigned maintenance level.
- Reduce vegetation encroachment.
- Provide access for mountain bikes (Road 39N28).

Fisheries/Hydrology/Soils
Issues:
- Road density, proximity to streams, sedimentation from Roads 39N21, 39N21B, 39N27, 39N28A, 39N35, 39N35A, 40N46, 40N46A, 40N55 and temporary roads.

Resource Concerns:
- Minimize sedimentation from roads.
- Identify problem areas and prioritize correction or mitigate adverse impacts.

Lands and Minerals
Issues:
- Access to private lands and temporary roads off County and Forest roads.

Resource Concerns:
- Determine if current use should be encouraged or restricted.

Range
Issues:
- Access to drop-off points for livestock within the watershed.

Resource Concerns:
- Maintain access to drop-off points.

Road Management
Issues:
- Roads that are not needed for management of the National Forest.
- Reduce road maintenance.
- Management of aggregate source.
- Traffic management for travel access.

Resource Concerns:
- Analyze roads and decommission those no longer needed.
- Identify roads that require permanent or seasonally closures.
- Assign appropriate maintenance level to all roads.
- Identify and correct problems that contribute to high maintenance costs.
- Install and maintain signs that correspond with the Forest visitors map, and provide for adequate direction and users' safety.
- Identify and develop a plan for existing aggregate source (Road 39N41 M.P. 0.81 and Road 40N46 spur road to pit M.P. 0.91).
- Need to look for and investigate future aggregate source that would be more environmentally sound.

Yellow Jacket Area

Some roads within this area are closed seasonally (during wet weather or for wildlife) or closed year-round (to avoid road surface problems). The other road systems including temporary spur roads are open to the public. There is a history of small fill slope failures, sedimentation to some streams, cut bank raveling and road surface erosion. A few roads have landslides above or below the road prism. Vegetation is encroaching upon the travelway. At the higher elevations, there is a lot of blow-down occurring.

List of roads within this drainage area and within the LSR:

40N51	40N51B	40N33	40N45
40N42	40N51D	40N51K	11N20
11N20A	40N42C	Temporary roads	

List of roads within this drainage area and outside LSR:

40N51	40N51A	40N51D	40N51E
40N51F	40N51G	40N51H	40N51I
40N51J	10N30	10N29	10N29A
11N10	11N10A	11N20	40N50
40N50A	10N21	40N42	40N42A
40N42B	40N42D	40N39	40N39A
40N57	Temporary roads		

Issues and Resource Concerns by Discipline

Wildlife
Issues:
- Designated as a LSR.
- Open road density and habitat fragmentation.

Resource Concerns:
- Manage access to protect and enhance condition, serves as habitat for LSR.
- Reduce open road density by considering decommissioning Roads 11N10, 11N10A, 40N51F, 40N51G, 40N51H, 40N51I, 40N51J, 40N51K, 11N20, 11N20A, 10N21, 40N50, 40N45, 40N50A, 40N39, 40N39A, 40N33 and most temporary roads.

Fire
Issues: Fire management access (key location for strategic fire management).
- Vegetation encroachment on roads (loss of fuel breaks).

Resource Concerns:
- Critical roads to be maintained and accessible during fire management season (Roads 40N51, 40N42 and 40N57).
- Develop an active program to manage vegetation encroachment.

Cultural Resource
Issues:
- Potential disturbance of historic/pre-historic properties through road construction or maintenance.
- Protect known sites that are on the National Register of Historic Places.

Resource Concerns:
- Further surveys needed.

Visual Quality
Issues:
- Visibility of roads (including cut/fill slopes and locations) from visually sensitive view points.

Resource Concerns:
- Further surveys needed.

Law Enforcement
Issues:
- Current Uses.

Resource Concerns:
- Need to determine if current uses should be encouraged or restricted.
- Maintain access for private landowners (temporary roads).

Timber
Issues:
- Management of plantations and vegetation manipulation for other resource concerns.

Resource Concerns:
- Maintain existing road system for access.
- Most of the temporary road system should be maintained for access.

Recreation
Issues:
- General users (hunting, fishing and wood collection).
- Access to campground.
- Vegetation encroachment on roads.

Resource Concerns:
- Improve or provide access to campgrounds.
- Provide access for other users.
- Provide and maintain trailhead access road system for assigned maintenance level.
- Reduce vegetation encroachment.
- Provide access for mountain bikes (Road 40N51).

Fisheries/Hydrology/Soils
Issues:
- Road density, proximity to streams, sedimentation from Roads 40N33, 40N45, 40N42, 40N42B, 40N50, 40N50A, 11N10, 11N10A, 40N51, 40N39, 40N51B and temporary roads.

Resource Concerns:
- Minimize sedimentation from roads.
- Identify problem areas and prioritize correction or mitigate adverse impacts.

Lands and Minerals
Issues:
- Access to private lands and temporary roads off County and Forest roads.

Resource Concerns:
- Determine if current use should be encouraged or restricted.

Range
Issues:
- Access to drop-off points for livestock within the watershed.

Resource Concerns:
- Maintain access to drop-off points (Road 40N51B).

Road Management
Issues:
- Roads that are not needed for management of the National Forest.
- Reduce road maintenance.
- Traffic management for travel access.
- Management of aggregate source.

Resource Concerns:
- Analyze roads and decommission those no longer needed.
- Identify roads that require permanent or seasonally closures.
- Assign appropriate maintenance level to all roads.
- Identify and correct problems that contribute to high maintenance costs.
- Install and maintain signs that correspond with the Forest visitors map, and provide for adequate direction and users' safety.
- Identify and develop a plan for existing aggregate source (Road 40N51 M.P. 17.58 (by JCT 10N30), Road 40N51 M.P. 21.17, and Road 40N42 M.P. 0.34).
- Need to look for and investigate future aggregate source that would be more environmentally sound.

Status of Roads in the North Fork Watershed

For an in-depth listing of roads and their status in the North Fork Watershed, refer to Table D-5 at the end of this appendix. Following are the definitions of terms used in Table D-5.

Definition of Terms
(Source TI8 & RMO Report 3/18/93)

Forest Road Number: Self-explanatory.

Road Name: Self-explanatory.

Length: Self-explanatory.

Termini: Shows the beginning and ending of the road specified. The first road number, milepost (M.P.) or description in the column is the beginning of the road. The following entry either shows the direction the road heads from the beginning or where the road terminates.

Maintenance Levels:
1 = Assigned to intermittent service roads during the time they are closed to vehicular traffic.
2 = Assigned to roads open for use by high clearance vehicles.
3 = Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car.
4 = Assigned to roads that provide a moderate degree of user comfort and convenience at moderate speeds.
5 = Assigned to roads that provide a high degree of user comfort and convenience. Normally paved roads. Aggregate roads would be treated for dust abatement.

Lanes: S = Single Lane, D = Double Lane.

Surface Class:
NATIVE = Existing Material.
PIT RUN = Aggregate (native material from pit).
CRUSHED = Crushed Aggregate.
PAVED = Pavement.
CHIP = Chip Seal.

Primary User:
P = Private land access use.
R = Recreation use.
T = Timber use.
H = Human Development/Administration.
GP = General public use (public highway, open to all users).

Existing Management Strategy:
A = Accept.
E = Encourage.
L = Eliminate.
P = Prohibit (road closure order applies).
N/A = Not Applicable for County roads.
Note: Will be expanded when opportunity warrants.
D = Decommission (close system, seed roadway, pull drainages, ripping road bed).

Average Daily Traffic:
Low (L) = 0 to 1.
Moderate (M) = 2 to 4.
High (H) = 5 to 15.
Very High (VH) = 16+.

Road Closures:
Y = Yearlong for the following reason(s): road maintenance, wildlife and sensitive soils.
N = Road open year-round.
S = Seasonal closure/open (minimize resource/use conflicts such as wildlife, sensitive soils, public safety, or road maintenance, normally during winter conditions).

Highway Safety Act (HSA):
(if road is passable by passenger car, then HSA applies; normally applies to Maintenance Level 3, 4 & 5 roads). Y = Yes N = No.

Template:
O = Outslope, assumes no ditch, or outside berm unless needed for short stretches.
I = Inslope, assumes inboard ditch, with no outside berm unless needed for short stretches.
C = Crown, assumes inboard ditch, with no outside berm unless needed for short stretches.

Date Built: Self-explanatory.

Attributes and Definitions Used for Each Resource

Wildlife

Disturbance — Deals with disturbance in terms of proximity to active nest sites for Threatened, Endangered or Sensitive species. Deals with harassment to some of the critical games species.

Fragmentation — Deals with fragmentation of habitats for particular species.

Road Density — Deals with areas of high road density. Can be closely correlated with the harassment issue and fragmentation of habitats.

Fire

Critical Roads — Roads that are critical for fire access, control points and those that provide a fuel break situation.

Important Roads — Roads that are important for fire access and those that are needed for strategic type project work (i.e., prescribed burning, fuels clean-up, etc.)

Visual Quality

Visual Quality is being analyzed as roads or portions of roads that may not currently meet the established visual quality objective (VQO) for the area. Roads addressed here are designated as needing additional field verification for actual vantage points and locations in need of visual restoration.

Cultural Resources

Protection and field verification for actual known sites and future historic or cultural sites.

Law Enforcement

Law Enforcement Problems — Will highlight which roads or system of road currently encounter law enforcement problems.

Current Use — Roads that need to have current use analyzed. It may not necessarily be an enforcement problem, but needs to be explored for current use needs to be encouraged or restrictions needed to be implemented. Other uses that have the potential to encourage or discourage use include snowmobiles, mountain bikes, and four-wheel-drive vehicles.

Law Enforcement Needs — Will identify roads or road system law enforcement needs for access and personal safety.

Timber

Matrix Lands — Areas where access is needed for timber management opportunities.

Other Lands — Areas where access may be needed to provide vegetative manipulation for other resource concerns.

Recreation

Trailhead Access — Roads that currently serve trailheads access into the Marble Mountain Wilderness.

General Recreation Use — Roads that are heavily used for dispersed recreation (i.e., hunting, sightseeing, woodcutting, fishing, etc.).

Fisheries/Hydrology/Soils

Stream Proximity — Roads that are located very close to streams. This issue is very closely related to the chronic sedimentation issue as discussed in the Areas With Watershed Concerns and Riparian Reserves Sections in the North Fork Watershed Analysis.

Lands and Minerals

Active Claims — Roads utilized for access to active mining claims.

Private Land — Roads needed to access private property or have special-use easements attached to them.

Road Management

Notes — Roads below Maintenance Level 3 normally do not receive brush treatment along roads.

Final Transportation Plan — A realistic look at maintenance wants versus dollars expected needs to occur. Public input needs to be included in the decision-making process.

[Insert "Table D-5 Numeric Listing of Roads and Their Status in the North Fork Watershed" here (6 pages).]

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed

Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
10N01	UMBER	0.30	39N28 - S	1	S	NATIVE	T	P	L	Y	N	O	1978
10N21	POLLOCK GULCH	0.10	40N51 - S	2	S	NATIVE	T	P	L	S	N	O	1978
10N22	HENRY BELL GULCH	0.40	39N28 - S	1	S	NATIVE	T	P	L	Y	N	O	1978
10N22A	HENRY BELL GULCH	0.20	10N22 - E	1	S	NATIVE	T	P	L	Y	N	O	1978
10N22B	HENRY BELL GULCH	0.20	10N22 - NW	1	S	NATIVE	T	P	L	Y	N	O	1978
10N22C	HENRY BELL GULCH	0.60	10N22 - SW	1	S	NATIVE	T	P	L	Y	N	O	1978
10N29	HOG RANGE	0.40	10N30 - M.P. 0.40	2	S	PIT RUN	T	P	L	S	N	O	1978
10N29A	HOG RANGE	0.20	10N29 - SE	2	S	PIT RUN	T	P	L	S	N	O	1978
10N30	BOYDS GULCH	0.20	40N51 - M.P. 0.20	2	S	NATIVE	T	P	L	S	N	O	1978
11N10	STING	0.80	40N51 - NE	2	S	CRUSHED	T	P	L	S	N	O	1978
11N10A	STING	0.50	11N10 - SE	2	S	CRUSHED	T	P	L	S	N	O	1978
11N20	YELLOW JACKET FLAT	1.20	40N51 - 40N51	2	S	CRUSHED	T	P	L	S	N	O	1978
39N12	HEINEY	0.50	39N28 - N	2	S	NATIVE	T	A	L	N	N	O	1978
39N14	GRASSHOPPER RIDGE	3.80	39N04 - 39N28	3	S	NATIVE	T/R	E	H	N	Y	C	1962
39N14F	GRASSHOPPER RIDGE	0.60	39N14 - E	2	S	NATIVE	T	A	L	N	Y	O	1964
39N14G	GRASSHOPPER RIDGE	0.60	39N14 - NW	2	S	NATIVE	H	A	L	N	Y	O	1966
39N15	UPPER WHITES	3.00	39N58 - N	2	S	NATIVE	H	A	L	N	N	O	1964
39N15B	UPPER WHITES	0.40	39N15 - S	2	S	NATIVE	H	A	L	N	N	O	1964
39N21	SMITH RIDGE	1.20	39N27 - 39N21A	2	S	NATIVE	T	A	L	N	N	O	1964

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed													
Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
39N21	SMITH RIDGE	5.90	39N21A - N	1	S	NATIVE	T	P	L	Y	N	O	1984
39N21A	SMITH RIDGE	0.90	39N21 - SW	2	S	NATIVE	T	A	L	N	N	O	1960
39N21B	SMITH RIDGE	1.50	39N21 - W	1	S	NATIVE	T	P	L	Y	N	O	1984
39N22	BLUE MUD	0.90	39N44 - 39N22B	2	S	NATIVE	T	A	L	N	N	O	1960
39N22A	BLUE MUD	1.30	39N22 - SW	2	S	NATIVE	T	A	L	N	N	O	1979
39N22B	BLUE MUD	0.70	39N22 - SW	2	S	NATIVE	T	A	L	N	N	O	1979
39N24	BLUE RIDGE	0.30	M.P. 2.00 - LO	2	S	NATIVE	T	A	L	N	Y	O	1933
39N27	ORIN E LEWIS RD	8.20	2E001 - 39N27B	3	S	PIT RUN	T/R	E	M	N	Y	O	1950
39N27A	ORIN E LEWIS RD	0.50	39N27 - NW	2	S	NATIVE	T	A	L	N	N	O	1964
39N27B	ORIN E LEWIS RD	0.40	39N27 - N	2	S	NATIVE	T	A	L	N	N	O	1950
39N28	PICAYUNE	3.50	39N12 - M.P. 13.5	3	S	PIT RUN	T/R	E	M	N	Y	C	1970
39N28A	PICAYUNE	0.20	M.P. 0.20 - E	2	S	NATIVE	T	A	L	N	N	O	1978
39N28B	PICAYUNE	0.80	39N28 - NE	1	S	PIT RUN	T	P	L	Y	N	O	1978
39N28C	PICAYUNE	0.40	39N28 - SW	1	S	NATIVE	T	P	L	Y	N	O	1978
39N28F	PICAYUNE	0.30	39N28 - NE	2	S	PIT RUN	T	A	L	N	N	O	1978
39N35	PICAYUNE LAKE	1.40	39N28 - NW	2	S	PIT RUN	T	P	L	S	N	O	1978
39N35A	PICAYUNE LAKE	1.00	39N35 - N	2	S	PIT RUN	T	P	L	S	N	O	1978
39N41	BLUE RIDGE TIE	0.70	39N27 - M.P. 0.70	3	S	NATIVE	T	A	L	N	Y	O	1930
39N44	BLUE TAIL FLY	2.40	39N41 - 39N27	2	S	NATIVE	T	A	L	N	N	O	1960
39N53	EDDY GULCH LO	0.80	39N14 - LO	3	S	NATIVE	T	P	L	S	Y	O	1930
39N54	KINCADE MINE ROAD	1.80	39N27 - SE	2	S	NATIVE	T	A	L	N	N	O	1984
39N58	DEACON LEE	2.20	39N14 - NE	3	S	NATIVE	H/R	E	L	N	Y	O	1964
39N58B	DEACON LEE	0.60	39N58 - N	2	S	NATIVE	H	A	L	N	N	O	1964

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed

Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
39N59	INCLINE RIDGE	1.20	39N14 - NW	2	S	NATIVE	H	A	L	N	N	O	1960
39N60	BLACK BEAR SUMMIT ROAD	2.40	39N27 - 39N28	3	S	NATIVE	H/T/R	E	M	N	Y	O	1982
39N61	CLEAVER MINE	1.20	39N62 - SW	2	S	NATIVE	H	A	L	N	N	O	1964/ 1978
39N61A	CLEAVER MINE	0.70	39N61 - S	2	S	NATIVE	H	A	L	N	N	O	1978
39N62	TABASCO	0.90	40N61 - 39N61	2	S	NATIVE	H	P	L	S	N	O	1964
39N62	TABASCO	2.40	39N61 - NW	2	S	NATIVE	H	P	L	S	N	O	1978
39N62A	TABASCO	0.70	39N62 - N	2	S	NATIVE	H	P	L	S	N	O	1978
39N65	YAT	1.70	39N27 - NW	2	S	PIT RUN	T	A	L	N	N	O	1950
39N66	ARGUS	0.90	39N14 - S	2	S	NATIVE	H	P	L	S	N	O	1964/ 1982
39N66 A	YAT	0.20	39N66 - M.P. 0.20	2	S	NATIVE	H	P	L	S	N	O	1964
40N07	CHINA GULCH	1.30	1C01 - E	1	S	NATIVE	H	P	L	Y	N	O	1930
40N33	SURCREE	5.80	40N51 - N	1	S	NATIVE	H	P	L	Y	N	O	1960
40N35	HICKEY GULCH	1.70	40N54 - SW	2	S	NATIVE	H	P	L	S	N	O	1988
40N35A	HICKEY GULCH	0.50	40N35 - E	2	S	NATIVE	H	P	L	S	N	O	1988
40N35B	HICKEY GULCH	1.80	40N35 - N	2	S	NATIVE	H	P	L	S	N	O	`988
40N38	HICKEY	1.20	2EOO2 - E	2	S	NATIVE	T	P	L	S	N	O	1988
40N39	NIELON GULCH	2.20	40N42 - N	2	S	NATIVE	T	A	L	N	N	O	1984
40N39A	NIELON GULCH	0.70	40N39 - SW	2	S	NATIVE	T	A	L	N	N	O	1984
40N42	KELLY GULCH	1.50	1C01-DUMP ROAD	3	S	PIT RUN	T	E	M	N	Y	O	1962
40N42	KELLY GULCH	2.40	DUMP ROAD-40N42A	2	S	PIT RUN	T	A	L	N	Y	O	1962/ 1976
40N42	KELLY GULCH	3.40	40N42A - NE	2	S	NATIVE	H	A	L	N	Y	O	1962/ 1976

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed

Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
40N42A	KELLY GULCH	0.70	40N42 - SW	2	S	NATIVE	T	A	L	N	N	O	1962
40N42B	KELLY GULCH	0.30	40N42 - NE	2	S	NATIVE	H	A	L	N	N	O	1976
40N42C	KELLY GULCH	0.20	40N42 - S	2	S	NATIVE	H	A	L	N	N	O	1976
40N42D	KELLY GULCH	0.60	40N42 - E	2	S	NATIVE	T	A	L	N	N	O	1984
40N43	JOHNS MEADOW	1.60	40N54 - SE	2	S	NATIVE	H	P	L	S	N	O	1989
40N45	SALMON SPECIMEN	1.10	40N51 - NE	1	S	NATIVE	H	P	L	Y	N	O	1930
40N46	JESSUPS	4.80	39N27 - N	2	S	NATIVE	T	A	L	N	Y	O	1975/ 1977
40N46A	JESSUPS	1.80	40N46 - NE	2	S	NATIVE	T	A	L	N	Y	O	1977
40N47	MULE BRIDGE	2.40	1C01 - N	3	S	CRUSHED	T/R	E	M	N	Y	O	1930
40N50	BIG CREEK	0.40	40N51 - S	2	S	NATIVE	T	P	L	S	N	O	1978
40N50A	BIG CREEK	0.30	40N50 - E	1	S	NATIVE	T	P	L	S	N	O	1978
40N51	YELLOW JACKET RIDGE	2.80	1C01 - 40N33	3	S	CRUSHED	H/R	E	M	N	N	O	1930
40N51	YELLOW JACKET RIDGE	8.20	40N33 - 40N51D	2	S	CRUSHED	H/T/R	E	L	S	N	O	1960/ 1988
40N51	YELLOW JACKET RIDGE	10.30	40N51D - M.P. 21.30	2	S	NATIVE	T	A	L	S	N	O	1920
40N51	YELLOW JACKET RIDGE	1.10	M.P. 21.30 - 1C01	2	S	NATIVE	T	A	L	S	N	O	1978
40N51A	YELLOW JACKET RIDGE	0.40	40N51 - S	2	S	CRUSHED	T	P	L	S	N	O	1988
40N51B	YELLOW JACKET RIDGE	1.10	40N51 - NW	2	S	PIT RUN	H/R	A/P	L	S	N	O	1978
40N51D	YELLOW JACKET RIDGE	2.10	40N51 - NE	2	S	PIT RUN	T	P	L	S	N	O	1978
40N51E	YELLOW JACKET RIDGE	0.20	40N51 - N	2	S	NATIVE	T	P	L	S	N	O	1978

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed

Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
40N51F	YELLOW JACKET RIDGE	0.20	40N51 - SE	2	S	NATIVE	T	P	L	S	N	O	1978
40N51G	YELLOW JACKET RIDGE	0.30	40N51 - NW	2	S	NATIVE	T	P	L	S	N	O	1978
40N51H	YELLOW JACKET RIDGE	0.10	40N51 - E	2	S	NATIVE	T	P	L	S	N	0	1978
40N51I	YELLOW JACKET RIDGE	0.30	40N51 - N	2	S	NATIVE	T	P	L	S	N	O	1978
40N51J	YELLOW JACKET RIDGE	0.30	40N51 - E	2	S	NATIVE	T	P	L	S	N	O	1978
40N51K	YELLOW JACKET RIDGE	0.20	40N51 - N	2	S	NATIVE	T	P	L	S	N	O	1978
40N54	SOUTH RUSSIAN	4.50	1C01 - 40N54A	3	S	PIT RUN	H/R	E	M	N	Y	O	1960
40N54	SOUTH RUSSIAN	2.20	40N54A - M.P. 6.70	2	S	NATIVE	H/R	E	M	N	Y	O	1960
40N54	SOUTH RUSSIAN	1.30	M.P. 6.70 - SE	2	S	NATIVE	H/R	E/P	M	S	Y	O	1960
40N54A	SOUTH RUSSIAN	1.10	40N54 - S	3	S	NATIVE	H/R	E	M	N	Y	O	1960
40N54B	SOUTH RUSSIAN	0.40	40N54 - SW	2	S	NATIVE	H	A	L	N	N	O	1960
40N54D	SOUTH RUSSIAN	1.80	40N54 - NW	2	S	NATIVE	H	P	L	S	N	O	1992
40N54G	SOUTH RUSSIAN	2.00	40N54 - SW	2	S	NATIVE	H	P	L	S	N	O	1992
40N55	RED BANK C.G.	0.30	1C01 - C.G.	3	S	NATIVE	R	E	M	N	Y	O	1930
40N57	SAWYERS BAR RS.	0.30	1C01 - WORK STATION	4	S	CHIP	H	A	M	N	Y	C	1920
40N58	IDLEWILD C.G.	0.40	40N47 - C.G.	3	S	CRUSHED	R	E	M	N	Y	C	UNK
40N61	WHITES GULCH	1.30	2E002 - MP 1.3	3	S	PIT RUN	T/R	A	M	N	Y	C	1600
40N61	WHITES GULCH	7.40	MP 1.3 - 39N14	3	S	NATIVE	T/R	A	M	N	Y	C	1940/ 1960
40N61A	WHITES GULCH	1.10	40N61 - S	2	S	NATIVE	T	A	L	N	Y	O	1964
40N72	COUNTS GULCH	2.00	40N61 - SW	1	S	NATIVE	H	P	L	Y	Y	O	1940

Table D-5. Numeric Listing of Roads and Their Status in the North Fork Watershed

Forest Road Number	Road Name	Length	Termini	Main-tenance Level	Lanes	Surface Class	Primary User	Existing Manage-ment Strategy	Average Daily Traffic	Closure	Highway Safety Act	Tem-plate	Date Built
40N72 A	COUNTS GULCH	0.40	40N72 - E	1	S	NATIVE	H	P	L	Y	N	O	1940
41N13	JUMP OFF	0.20	1C01 - S	2	S	NATIVE	H	A	L	N	N	O	1976
41N18	TAYLOR LAKE	2.40	1C01 - SE	3	S	NATIVE	T/R	E/P	M	S	Y	O	1940
41N19	NORTH RUSSIAN	0.70	1C01 - NE	2	S	NATIVE	H	A	L	N	N	O	1950-
41N22	COW CR	0.90	1C01 - E	2	S	NATIVE	H	A	L	S	N	O	1930/ 1989
41N23	NORTH RUSSIAN TIE	1.70	1C01 - N	2	S	NATIVE	H	A	L	N	N	O	1960
41N36	HOGAN MINE	0.90	1C01 - SE	2	S	NATIVE	H	A	L	N	N	O	1930
41N38	VIEW	2.30	1C01 - SEC 28	1	S	NATIVE	H	P	L	Y	N	O	1986
County Roads													
1C01	SAWYERS BAR RD.	3.20	ETNA SUMMIT - 41N13	5	D	PAVED	H/T/R	E	VH	N	Y	C/O	1933
1C01	SAWYERS BAR RD.	23.30	41N13 - FH 93	5	S	PAVED	H/T/R	E	VH	N	Y	O	1933
2E001	EDDY GULCH RD.	2.80	1C01 - 39N27	5	S	NATIVE	T/R	E	M	N	Y	O	1950
2E001	EDDY GULCH RD.	1.90	39N27 - 39N28	5	S	NATIVE	H	A	L	N	Y	O	1950
2E002	WHITES GULCH RD.	0.10	1C01 - M.P. 0.10	5	S	PAVED	T/R	E	M	N	Y	O	1800
2E002	WHITES GULCH RD.	0.70	M.P. 0.10 - 40N61	5	S	NATIVE	T/R	E	M	N	Y	O	1800

Appendix E - Special Forest Products Found in Analysis Area

Pennyroyal
Prince's pine
Slender tubed iris
Indian tobacco
Yellow mountain moss
Evergreen huckleberry
Mock orange
Green manzanita
Mountain mahogany
California wild grape
Hazel
Sandbar willow
California black oak
Tanoak
Red alder
Sugar pine
White alder
Bear grass
Woodwardia chain fern
Yarrow
Yerba buena
Tanoak mushroom
Blackcap raspberry
Manzanita uva ursa
Redbud
Dwarf Oregon grape
Manzanita
Gooseberry
Salal
Ponderosa pine
Oregon white oak
Bigleaf maple
Pacific madrone
California bay laurel
Maiden hair fern
Umbrella plant
Wild celery
Miner's lettuce
Sadler oak
Red huckleberry
Serviceberry
Oregon grape
Creek dogwood
Thimbleberry
Nine bark
Blackberry
Pacific dogwood
Red willow
Elderberry
Chinkapin
Pacific yew

Appendix F - Risk/Fire Behavior Potential Analysis

Fuel Model Descriptions and Resulting Fire Behavior Potential for the North Fork Salmon Watershed

The Forest Service Manual (FSM), Chapter 5105, defines fuel as combustible wildland vegetative materials, living or dead. Within this chapter on fuel management, direction is provided to evaluate, plan and treat wildland fuel to control flammability and reduce resistance to control. Treatments include mechanical, chemical, biological or manual means, including the use of prescribed fire, to support land and resource management objectives.

The objectives of fuels management are to:

1. Reduce fire hazard to a level where cost-effective resource protection is possible should a wildfire ignition occur. Fire hazard is the fire behavior potential (intensity and rate of spread) of a fire burning in a given fuel profile and its ability to be suppressed by fire forces.
2. Reduce the potential fire severity.

The reason fire managers are concerned with fuels is that of the 3 elements that influence fire behavior (weather, topography and fuels), the only element that can be manipulated is vegetation or fuels.

Fuel Model Definitions

The criteria for choosing a fuel model (Anderson, 1982) is based on the fact that fire burns in the fuel stratum best conditioned to support it. This means situations will occur where 1 fuel model represents rate of spread most accurately and another best depicts fire intensity. In other situations, 2 fuel conditions may exist, so the spread of fire across the area must be weighed by the fraction of the area occupied by each fuel. Fuel models are simply tools to help the user realistically estimate fire behavior. Refer to Table F-1 for a description of the fuel models used in fire behavior (as documented by Albini [1976]).

Table F-1. Description of Fuel Models Used in Fire Behavior as Documented by Albini (1976).

Fuel Model	Typical Fuel Complex	Fuel Loading (tons/acre)				Fuel Bed Depth (feet)
		1 Hour	10 Hour	100 Hour	Live	
Grass and grass-dominated						
1	Short Grass (1 foot)	0.74	0.00	0.00	0.00	1.0
2	Timber (Grass and Understory)	2.00	1.00	0.50	0.50	1.0
3	Tall Grass(2.5 feet)	3.01	0.00	0.00	0.00	2.5
Chaparral and Shrub Fields						
4	Chaparral (6 feet)	5.01	4.01	2.00	5.01	6.0
5	Brush (2 Feet)	1.00	0.50	0.00	2.00	2.0
6	Dormant Brush/Hardwood Slash	1.50	2.50	2.00	0.00	2.5
7	Southern Rough	1.13	1.87	1.50	0.37	2.5
Timber Litter						
8	Closed Timber Litter	1.50	1.00	2.50	0.00	0.2
9	Hardwood Litter	2.92	0.41	0.15	0.00	0.2
10	Timber (litter and understory)	3.01	2.00	5.01	2.00	1.0
Slash						
11	Light Logging Slash	1.50	4.51	5.51	0.00	1.0
12	Medium Logging Slash	4.01	14.03	16.53	0.00	2.3
13	Heavy Logging Slash	7.01	23.04	28.05	0.00	3.0

The prediction of fire behavior has become more valuable for assessing potential fire damage to resources. A quantitative basis for rating fire danger and predicting fire behavior became possible with the development of mathematical fire behavior fuel models. Fuels have been classified into four groups: grasses, brush, timber and slash. The differences in these groups are related to the fuel load and the distribution of the fuel among the size classes. Size classes are: 0-1/4", 1/4-1", 1-3", and 3" and greater.

The criteria for choosing a fuel model includes the fact that the fire burns in the fuel stratum best conditioned to support the fire. Fuel models are simply tools to help the user realistically estimate fire behavior. Modifications to fuel models are possible by changes in the live/dead ratios, moisture contents, fuel loads and drought influences. The 13 fire behavior predictive fuel models are used during the severe period of the fire season when wildfire pose greater control problems and impacts on land resources.

The following is a brief description of each of the 13 fire behavior fuel models.

Grass Group

Fire Behavior Fuel Model 1

Fire spread is governed by the very fine, porous and continous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass. Very little timber or shrub is present.

Fire Behavior Fuel Model 2

Fire spread is primarily through cured or nearly cured grass where timber or shrubs cover one to two-thirds of the open area. These are surface fires that may increase in intensity as they hit pockets of other litter.

Fire Behavior Fuel Model 3

Fires in this grass group display the highest rates of spread and fire intensity under the influence of wind. Approximately one-third or more of the stand is dead or nearly dead.

Shrub Group

Fire Behavior Fuel Model 4

Fire intensity and fast spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Stands of mature shrubs (6 feet tall or more) are typical candidates. Besides flammable foliage, dead woody material in the stands contributes significantly to the fire intensity. A deep litter layer may also hamper suppression efforts.

Fire Behavior Fuel Model 5

Fire is generally carried by surface fuels that are made up of litter cast by the shrubs and grasses or forbs in the understory. Fires are generally not very intense because the fuels are light and shrubs are young with little dead material. Young green stands with little dead wood would qualify.

Fire Behavior Fuel Model 6

Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but requires moderate winds, greater than 8 miles per hour.

Fire Behavior Fuel Model 7

Fires burn through the surface and shrub strata with equal ease and can occur at higher dead fuel moistures because of the flammability of live foliage and other live material.

Timber Group

Fire Behavior Fuel Model 8

Slow burning ground fuels with low flame lengths are generally the case, although the fire may encounter small "jackpots" of heavier concentrations of fuels that can flare up. Only under severe weather conditions do the fuels pose a threat. Closed canopy stands of short-needled conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer is mostly twigs, needles and leaves.

Fire Behavior Fuel Model 9

Fires run through the surface faster than in fuel model 8 and have a longer flame length. Both long-needle pine and hardwood stands are typical. Concentrations of dead, down woody material will cause possible torching, spotting and crowning of trees.

Fire Behavior Fuel Model 10

Fires burn in the surface and ground fuels with greater intensity than the other timber litter types. A result of overmaturing and natural events create a large load of heavy down, dead material on the forest floor. Crowning out, spotting and torching of individual trees is more likely to occur, leading to potential fire control difficulties.

Logging Slash Group

Fire Behavior Fuel Model 11

Fires are fairly active in the slash and herbaceous material intermixed with the slash. Fuel loads are light and often shaded. Light partial cuts or thinning operations in conifer or hardwood stands. Clearcut operations generally produce more slash than is typical of this fuel model.

Fire Behavior Fuel Model 12

Rapidly spreading fires with high intensities capable of generating firebrands can occur. When fire starts it is generally sustained until a fuelbreak or change in conditions occur. Fuels generally total less than 35 tons per acre and are well distributed. Heavily thinned conifer stands, clearcuts, and medium to heavy partial cuts are of this model.

Fire Behavior Fuel Model 13

Fire is generally carried by a continuous layer of slash. Large quantities of material 3 inches and greater are present. Fires spread quickly through the fine fuels and intensity builds up as the large fuels begin burning. Active flaming is present for a sustained period of time and firebrands may be generated. This contributes to spotting as weather conditions become more severe. Clearcuts are depicted where the slash load is dominated by the greater than 3 inch fuel size, but may also be represented by a "red slash" type where the needles are still attached because of high intensity of the fuel type.

Weather Data

Table F-2 shows weather parameters taken from the data collected at the Sawyers Bar weather station from 1973 through 1992. These parameters are representative of 90th percentile weather conditions.

Table F-2. Weather Parameters, Sawyers Bar, 1973-1992.

Fuel Moisture	Percent
1 Hour	2
10 Hour	4
100 Hour	7
1,000 Hour	8
20 Foot Wind Speed	9 Miles Per Hour

Table F-3 shows the conversion factors used to adjust 20 foot windspeed to midflame windspeed.

Table F-3. Conversion Factors Used to Adjust 20 Foot Windspeed to Midflame Windspeed.

Fuel Model	Exposure	Adjustment Factor	Midflame Windspeed
1	Full	0.36	4
2	Partial	0.25	3
4	Exposed	0.55	6
5	Exposed	0.42	4
6	Exposed	0.44	4
8	Partial	0.25	3
9	Partial	0.25	3
10	Partial	0.25	3
11	Exposed	0.36	4
12	Exposed	0.43	4
13	Exposed	0.46	5

Conversion factors used are taken from the NFES 1981 S-390 Fire Behavior Field Guide. Table 4A: Wind Adjustment Factors.

Fire Behavior Potential

To determine Fire Behavior Potential Classes, each fuel model is run through the BEHAVE program. This program uses fuel model, slope and weather parameters to predict fire behavior and resistance to control for fire suppression purposes. The 90th percentile weather from the most representative weather station was used to model late summer afternoons, typical of late July through early September. All fuel models were run through each of the 2 slope classes to determine increases in fire behavior with increased steepness of terrain.

The output from this is a rating of Low, Moderate or High fire behavior based on flame lengths. This information is a good indicator of fire line intensity and resistance to control. Rate of spread (ROS) is also a good indicator of resistance to control.

Using the CONTAIN model of BEHAVE, it was determined whether or not a fire with low flame lengths could be contained by the initial attack forces. These runs indicated that, given typical response times, terrain, fuels and available forces, a Low rating had to have a ROS less than 30 chains per hour for containment to be accomplished during initial attack.

Fire Behavior Potential Classes

Low: Flame lengths less than 4 feet and ROS less than 30 chains per hour
Fires can generally be attacked at the head or flanks by firefighters using handtools. Handline should hold the fire.

Moderate: Flame lengths 4 to 8 feet.
Fires are too intense for direct attack at the head of the fire by firefighters using handtools. Handline cannot be relied on to hold the fire. Equipment such as dozers, engines, water and/or retardent dropping aircraft can be effective.

High: Flame lengths greater than 8 feet.
Fires may present serious control problems, such as torching, crowning and spotting. Control efforts at the head of the fire will be ineffective.

Table F-4 shows the acres associated with each Fire Behavior Class in the watershed.

Table F-4. Acres Associated With Each Fire Behavior Potential Class in the North Fork Watershed.

Fire Behavior Potential Class	Acres	Percent of Watershed
High	49,043	38
Moderate	32,762	25
Low	44,852	34
Non-flammable	3,653	3

Appendix G - Spotted Owl Habitat/ 50-11-40 Analysis

Table G-1. Spotted Owl Habitat/50-11-40 Analysis.				
1/4 Township	**Total Acre Within Watershed**	**Capable Acres Within Watershed**	**Acres of 11-40 Habitat**	**Percentage Meeting 11-40**
T10NR7E-NE	311	68	9	13
T10NR8E-N	4,128	1,978	207	10
T11NR8E-SE	379	320	0	0
T39NR10W-NE	1,873 (205 in LSR)	422	278	66
T39NR10W-NW	3,152 (all in LSR)	*	*	*
T39NR11W-NE	3,463 (3,448 in LSR)	11	11	100
T39NR11W-NW	3,171 (2,346 in LSR)	559	341	61
T39NR12W-NE	983	789	424	54
T39NR12W-NW	1,443	987	494	50
T40NR10W-NE	2,378 (1,096 in LSR)	361	303	84
T40NR10W-NW	3,722 (2,507 in LSR)	645	441	68
T40NR10W-SE	4,426 (3,059 in LSR)	643	492	77
T40NR10W-SW	6,403 (6,313 in LSR)	40	19	48
T40NR11W-NE	3,007	1,641	1,348	82
T40NR11W-NW	3,923 (851 in LSR)	1,545	1,052	68
T40NR11W-SE	4,824 (1,892 in LSR)	738	407	55
T40NR11W-SW	5,804	3,285	2,154	66
T40NR12W-NE	3,902 (3,115 in LSR)	759	705	93
T40NR12W-NW	1,199 (36 in LSR)	560	348	62

Table G-1. Spotted Owl Habitat/50-11-40 Analysis.				
1/4 Township	Total Acre Within Watershed	Capable Acres Within Watershed	Acres of 11-40 Habitat	Percentage Meeting 11-40
T40NR12W-SE	5,775 (25 in LSR)	3,458	2,597	75
T40NR12W-SW	4,487	3,332	1,084	33
T40NR9W-SW	163	64	64	100
T41NR10W-NW	2,454	859	749	87
T41NR10W-SE	1,961 (286 in LSR)	179	141	79
T41NR10W-SW	5,350 (2,159 in LSR)	712	465	65
T41NR11W-NE	5,888	1,823	1,705	94
T41NR11W-NW	5,958	2,098	2,022	96
T41NR11W-SE	5,397	1,589	1,223	77
T41NR11W-SW	5,730 (845 in LSR)	1,444	1,441	100
T41NR12W-NE	5,466	1,688	1,635	97
T41NR12W-NW	121	39	39	100
T41NR12W-SE	5,738 (2,791 in LSR)	1,953	1,890	97
T41NR12W-SW	3,121	1,560	1,473	94
T42NR10W-SW	3,837	321	301	94
T42NR11W-NE	917	279	223	80
T42NR11W-NW	813	74	59	80
T42NR11W-SE	5,275	2,300	2,149	93
T42NR11W-SW	5,202	1,142	915	80
T42NR12W-SE	1,438	695	600	96

** Lands within LSRs are not analyzed in this appendix.*

Appendix H - Forest Plan Feedback

The following comment was developed throughout the planning process for the North Fork Ecosystem Analysis:

It is recommended that the lands identified as Low Site Capability be moved to Regulation Class 3 in Management Areas Partial Retention and General Forest. These areas will continue to have timber outputs at a lower level, approximately 6,000 acres are included in the recommendation. Two options exist: 1) make a new Management Area for these lands, or 2) develop some standards and guidelines that will cover these type of lands.

Appendix I - Visual Quality Improvement Opportunities - North Fork Salmon River

Visual Quality Improvement Opportunities were identified in Chapter 6 - Management Opportunities. This paper documents the process used to develop those opportunities by first briefly outlining the process used, and then defining and describing the process steps and the information sources used.

General Process Used

1) Identify existing visual condition for the watershed.

2) Identify visual quality objectives for the watershed.

3) Identify visual improvement opportunities.

I. Existing Visual Condition (EVC)

EVC represents differing degrees of deviation in form, line, color and texture caused by human activities. Examples include: road construction, timber harvest, mining or habitat alteration. In evaluating the scenic impacts of human activities in a landscape, the magnitude, scale and degree of deviation of design attributes (form, line, color and texture) determine scenic condition levels. These attributes include: soils color, vegetative pattern, landform, rockform and waterform.

Harsh deviations with discordant visual elements decrease visual condition levels, while subtle deviations do not.

In evaluating the achievement of visual condition levels, the frame of reference is the combination of attributes of the natural or natural-appearing landscape character of a National Forest.

The existing visual condition levels for the North Fork Salmon River Watershed were inventoried in 1988 as part of the Forest planning process. Aerial photos of the Forest from 1985-1988 were used to determine degree of change from natural conditions. Areas mapped also included an area of influence which is larger than the actual disturbance. The EVC map, taken directly from the Forest Plan database, was reviewed and revised by input from Salmon River District personnel. The acreage totals are listed in Table I-1.

Table I-1. Acreage and Percentage Totals of Existing Visual Condition Levels in North Fork Salmon Watershed.

Existing Visual Condition Levels	Acreage	Percent of Watershed
Untouched	89,000	68
Unnoticed	5,400	4
Minor Disturbance	5,100	4
Disturbance	8,000	6
Major Disturbance	4,700	4
Drastic Disturbance	18,800	14
Total	130,100	100

II. Visual Quality Objectives (VQOs)

These objectives are established and adopted in the Forest's Land and Resource Management Plan. Data was taken directly from the Forest Plan database. The objectives identify acceptable levels of visual change to the landscape. The acreage totals for the North Fork Salmon River Watershed are listed in Table I-2.

Table I-2. Acreage Totals of Visual Quality Objectives in the North Fork Salmon Watershed.

Visual Quality Objectives	Acres
Natural or Natural-appearing:	
A. Preservation	56,000
B. Retention	1,400
C. Partial Retention	69,500
Human-Dominated:	
C. Modification	900

III. Visual Improvement Opportunities

Visual Improvement Opportunities are large areas which may need visual rehabilitiation to meet the assigned VQO. Further field verification will be necessary before project-level work could proceed.

To identify visual management opportunities, an overlay

of EVC and VQO maps was done. As there is a strong correlation between visual conditions and objectives, areas were highlighted in which there were discrepancies between the two. Table I-3 displays the correlation between EVC and VQOs.

Existing Condition areas which did not correlate with the visual quality objectives were identified as visual improvement opportunities. As an example, an area with an EVC of "Disturbance" may require rehabilitation if it has an assigned VQO of Partial Retention. Also all Drastic Disturbance areas were automatically identified, as there is no matching VQO.

To further determine the degree of inconsistency between VQO and EVC, and also to assist in setting work priorities, a delta score was assigned. The "Delta Score" represents the difference between VQO and EVC. For example, an area that has been Drastically Disturbed but which has a VQO of Preservation would receive a score of 5; its existing visual condition is 5 categories removed from its visual quality objective. As in the earlier example, an area that has some disturbances with a VQO of Partial Retention would receive a score of 1. Table I-4 displays the VQOs by delta score and acres.

Management opportunities for visual improvements would total 30,725 acres. Most of the acres are in the Partial Retention VQO areas.

Table I-3. Correlation between EVC and VQOs.

Visual Quality Objectives	Existing Visual Condition
Preservation	Untouched
Retention	Unnoticed
Partial Retention	Minor Disturbance
Modification	Disturbance
Maximum Modification	Major Disturbance
No corresponding VQO	Drastic Disturbance

Table I-4. Visual Quality Objectives by Delta Score and Acres in North Fork Salmon Watershed.

VQO	Delta Score	Acres
Preservation	3	15
P	4	10
P	5	16
P		41
Retention	2	465
R	3	257
R	4	41
R		763
Partial Retention	1	7,257
PR	2	6,109
PR	3	16,019
PR		29,385
Modification	1	0
M	2	536
M		536
Total		**30,725**

Appendix J - Riparian Reserves in the North Fork Salmon Analysis Area

The purpose of this document is to provide recommendations for the field delineation and management of the Riparian Reserves (RRs) in the North Fork Watershed.

Field Delineation

In summary, the Record of Decision for the Northwest Forest Plan (ROD) states that RRs include the land adjacent to all permanently flowing streams, constructed ponds and reservoirs, wetlands, lakes and natural ponds, seasonally flowing or intermittent streams, floodplains, and unstable and potentially unstable land. RRs include a minimum 2 site potential tree heights from fish-bearing streams, lakes and natural ponds. They also include a minimum 1 site potential tree height from non fish-bearing permanently flowing and intermittent streams, constructed ponds, reservoirs and wetlands greater than 1 acre.

The unstable and potentially unstable lands comprise a large proportion of the North Fork RRs. These include active landslides, inner gorges, toe zones of slump/ earthflow terrane, and severely dissected granitic terrane. The extent of these has been roughly mapped as part of the land management planning process and refined for the North Fork Ecoystem Analysis. The actual ground location of these lands will need to be determined at the project level.

Along some streams, a stream buffer width will determine the extent of the RR. The fish-bearing stream mapping is available in the North Fork GIS database, subject to additional ground verification. One site potential tree height averages about 170 feet in the analysis area, so the RR would be a minimum of 340 feet on each side of the fish-bearing streams. The extent of the floodplain on the North Fork and some of the larger tributaries may exceed this distance, in which case the entire flood plain is included in the RR.

The RRs also include the land 1 site potential tree height (170 feet) from each side of the non fish-bearing perennial and intermittent streams. The approximate extent of perennial and intermittent streams is available in the GIS database. The intermittent stream mapping can be used as a guide, but is subject to ground verification based meeting 2 or more of the following criteria:

- Intermittent streams are included within RRs if they show evidence of annual scour or deposition.

- Open water is available for some portion of the year.

- Plant species, especially riparian species, are present along the drainage in noticeably different amounts than in the adjoining vegetative community.

- There is a noticeable edge between the vegetation adjacent to the drainage and the adjoining vegetation.

- A microclimate can be sensed: cooler, wetter and breezier than adjacent areas.

- The drainage functions as a connector between large blocks of mature or old growth habitat.

- The vegetation present along the drainage provides hiding or thermal cover which is not fulfilled by the surronding vegetation.

- The drainage provides forested talus habitats.

- Concentrations of snags or down woody debris are present.

- Disturbance in this drainage could adversely influence downstream habitats.

Many instances will still arise which will leave questions as to the appropriateness of RR designation on an intermittent stream. One example is roadside ditches or other drainage features created by the transportation system. Another is a dry swale which rarely contains surface water, but may become a channel if disturbed. Neither of these situations would likely require RR designation, but may benefit from protective measures during site-specific project implementation.

Management within RRs

RRs provide an area along streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. RRs are important to the terrestrial ecosystem as well, serving, for example, as dispersal habitat for certain terrestrial species. This does not mean that no active management is to occur; rather that management which is intended to benefit riparian-dependent resources or terrestrial species can and should occur.

The North Fork RRs contain 2 types of conditions which could benefit from management activities. These are areas with excessive fuel loads causing increased fire risk and areas with less than potential vegetative characteristics in terms of either density, tree size or species composition. Thinning, planting or other silvi-

cultural activities could be done at certain locations as determined by a site analysis. Fuel treatments could be done in areas with high fuel loadings to reduce the likelihood of riparian damage during a future wildfire.

An immediate management concern in the North Fork Watershed RRs is the amount of dead riparian zone trees in the Specimen Fire area. Some RRs burned at high intensity leaving only dead snags. These snags will fall to the ground over time, contributing to the fire hazard and potentially to another stand-replacing fire in the future. But removing all dead stems in the short-term will deplete the area of wildlife snags and coarse woody material important to the functioning of the RRs. The following management guidelines are intended to help resolve these concerns:

- Save all RR trees that have any remaining green needles.

- Leave a minimum of 3-5 stems per acre, or about 20-40 stems per 1,000 lineal feet on non fish-bearing streams. About 3 stems per acre is appropriate on the steep, higher slope position headwater portions of the RRs, 3-5 in the midslope sections, and upwards of 8 per acre along the perennial, low slope stream sections. Some variation may occur depending on site-specific conditions. The intent is to reduce fuel loadings most where stream courses can act as chimneys to funnel fire and leave more stems where slope position and higher humidities tend to retard fire intensity.

- Leave snags should be those that have the greatest potential for longevity as either a snag or down coarse woody material. This means leaving the largest snags available with a bias toward sugar pine, Douglas-fir, ponderosa pine and hardwoods and against true firs.

- Snags should be randomly spaced with some combination of spacing and clumping.

- Yarding of Unmerchantable Material (YUM) should not occur with material larger than 16 inches in diameter. However, the removal of smaller dead material through either YUM or other methods should be emphasized for the removal of fuel.

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Figure 1-1

North Fork Salmon Watershed
Land Management Plan Direction (Update)

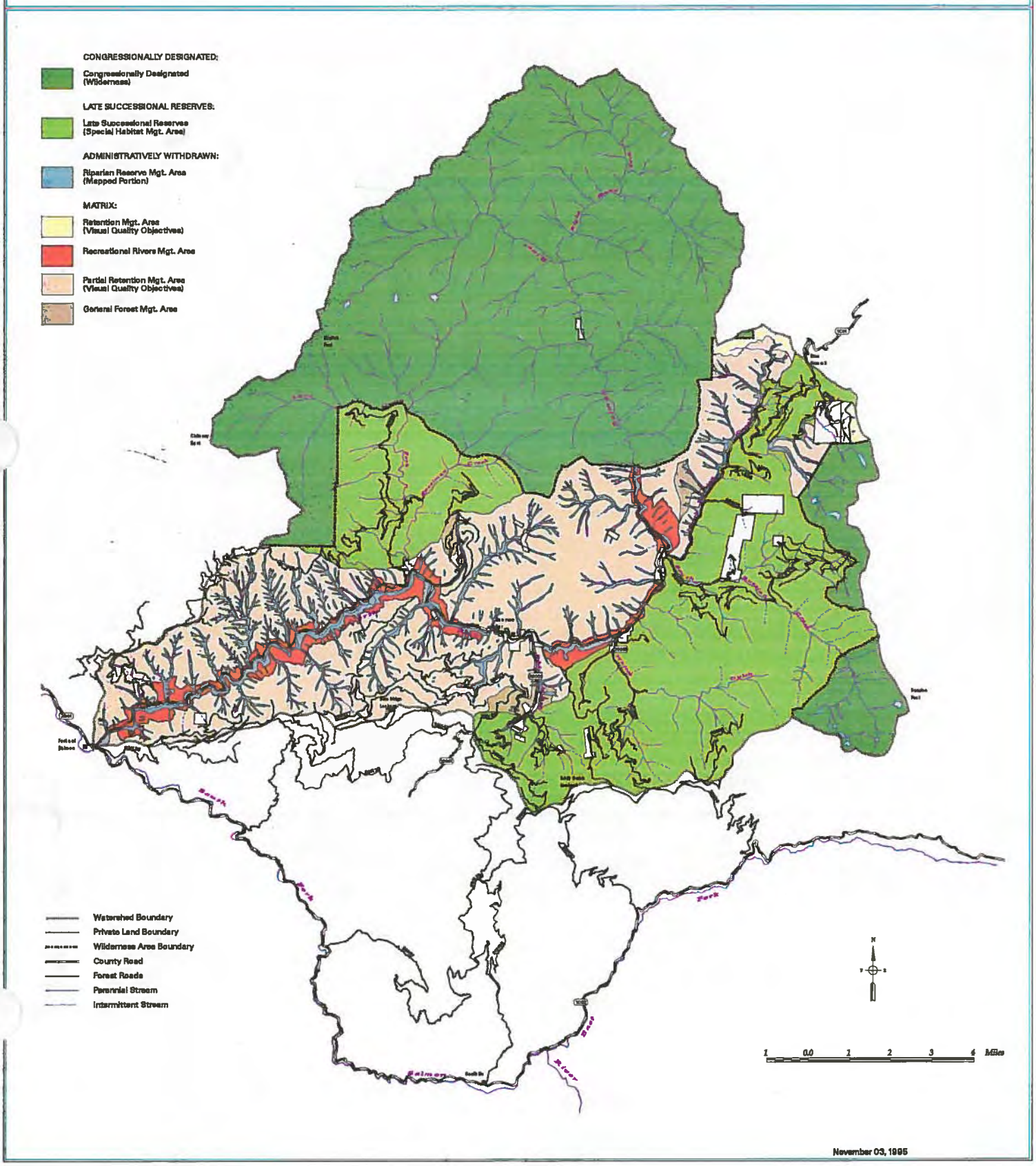


Figure 1-2

North Fork Salmon Watershed
Base Map

Kiamath National Forest

R8E R12W R11W R10W

T 42 N
T 41 N
T 40 N
T 39 N

Private Lands

Watershed Boundary
Private Land Boundary
Wilderness Area Boundary
County Road
Forest Roads
Primary Trail
Secondary Trail
Perennial Stream
Intermittent Stream

N

1 0.0 1 2 3 4 Miles

November 28, 1995

Figure 3-1

North Fork Salmon Watershed

Timber Mortality (1993, 1994 & 1995 Aerial Surveys)

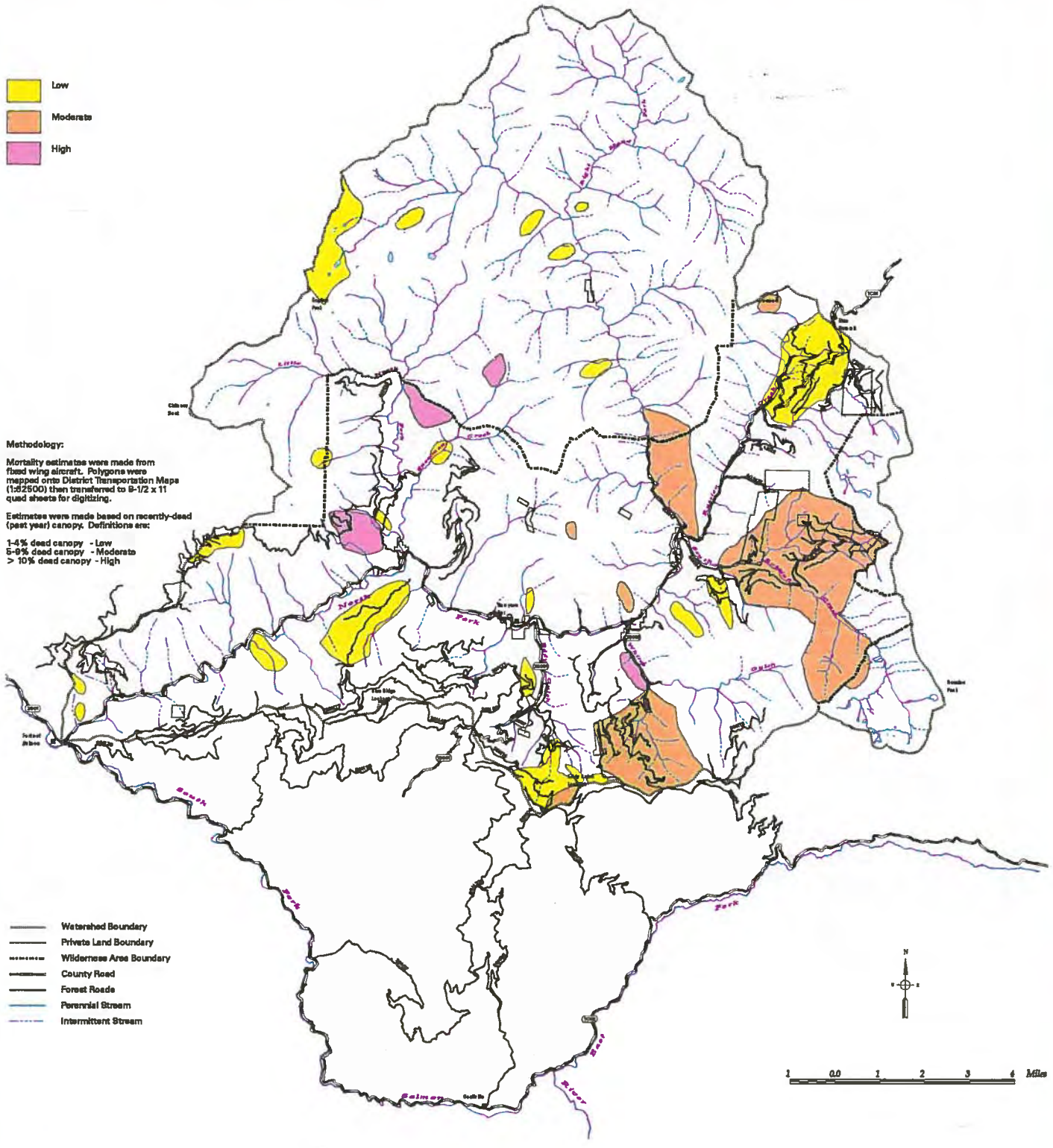
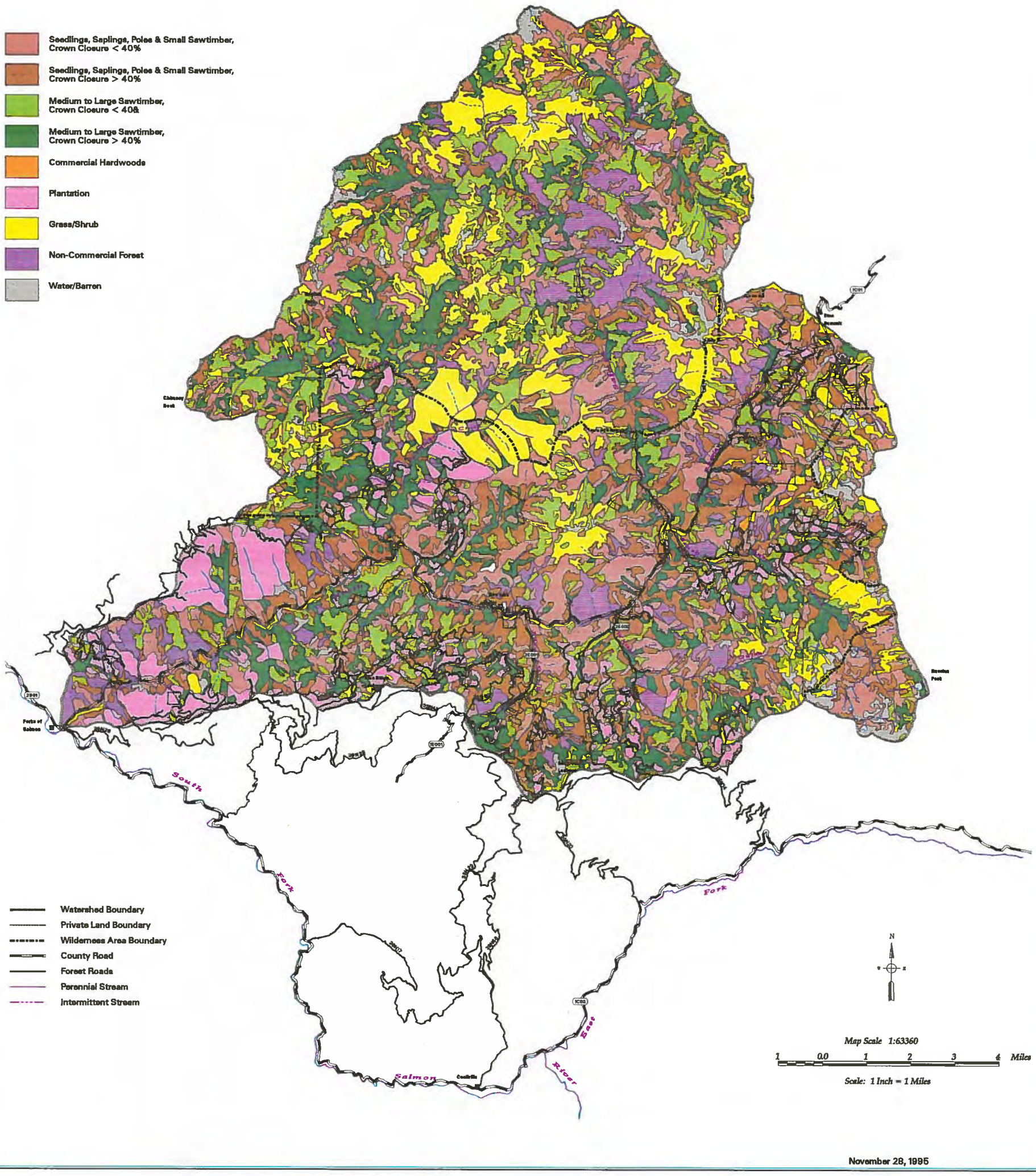


Figure 3-2

North Fork Salmon Watershed
Existing Vegetative Condition

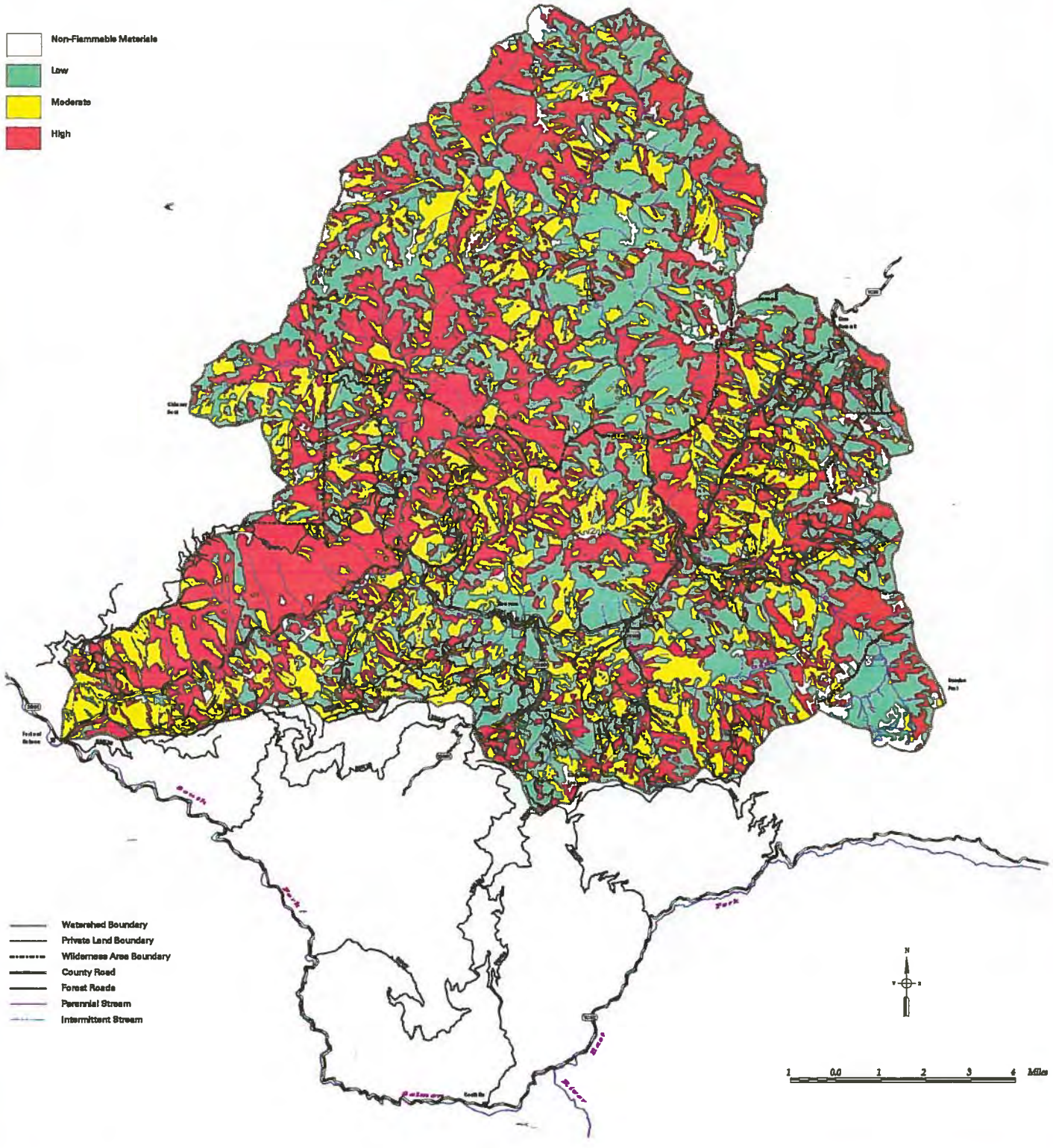
Klamath National Forest



November 28, 1995

Figure 3-3

North Fork Salmon Watershed
Fire Behavior Potential



September 29, 1995

Figure 3-4

North Fork Salmon Watershed
Fuel Models

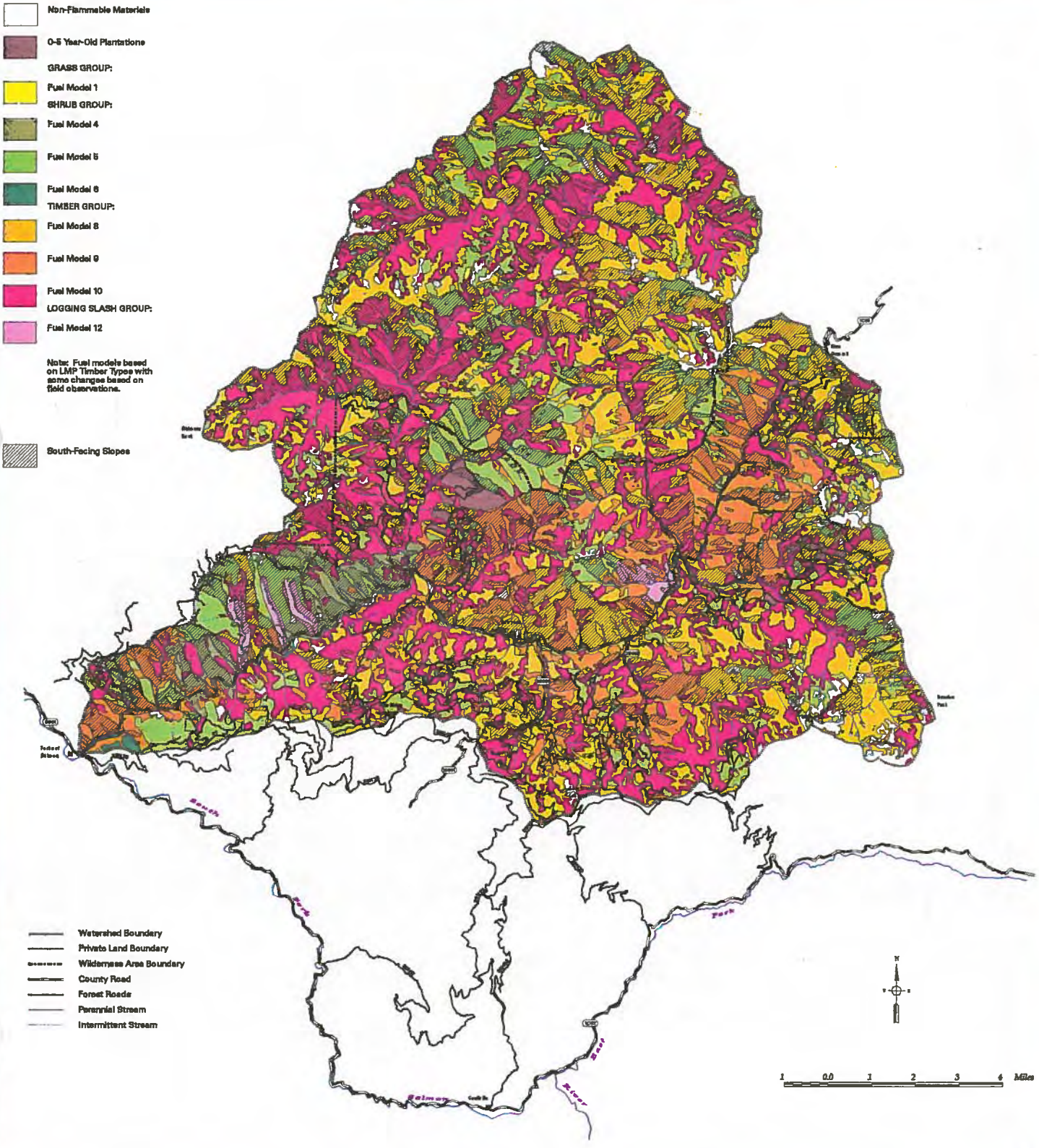
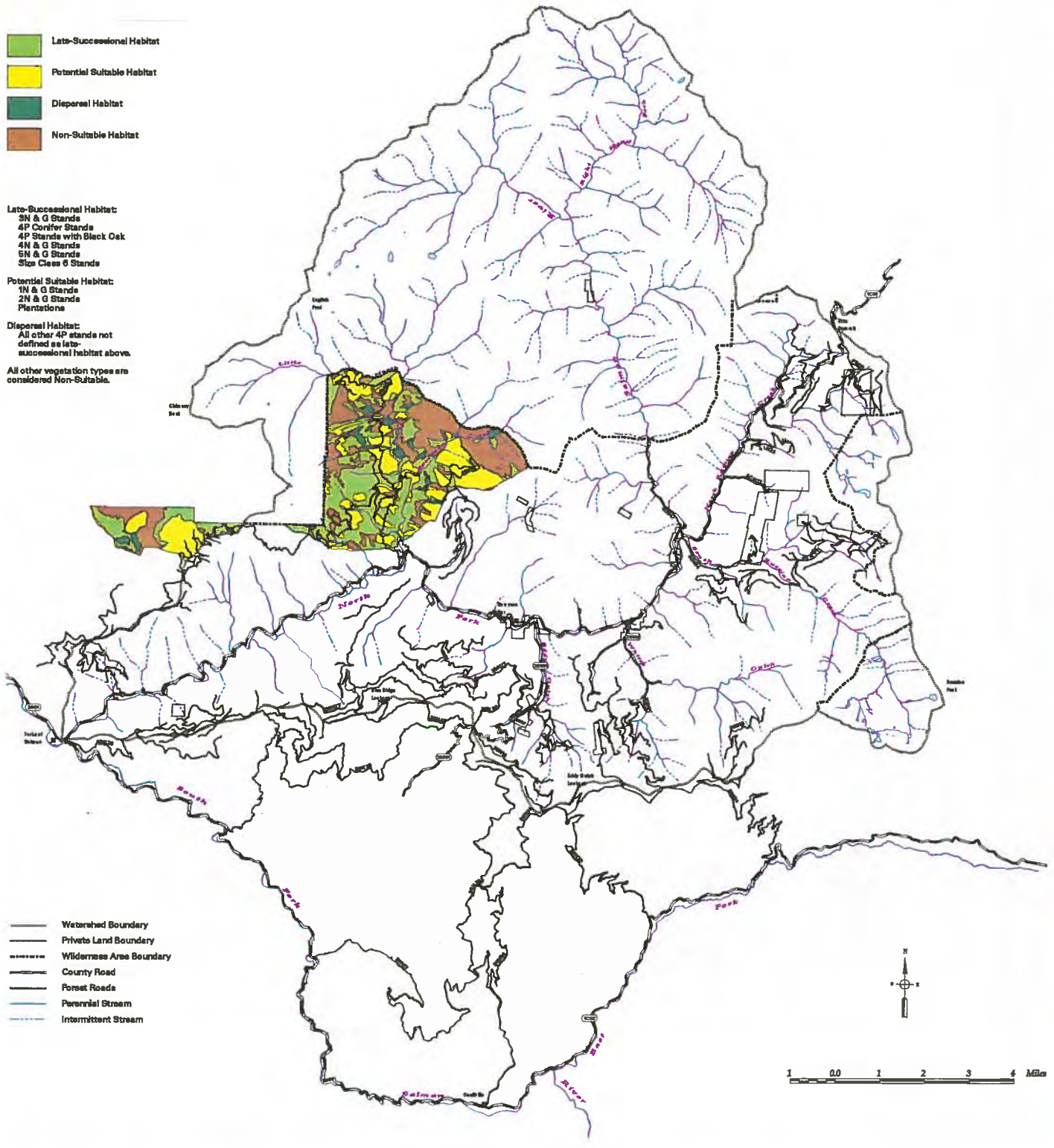


Figure 3-5

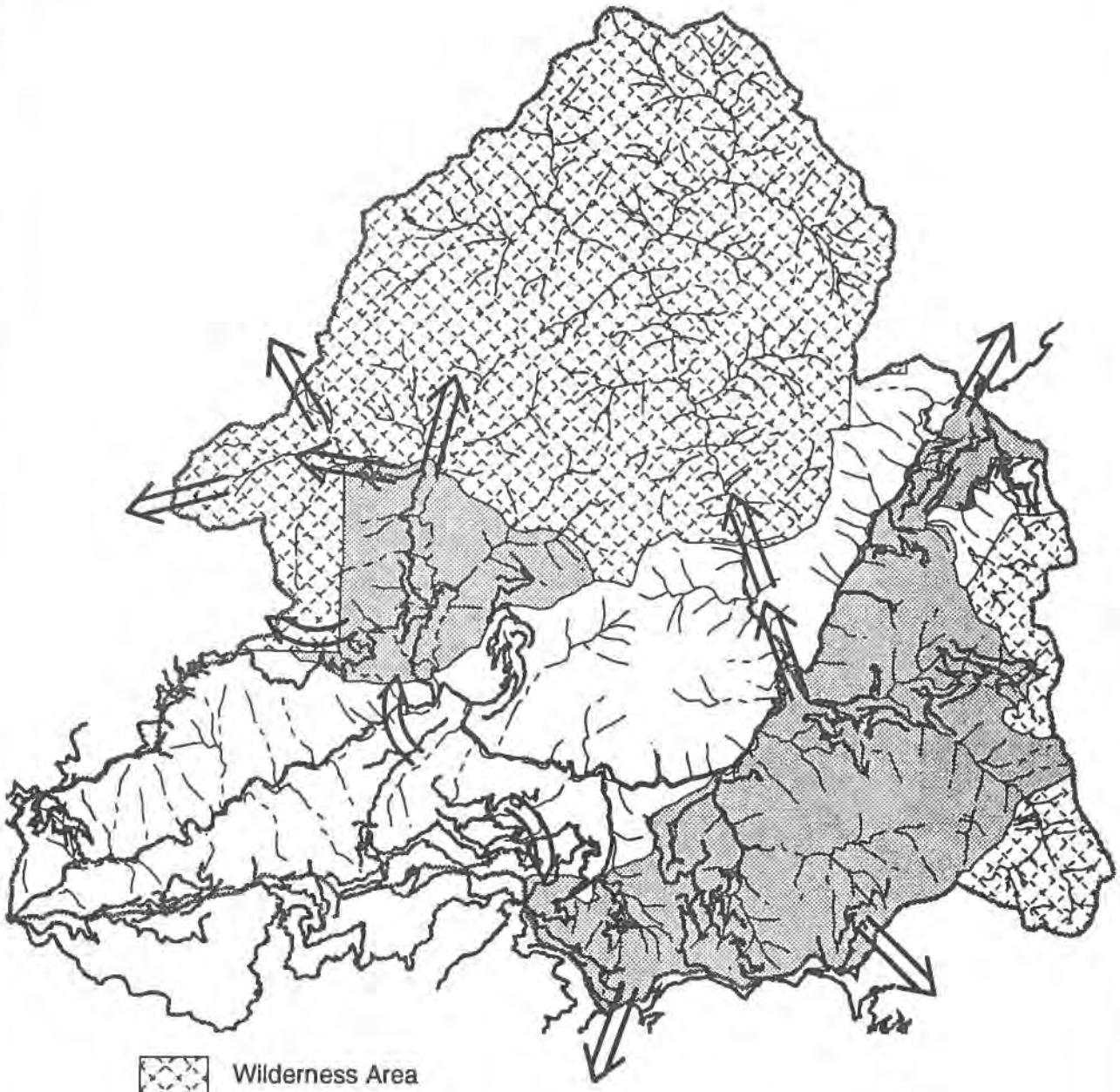
North Fork Salmon Watershed
Late-Successional Habitat
Within the Little North Fork LSR



November 28, 1995

Figure 3–6

North Fork Watershed
Habitat Connectivity



Wilderness Area

Late Successional Reserve

Connectivity Corridors

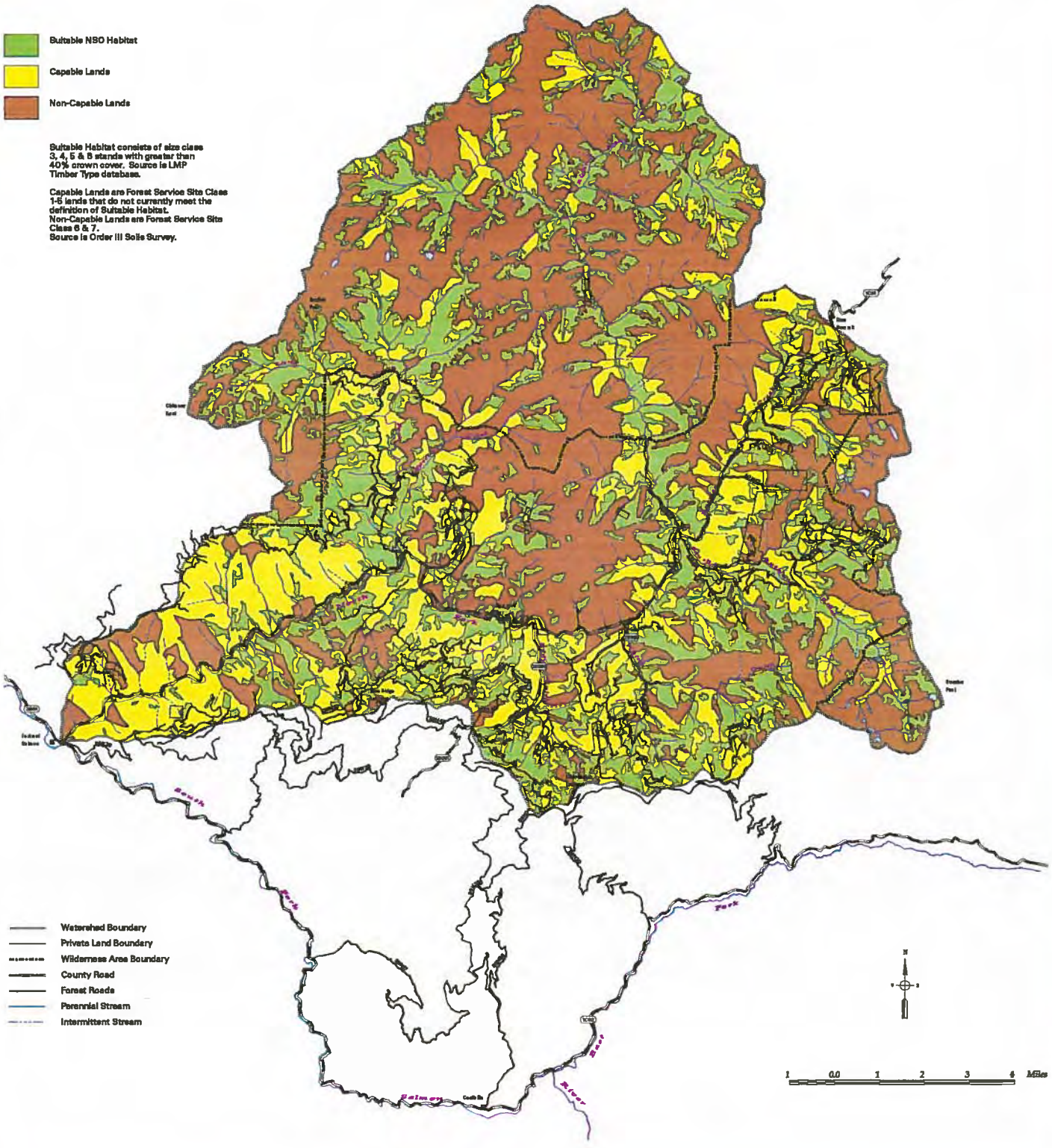
Highway/Road

River/Stream

0 3 Miles

Figure 3-7

North Fork Salmon Watershed
Suitable, Capable & Non-Capable Lands



September 29, 1995

Figure 3-8

North Fork Salmon Watershed
Areas With Watershed Concerns

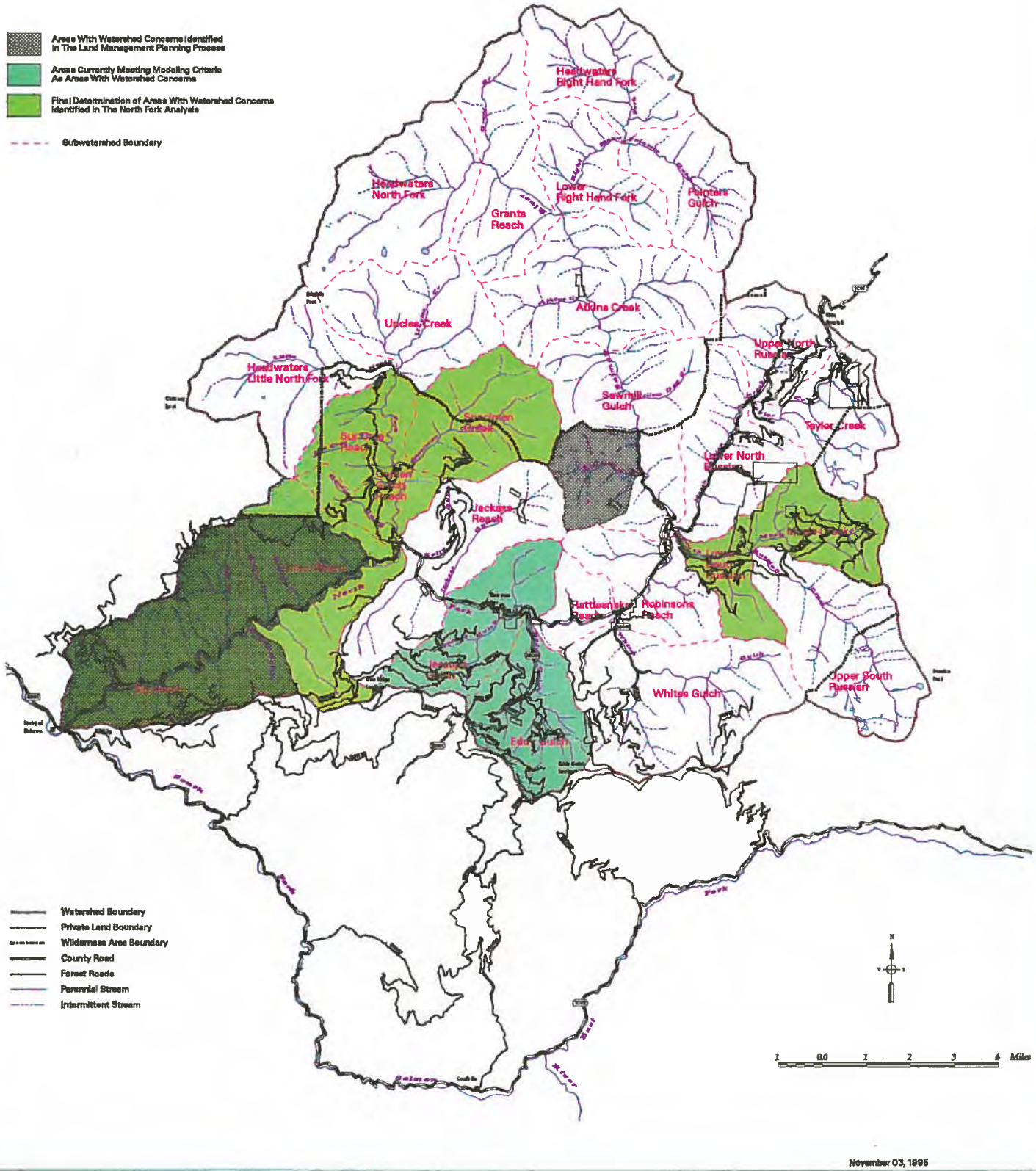
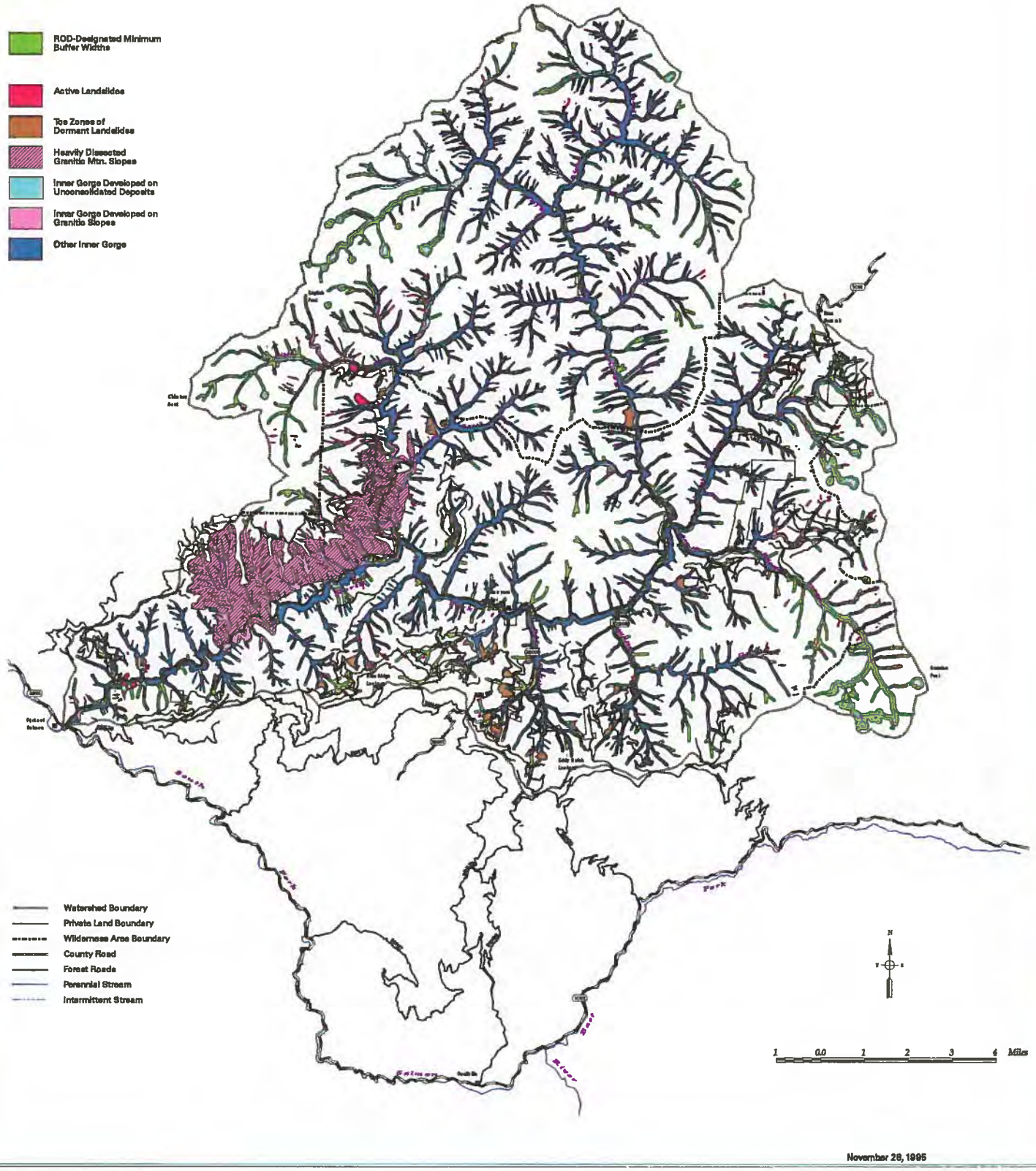


Figure 3-9

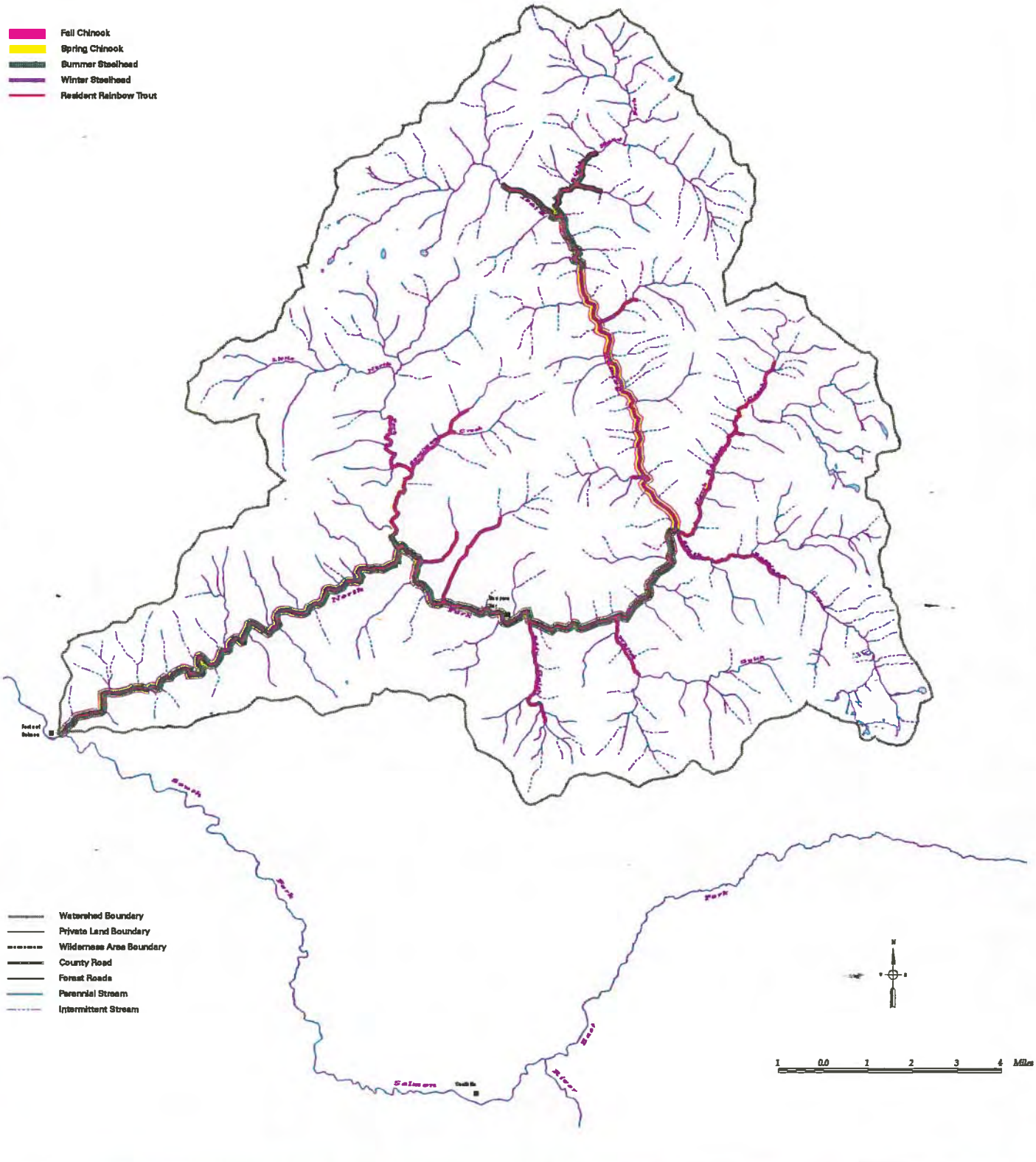
North Fork Salmon Watershed
Riparian Reserve Components



November 28, 1995

Figure 3-10

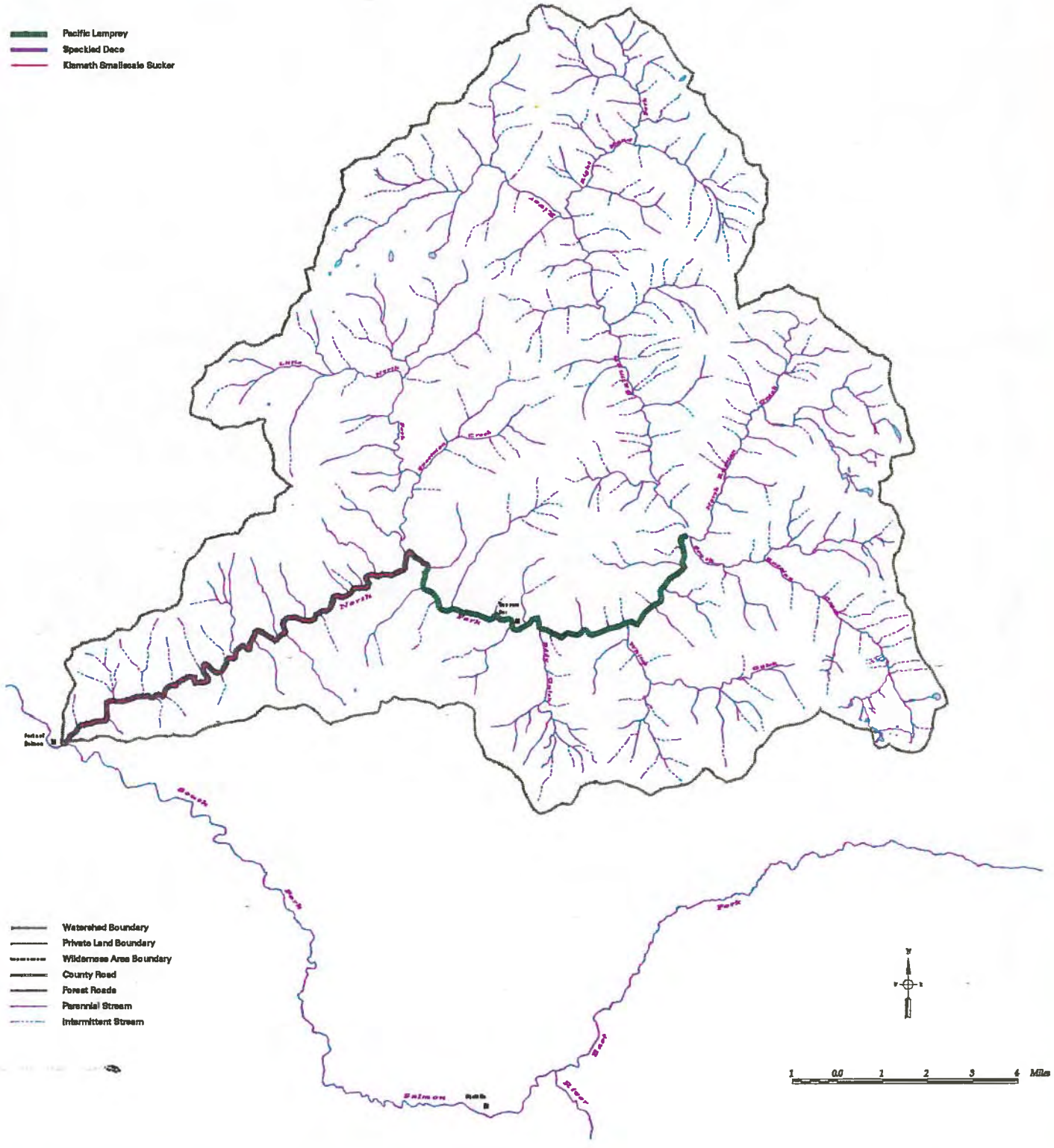
North Fork Salmon Watershed
Fish Species Range



November 03, 1995

Figure 3-11

North Fork Salmon Watershed
Fish Species Range



November 03, 1995

Figure 3-12

North Fork Salmon Watershed
Fish Species Range

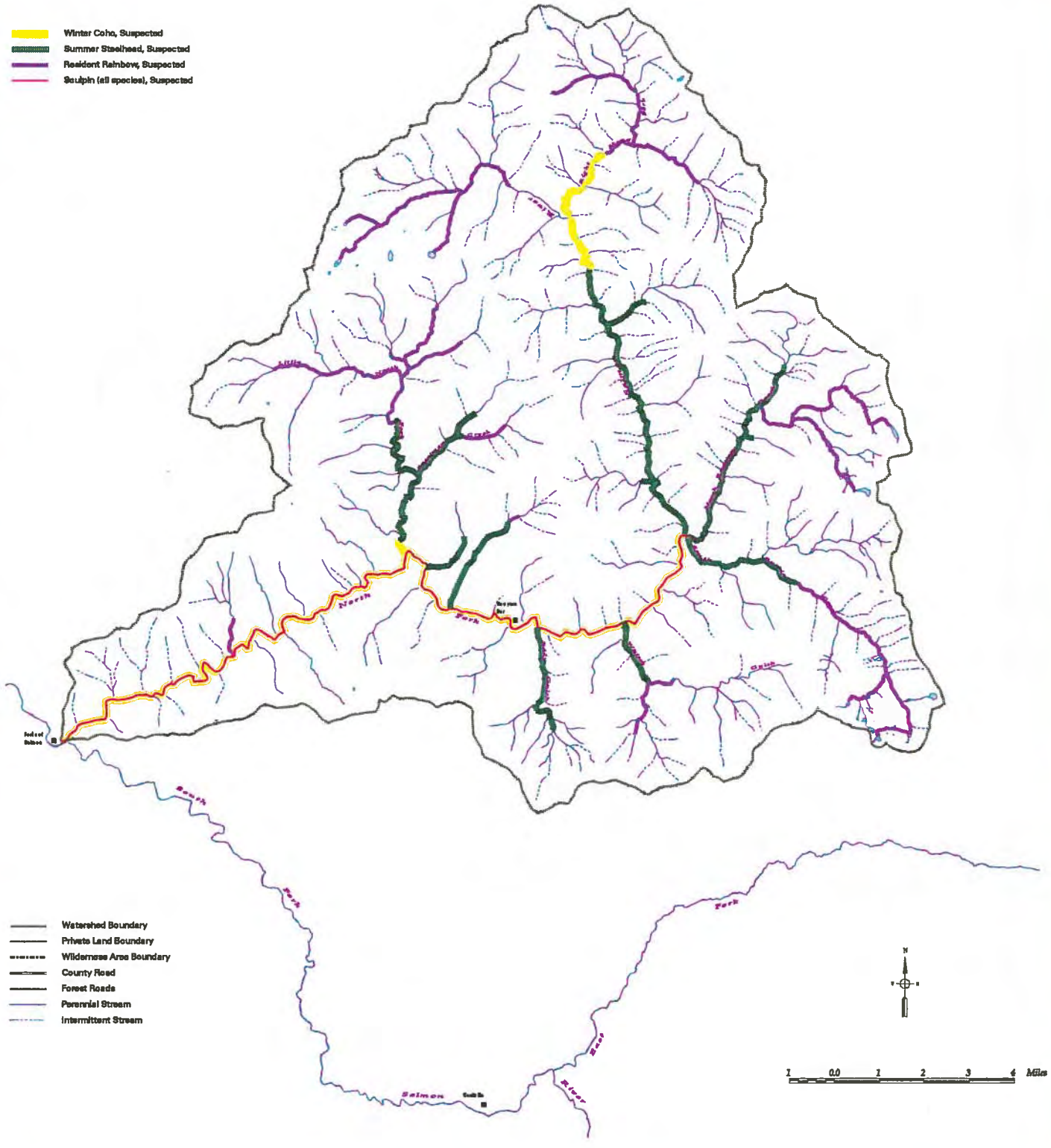


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Figure 4-1

North Fork Salmon Watershed
Fire History, 1917-1994

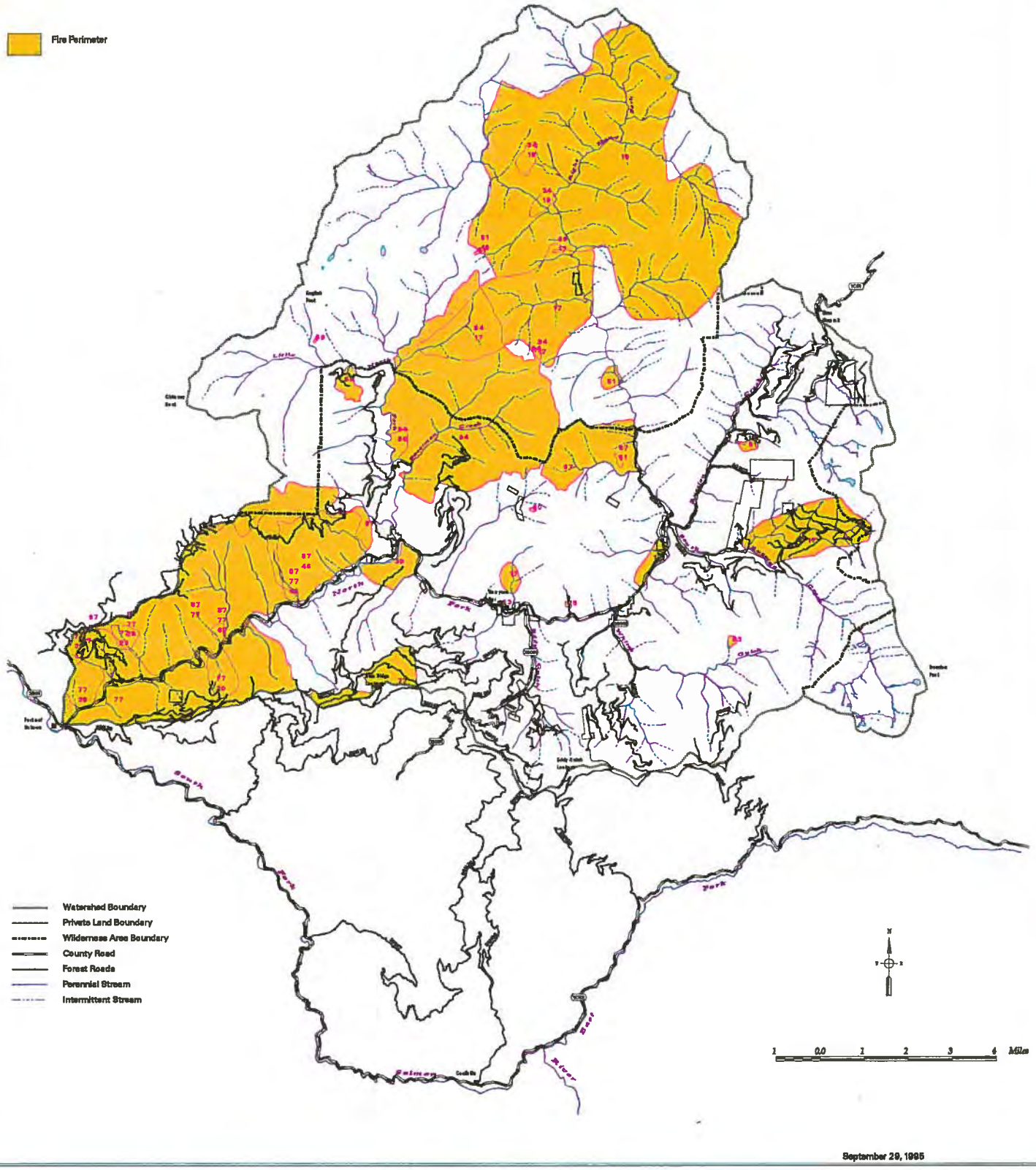
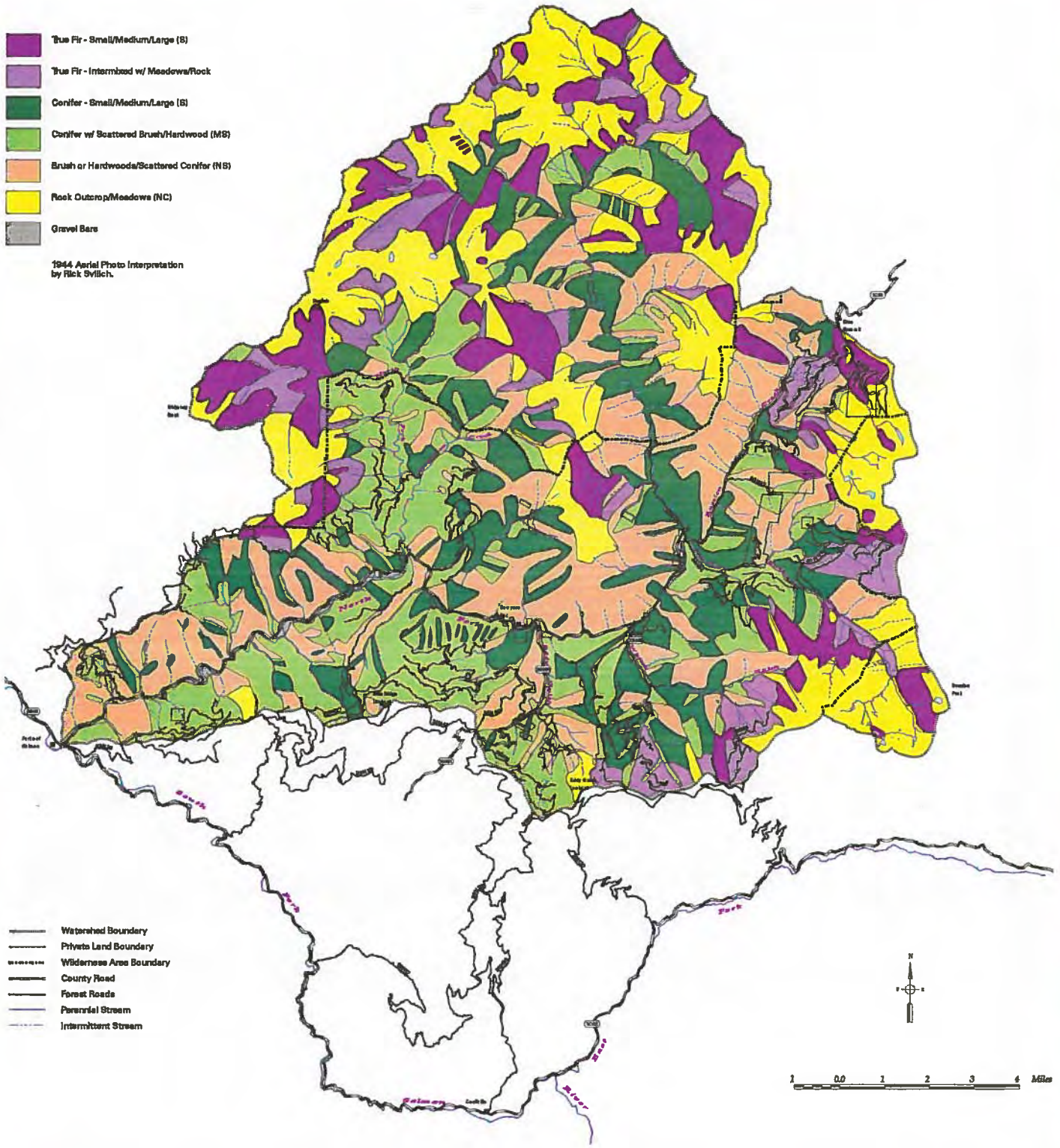


Figure 4-2

North Fork Salmon Watershed
1944 Vegetative Condition



September 29, 1995

Figure 5-1

North Fork Salmon Watershed

Connectivity Between Little North Fork & Eddy Gulch LSR

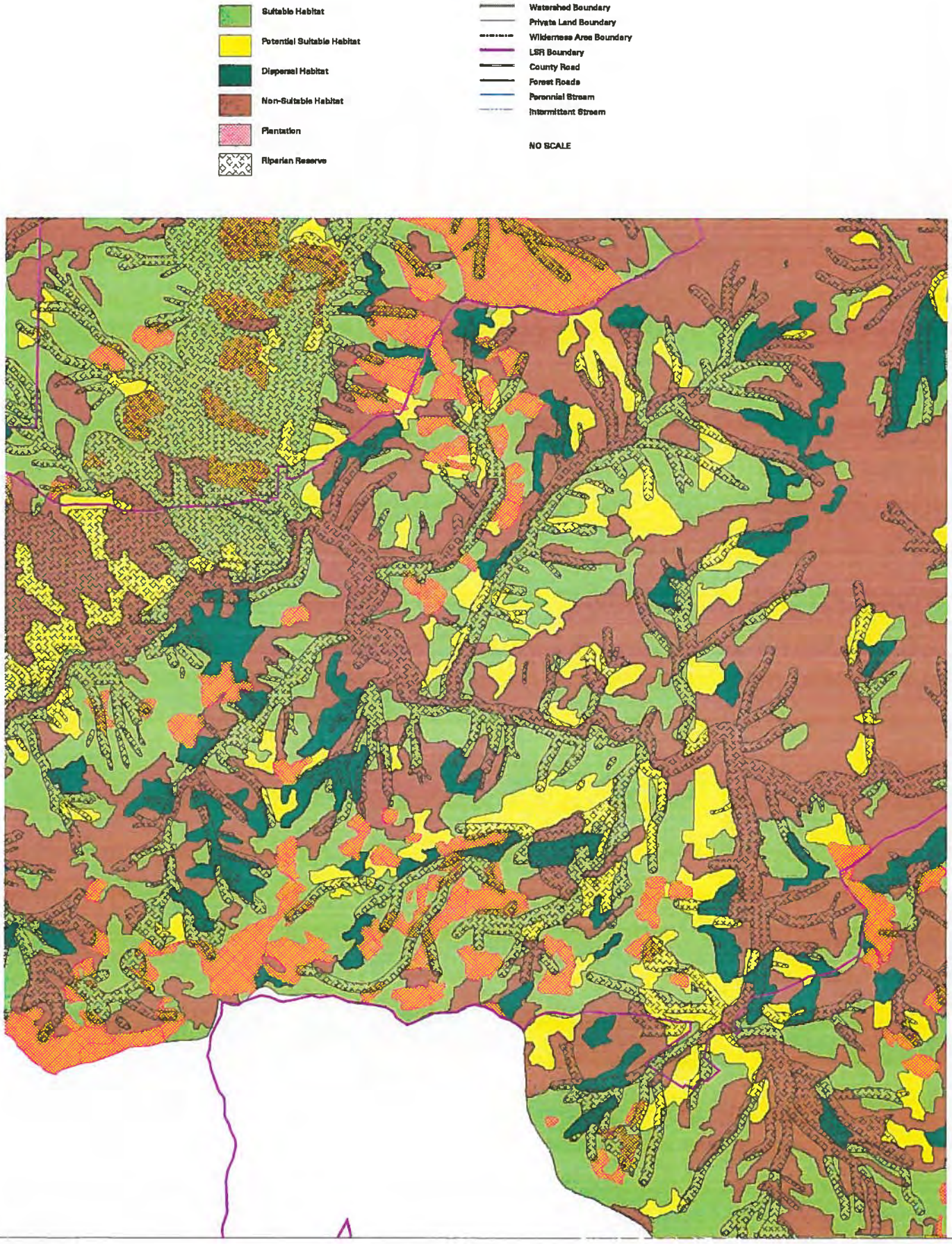
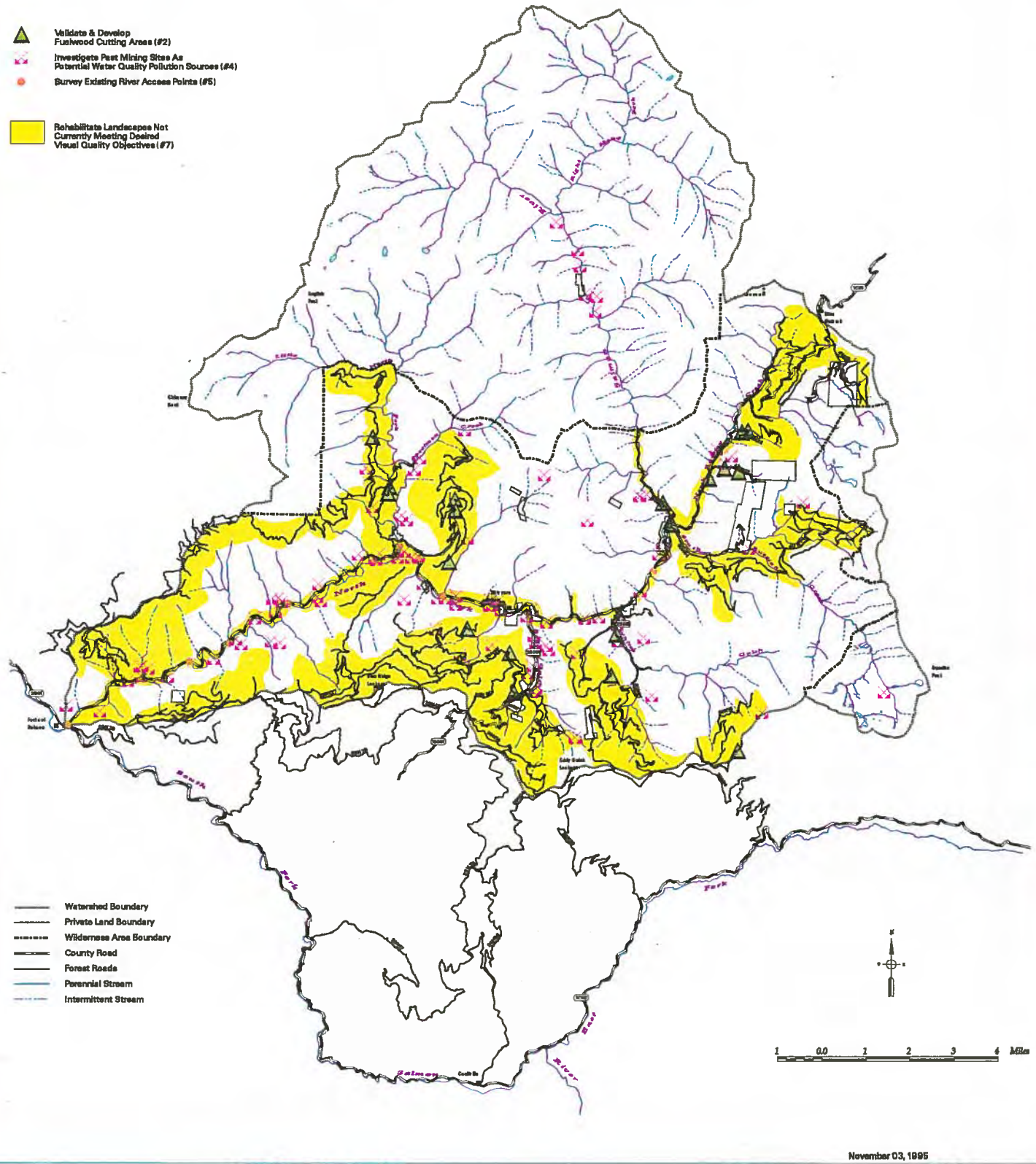


Figure 6-1

North Fork Salmon Watershed
Management Opportunities
Human/Social Dimensions



November 03, 1995

Figure 6-2

North Fork Salmon Watershed
Management Opportunities
Forest Health

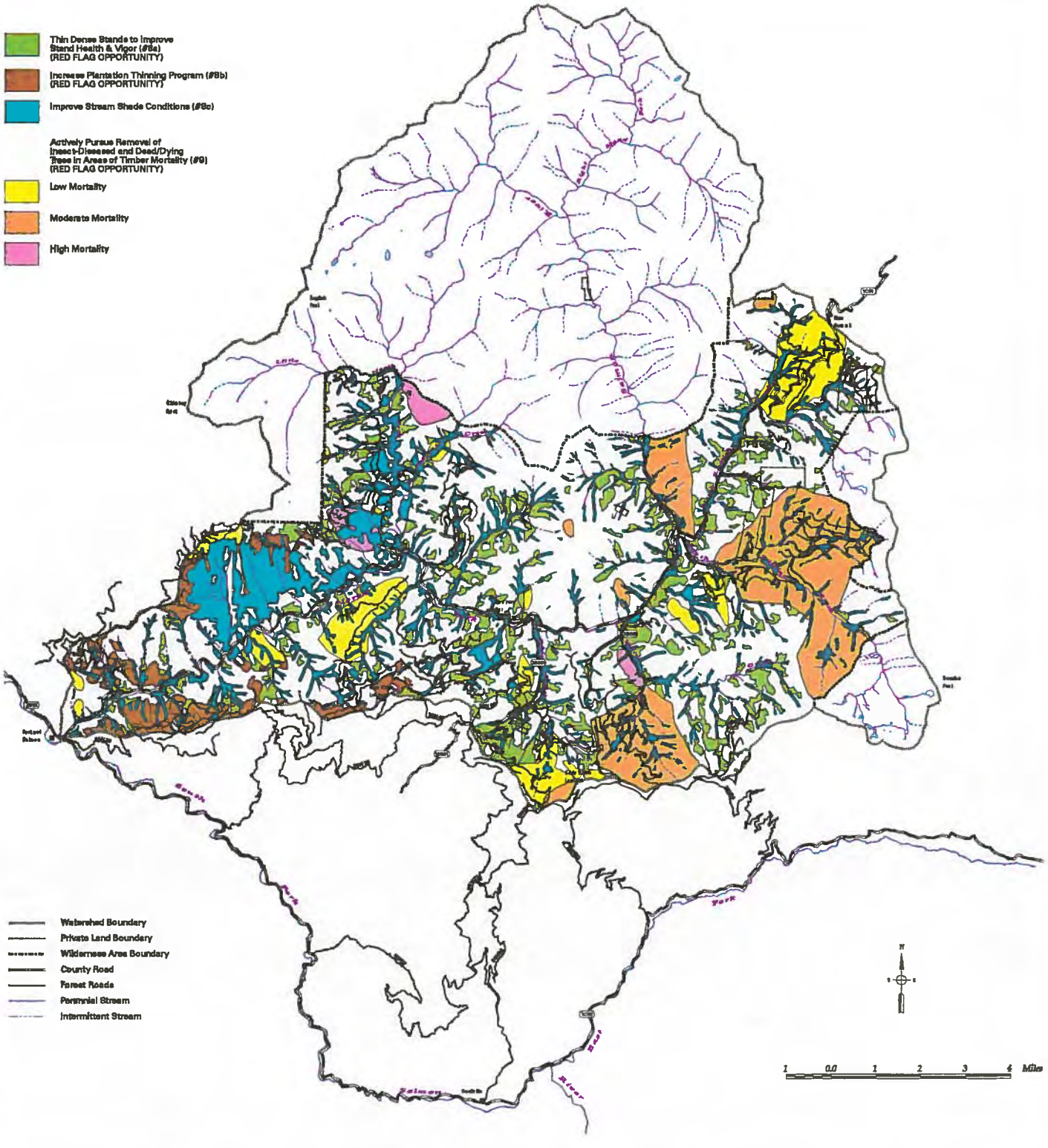


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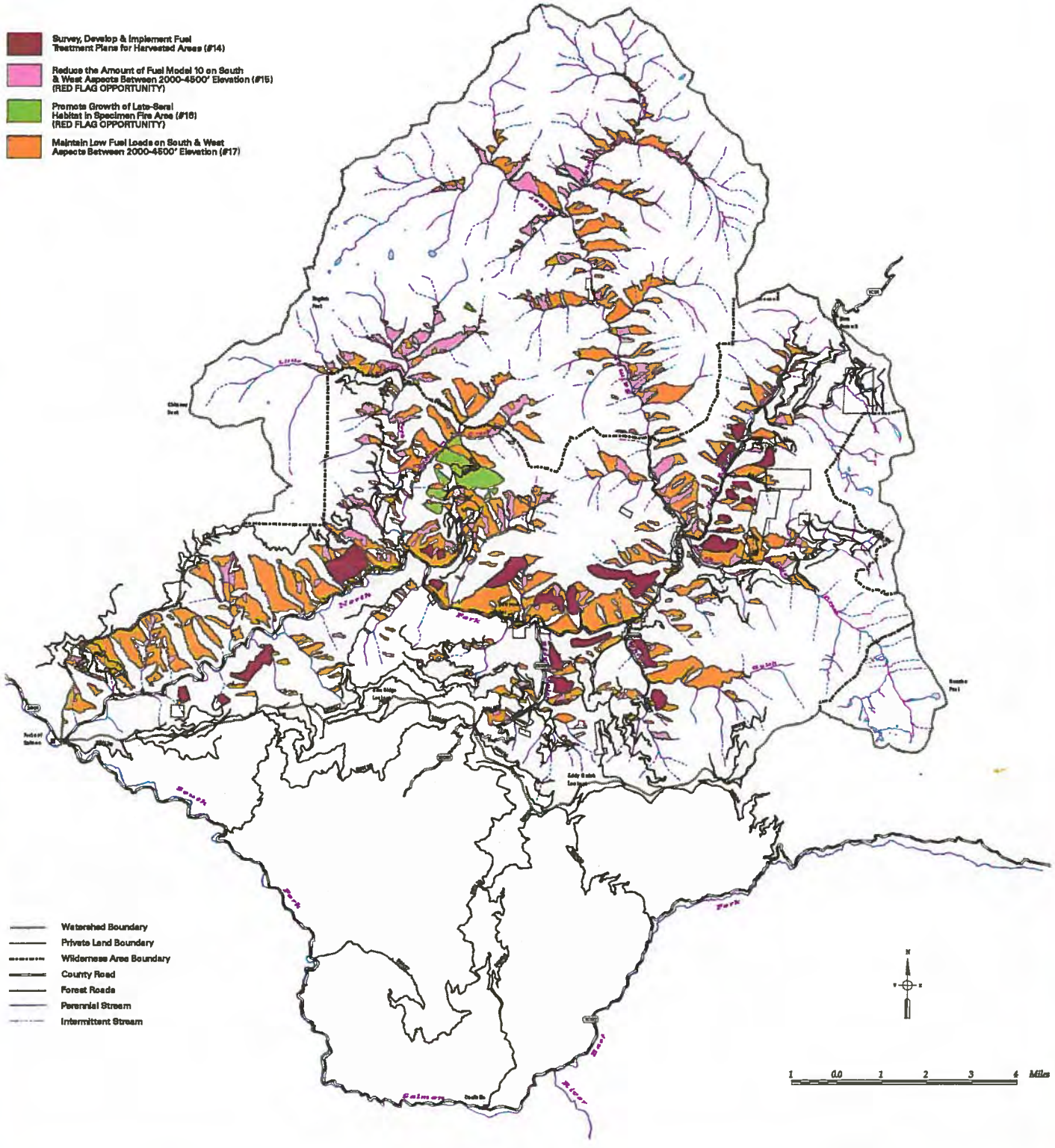
Figure 6-3

North Fork Salmon Watershed
Management Opportunities
Fire Management



November 03, 1995

Figure 6-4

North Fork Salmon Watershed
Management Opportunities
LSR & Aquatic Management