United States
Department of Agriculture
Forest Service

Pacific Northwest Region

1995

South Fork Coquille

Watershed Analysis

Iteration 1.0

Powers Ranger District
Siskiyou National Forest

September 1995

United States
Department
of Agriculture

Forest Service
Pacific
Northwest
Region

1995

SOUTH FORK COQUILLE WATERSHED ANALYSIS

ITERATION 1.0

I have read this analysis and it meets the Standards and Guidelines for watershed analysis required by an amendment to the Forest Plan (Record of Decision dated April 1994). Any additional evidence needed to make a decision will be gathered site-specifically as part of a NEPA document or as an update to this document.

SIGNED *Carl Linden* DATE *9/21/95*

District Ranger
Powers Ranger District
Siskiyou National Forest

Developed by Interdisciplinary Team Members:

Steve Harbert	*Team leader*
Betsy Howell	*Wildlife Biologist*
Dave Shea	*Botantist, Wildlife Biologist*
Ruth Sisko	*Forester*
Cindy Ricks	*Geologist*
Chris Parks	*Hydrologist*
Max Yager	*Fish Biologist*
Kathy Helm	*Writer-Editor (March-April 1995), BLM*
Tina Harbert	*Writer-Editor (May-July 1995), Powers R.D.*
Joe Hallett	*Cultural Resource*

Key Support:

Joel King	*Forest Planner, Siskiyou National Forest*
Sue Olson	*Acting District Ranger, Powers R.D. (Jan-May 1995)*
Carl Linderman	*District Ranger, Powers R.D.*
Marshall Foster	*GIS, Powers R.D.*
Jodi Shorb	*Computer Assistant*
Linda Spencer	*Computer Support*

For Further Information, contact:

Powers Ranger District
Powers, OR 97466
(503) 439-3011

SOUTH FORK COQUILLE WATERSHED ANALYSIS
TABLE OF CONTENTS

Watershed Overview

Aquatic Ecosystem

Aquatic Ecosystem (cont.)

List of Tables:

List of Figures:

Social Discussion

Terrestrial Ecosystem

Terrestrial Ecosystem (cont.)

List of Figures:

List of Tables:

GLOSSARY

REFERENCES

APPENDICES:

WATERSHED OVERVIEW

INTRODUCTION

The South Fork Coquille was designated as a Key Watershed by the Forest Ecosystem Management Assessment Team (FEMAT) in 1993 and the Northwest Forest Plan (USDA, 1994). Key Watersheds serve as refuge areas, or refugia, critical for maintaing and recovering habitat for at-risk stocks of anadromous salmonids. FEMAT direction requries that a watershed assessment be completed prior to identifying and implementing projects in Key Watersheds. Supplemental direction was provided to guide urgently needed restoriation work for fiscal year 1994 with an abbreviated analysis process. A preliminary watershed restoration assessment consists of: 1) identifying prinicipal issues that drive the need for action; 2) describing ecological processes and existing conditions within the watershed; 3) defining activities that need to be modified to achieve the desired condition; and 4) outlining restoration opportunities.

The South Fork Coquille Watershed Analysis summarizes key information for the Upper South Fork Coquille beginning at the headwaters in Eden Valley and ending one mile south of the town of Powers. In this discussion, "South Fork Coquille" or "key watershed" refers to the Upper South Fork Coquille analysis area. (Figure O-1)

The analysis area contains 61,316 acres of Federally managed land and 25,749 acres of privately owned land for an approximate total of 87,100 acres. This is divided into eight subwatersheds (Foggy/Eden, Wooden Rock, Upper Mainstem, Johnson/Sucker, Rock, Lower Mainstem, Coal Creek and Hayes Creek), ranging from approximately 6,800 to 24,100 acres each (Figure O-2). There are private land holdings in the Hayes, Coal and Wooden subwatersheds with a significant portion of the Lower Mainstem, Rock Creek, and Wooden Rock subwatersheds owned by Georgic-Pacific West, Inc., Coquille Timberlands.

Concurrently, the Bureau of Land Management (Coos Bay District) is conducting an analysis of the Lower South Fork Coquille beginning one mile south of Powers and continuing to the confluence with the Middle Fork of the Coquille River. Although part of Salmon Creek is within the Forest Service's key watershed analysis area, the BLM will include all of it in their analysis.

The analysis followed the eight steps of the *Federal Guide for Pilot Watershed Analysis* and considered physical, biological, and social conditions and trends relevant to the South Fork Coquille watershed. Information and ideas from several federal, state and local agencies as well as the public were included in the analysis. Data was collected from lands under federal management (Forest Service, Bureau of Land Management). Additional analysis documentation includes data files, maps, computer model runs, specialist reports, lists of data gaps, monitoring recommendations and process records. New information will be appended to the analysis as it is collected. Thus, the analysis is considered an ongoing process.

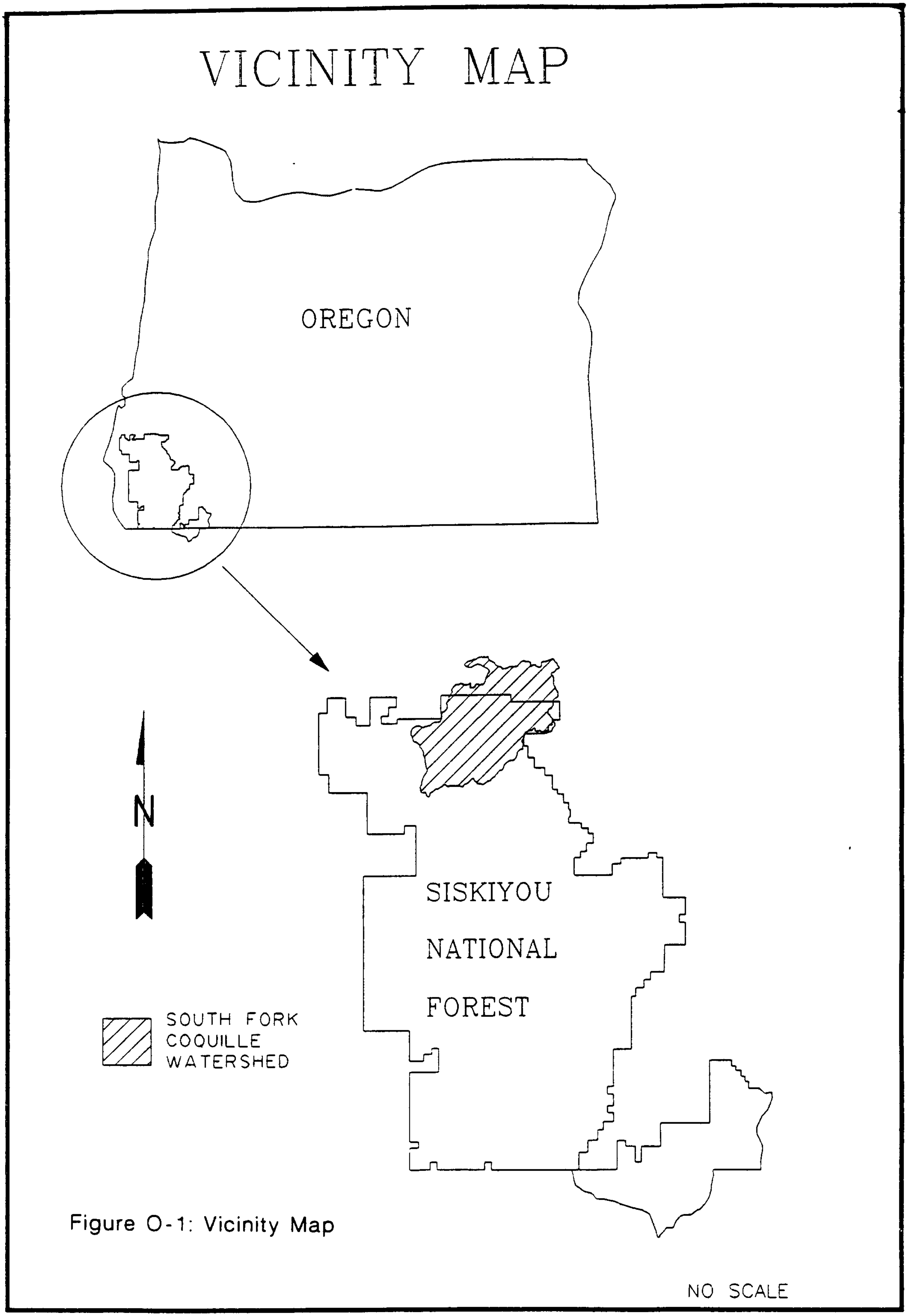

Figure O-1: Vicinity Map

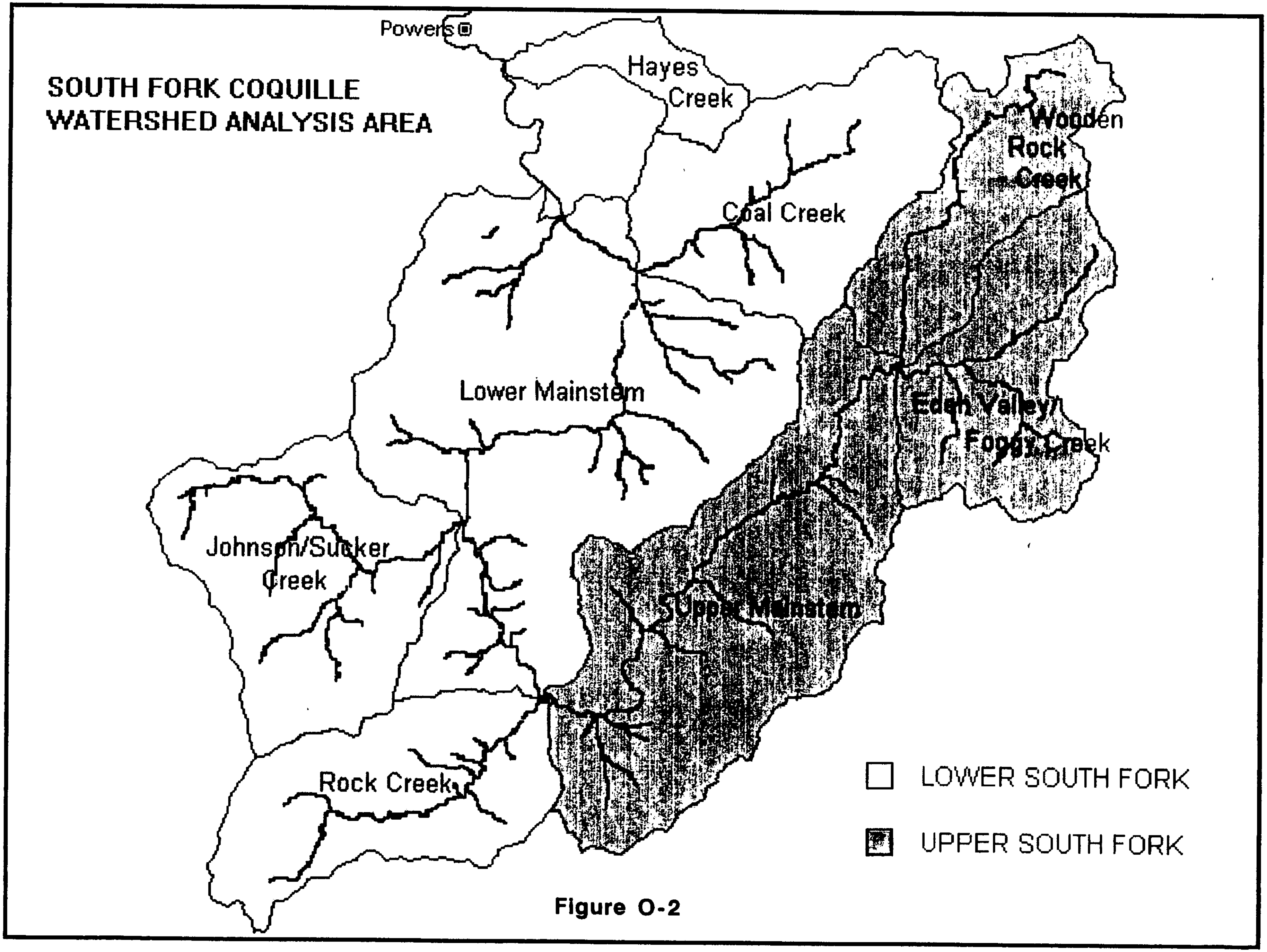
SOUTH FORK COQUILLE
WATERSHED ANALYSIS AREA
Powers
Hayes
Creek
Wooden
Rock
Creek
Coal Creek
Lower Mainstem
Eden Valley/
Foggy Creek
Johnson/Sucker
Creek
Upper Mainstem
Rock Creek
LOWER SOUTH FORK
UPPER SOUTH FORK

Figure O-2

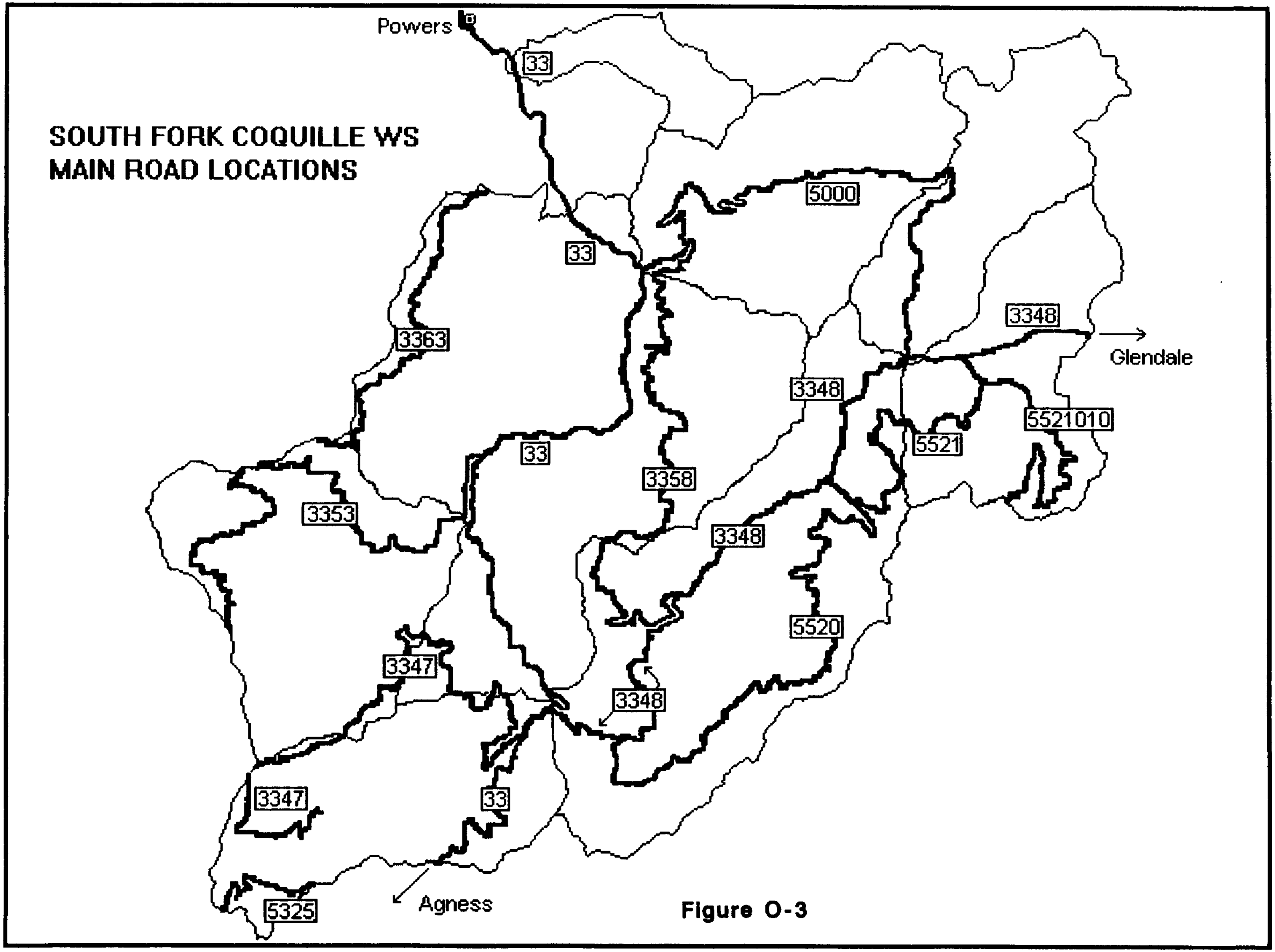
SOUTH FORK COQUILLE WS
MAIN ROAD LOCATIONS
Powers
33
33
5000
3363
3348
Glendale
3348
5521010
5521
33
3358
3353
3348
5520
3347
3348
3347
33
5325
Agness

Figure O-3

PURPOSE

The South Fork Coquille was selected for study for several reasons:

1) It is a Tier 1 key watershed, designated in the Northwest Forest Plan.

2) A mix of land ownership and management allocations occurs.

3) Its importance to Oregon South Coast fisheries is recognized by the state managers.

VALUES

Among the important values of the South Fork Coquille drainage are its fish, wildlife, aesthetics, timber, and recreation. The watershed is representative of forested ecosystems along the southern Oregon coast, and includes habitat for old-growth associated species such as the northern spotted owl and marbled murrelet.

The Siskiyou National Forest Land and Resource Management Plan (LRMP), as amended by the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (USDA, USDI, 1994) has created management allocations on Federal Lands within the watershed. These allocations define the type of management activities in Federal Lands. Current land designations within the key watershed are 12,165 acres of matrix, 41,854 acres of late successional reserves (LSR) and 4,477 acres of riparian reserves. An additional 2820 acres are in other designations.

MANAGEMENT CONTEXT

Southwest Oregon Province

The South Fork Coquille River is located in the Southwest Oregon Province, and includes the Umpqua River and Rogue River watersheds and various basins along the coast of southwest Oregon. These basins are lumped together as the South Coast drainage basins and can again be divided into four sub-basins: Sixes, Coquille, Coos and Chetco. The South Coast Basin is approximately 2,985 square miles or 1,910,000 acres in size. The Coquille River is the largest of the south coast basins - approximately 700,000 acres.

The SW Oregon Province overlays important geologic areas that have considerable implications for the diversity and migration of flora and fauna. This province includes the Cascade Province, the west Cascade sub-province and the Klamath Province. The Klamath Province links these areas to the Sierra Nevada of California to the south and the Oregon Coast Range to the west and north. Generally the Klamath Province is the older geology (300-450 million years ago) with the west Cascade Province originally formed 38 to 9 million years ago and the high Cascades formed 8 million years ago to present.

South Coast Basin

The various South Coast basins generally have headwaters in the Siskiyou Mountains of the Klamath Mountain physiographic area and include the Southern Oregon Coast physiographic area near the Pacific Ocean. The topography is characterized by a relatively narrow coastal plain and narrow alluvial valleys extending into the mountainous interior. The climate has a strong marine influence, high winter precipitation and moderate year-round temperatures. Streams typically have high winter and spring flows with considerably less flow during the summer months and early fall.

The South Coast streams have been altered by humans starting in the late nineteenth century. The narrow coastal plain, once mature spruce and redwood forest, has been cleared for agriculture. The narrow valleys in the coast range have also been settled and cleared where agriculture is possible. The draining and clearing has simplified the stream and riparian habitat in, and along, coastal streams.

The result of these activities has been a general lowering of the water table in the coastal and interior valleys and the confinement of the streams to a single channel. The interior hillslopes have been extensively roaded for timber harvest. Many of these headwater areas are in unstable geologic areas in the Siskiyou and Coast Range geology and the sediment budget of the stream has been altered. These activities have changed the lower stream sections and estuary habitat so important to juvenile salmonids migrating to the ocean.

Coquille Basin

The South Fork Coquille River is one of four major tributaries that enter the Coquille River, located in the South Coast Basin of Oregon. The Coquille basin covers 677,800 acres, with 32% of the basin located on Bureau of Land Management and National Forest lands. The South Fork Coquille, 156,800 acres, is the only portion of the Coquille located on National Forest, with 47% of the area located entirely on the Powers Ranger District, Siskiyou National Forest. The 47% constitutes part of the analysis area addressed by this document. (Figure O-1)

The Coquille Basin, including the South Fork, occupies the Klamath and the Coast Range Physiographic Provinces. These geologies produce fine grain sediments which are tranported to stream channels. A strong maritime influence results in high winter precipitations and moderate year-round temperatures. Annual precipitation ranges from 50 to 110 inches per year, with very little snow pack. Thus , 90% of the mean annual discharge of the Coquille occurs from November to April, with less than 1% occurring during August and September.

Moving up the Coquille River from the coastline to the coastal mountains, land surfaces and elevations change from dunes and marine terraces (5%), to flood plains and stream terraces (4%), to low hills (28%), and finally to mountains (63%). The 4% of the basin in flood plains and terraces historically provided highly productive areas critical to salmonid fish species. These riparian and stream habitats were the focal point of early European human settlement and disturbance. Flood plains and stream terraces located on the South Fork Coquille tend to be on private land. That portion located on the National Forest is mostly mountainous.

SOCIAL SETTING (HISTORY)

The South Fork Coquille has an interesting history of human habitation and use. Before the coming of the white man, the area was inhabited by the Upper Coquille band of the Athabascan Indians. The Cow Creek band of the Umpqua Tribe, as well as several bands of Rogue River Indians, may have used the river headwater valley (later named Eden Valley after an early settler). There were Indian settlements in the Broadbent, Gaylord, and Powers areas. Seasonal hunting camps existed higher in the river valley.

The first Europeans in the region were fur trappers and traders in the 1820's. A main travel route ran north-south through what is now called the Siskiyou National Forest. It followed the South Fork Coquille River up to Rock Creek then climbed to the divide at Agness Pass and down to Illahe and Agness on the Rogue River. After 1868, hide hunters, or "pelters", as they were called, came into the area and established camps all through the Coquille and Cow Creek drainages. Some of the known camps were: Cedar Swamp, Hide Camp, Cold Springs, Elk Valley, Cow Creek, and Dutchman Butte. These men hunted deer and elk for their hides and elk eye teeth only. They exterminated the elk from Eden Valley (Cooper, 1939). Elk herds have re-established since the early twentieth century (Magill, 1976).

Settlers and miners started moving into the area in the early 1850's. The miners used the early Indian trails and built some of their own. Many placer miners operated in the South Fork Coquille River and its tributaries. The miners were mostly looking for gold although some later mines produced nickel. Johnson Creek and Rock Creek were actively mined. The Chinese, perhaps a thousand strong, had a settlement at China Flat in the late 1800's and worked the diggings at Johnson Creek until they were chased off by the homesteaders of the North Carolina Settlement (Powers area) in the 1890's. In 1891 the Sucker Creek slide and two others on Johnson Creek buried much of the miners' diggings.

The area that is now Powers was settled by a few pioneers in the late 1850's to 1860's. The town was initially named Rural. It changed to Powers (after a local landowner) in the early 1900's. Around 1900, there were an increasing number of people settling south of Powers on land that later became the Siskiyou National Forest (established 1909). The Port Orford Ranger District office was moved from Port Orford to Powers in 1924. After World War II the name of the district was changed to Powers Ranger District.

The biggest changes to the watershed began to occur with the appearance of the railroad in 1915 and the establishment of the Smith/Powers Logging Company. Early activity concentrated largely in the Salmon and Land Creek areas and later extended east of Powers onto Eden Ridge. Settlement in the watershed continued throughout this time and at its height the Eden Valley vicinity had 7-10 families, a post office, a school, two sawmills, and an emergency airplane landing field. It was during this early era that the watershed began to be roaded. Major connections were completed including the road along the South Fork, the road from Glendale to the Eden Valley Ranger Station, and the road connecting Powers with Agness in the Rogue River drainage. (Figure O-3)

Mining and logging continue today at less than historic levels. Most mining operations do not produce enough income to be significant. Although mining is mostly recreational, several social, environmental, and political issues surround mining operations. Some of these issues are discussed in the Aquatic and Social sections.

Timber harvest activities were the main industry in the area after World War II. Like many other areas, several social issues regarding timber harvest continue to affect the watershed. These include effects on scenery, wildlife habitat, and water quality and local employment. Timber harvest effects on wildlife and water quality are discussed in the Terrestrial and Aquatic sections.

Camping, fishing and hunting are still popular recreational activities with local residents. There are two developed campgrounds. Daphne Grove is located 7 miles south of the Forest boundary and Rock Creek is 5 miles beyond Daphne Grove. China Flat campground, maintained by Georgia-Pacific West, Inc., Coquille Timberlands, is the only privately owned campground in the analysis area. There is other dispersed camping within the key watershed. Use is not heavy as the area is not near a major population center.

Several small communities are adjacent to the analysis area. The closest is the city of Powers located on the river several miles north of the Forest boundary. A community of 680, Powers has deep historical roots in the area. Many families can trace their presence back six generations. Demographic information indicates that population and employment in the Powers area declined by 16.7% between 1980 and 1990 (Markgraf, 1992). Due to the loss of jobs in the timber industry, employment has shifted to light manufacturing and service jobs. There are also a growing number of entrepreneurial activities.

PHYSICAL SETTING

Climate

The watershed is dominated by a wet, warm, marine climate, with temperature variations corresponding to changes in elevation. The area receives 70-100 inches of rain annually. It is often inundated by fog which extends inland along the river and up to 2,500 feet depending on the height of marine inversion layers. Frequent moist fog and cloud cover buffers vegetation by reducing fluctuations in temperature and seasonal water stress. There is little snowpack.

East wind episodes are most severe in late summer and fall. These episodes are characterized by strong easterly winds, low humidities, and relatively high day and night temperatures.

Elevations range from 190 feet in the Powers area, to 4,026 feet at Iron Mountain on the southwestern divide of the watershed.

Geology

The Upper South Fork Coquille Watershed straddles the Klamath/Siskiyou province which is separated by the Coquille River Fault Zone (Dott 1971) from the Coast Range province. Both geologies weather rapidly and produce fine grain sediments that are transported to stream channels. Therefore, sediment inputs are naturally high. The geologic and geomorphic setting of each tributary is described in the Aquatic Ecosystem section.

BIOLOGICAL SETTING

Vegetation

The landscape is dominated by conifer forests on productive soils and steep slopes. The watershed is a patchwork of many age classes and species, due mainly to timber harvest and past disturbances. Vegetation types vary from oak savannahs and Douglas-fir forests in the lowlands to knobcone-lodgepole-sugar pines in the highest mountains, with a great diversity of habitats between these two extremes. Often earlier seral stages are present along ridgetops as they are more prone to wind damage and to lightning strikes. They are drier sites that receive more frequent and more intense wildfire. As a result, mature and old-growth stands most often occur below midslope in the cool and moist drainages. Historically, the occurrence interval of fire in the Western hemlock series in the Klamath Region has been about 65 years, with an average stand age of 281 years (Atzet and Martin, 1991). The fire occurrence rate in the South Fork Coquille drainage is low for both lightning and human-caused fires when compared to other drainages on the Siskiyou National Forest.

Wildlife

There are a broad array of species with a variety of needs within the analysis area. There are many documented occurrences of old-growth dependent species, most notably, the spotted owl and marbled murrelet. Both of these are listed as *Threatened* by the U.S. Fish and Wildlife Service. Habitat exists for additionally listed species including the peregrine falcon (endangered) and the bald eagle (threatened).

Historically the area has had much higher amounts of late successional habitat (Figure T-2, Terrestrial Section) but many species, such as elk, actually thrived due to increase in early successional habitat. There are a small amount of special and unique wildlife habitat areas such as ponds/lakes, meadows, and cliffs.

Fisheries

Key watersheds are critical refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids. Nehlsen (1991) identified anadromous stocks along California, Oregon and Washington coasts that exhibited significantly depressed populations to be at some risk of extinction. He cited destruction or modification of range, overutilization, disease, and other natural or man-made factors. At-risk species in the South Fork Coquille are the spring chinook, coho, and sea-run cutthroat.

In 1986, the Coquille River was listed by the Department of Environmental Quality (DEQ) as failing to meet water quality standards adopted to protect beneficial uses. DEQ identified the South Fork as being "water quality-limited" for dissolved oxygen downstream from the city of Powers. This affects aquatic life and aesthetics. The City of Powers currently gets its water directly from the Coquille River just downstream from the mouth of Mill Creek and the Johnson Mountain Bridge. When the water is high and muddy during winter storms, the city switches to Bingham Creek.

AQUATIC ECOSYSTEM

This section contains a blending of information with the Social and Terrestrial sections. This is important in the discussion of the subwatersheds. This integration will assist the land manager in understanding watershed processes.

I. Watershed Geology and Geomorphology

The diverse geologic and geomorphic setting of the watershed affects terrestrial and social, as well as aquatic ecosystem processes. Rock types and landforms influence the texture, thickness, and productivity of soils. The distribution of mineral-bearing rocks relates to the history of settlement in the area, as well as to current mineral operations. The following discussion provides background for aquatic processes and features, such as sediment and large wood delivery, landslide-related lakes (sagponds), streambank stability and susceptibility to channel erosion, soil thickness and hydrologic response, gradient and valley confinement of channels, size and durability of substrate, and exchange between groundwater aquifers and surface flow.

Beginning at the headwaters upstream from Foggy Creek, the river flows through Days Creek Formation and into the broad alluvial flat known as Eden Valley. Both Foggy and Clear Creeks flow through alluvium to the mainstem. From above Wooden Rock Creek to below Elk Horn Creek, the river parallels the dip slope of the Flournoy formation (Figure A-1), flowing on exposed bedrock in a moderately wide valley floor. Below Wooden Rock Creek, the additional flow increases the sizes of pools. After flowing through another extensive alluvial deposit at Ash Swamp, the river flows into the Tyee Formation, which forms steep slopes (often cliffs) and confined channels (Figure A-2). The stream flow and gradient increase downstream, creating plunge pools. Where the river is confined by cliffs, boulders are delivered to the channel. Because the sandstone is not durable, these boulders are readily reduced to sand and silt-sized substrate. Between Ash Swamp and Coquille River Falls, the Tyee Formation dips to the northwest, resulting in gentle hillslopes on the southeast and cliffs on the northwest.

The Coquille River Falls are formed where the river flows off the edge of the plateau known as Eden Ridge. Steep hillslopes occur in the Tyee downstream to near Hosposki Creek, where the river flows through Lookingglass Formation, which is less resistant and forms more moderate hillslopes and stream gradients.

From Fall Creek to China Flat, the river flows near the Coquille River Fault. Within this reach, for 6000-7000 feet between Fall Creek and Kelly Creek, an ancient block slide in serpentinite has moved the river from the west to the east. Parts of the toe near Kelly Creek and between Fall and Anderson Creeks remain active today. The river crosses the fault into serpentinite near the mouth of Johnson Creek, in the Port Orford Cedar Research Natural Area.

South Fork Coquille
(Including Salmon Creek)
Geology

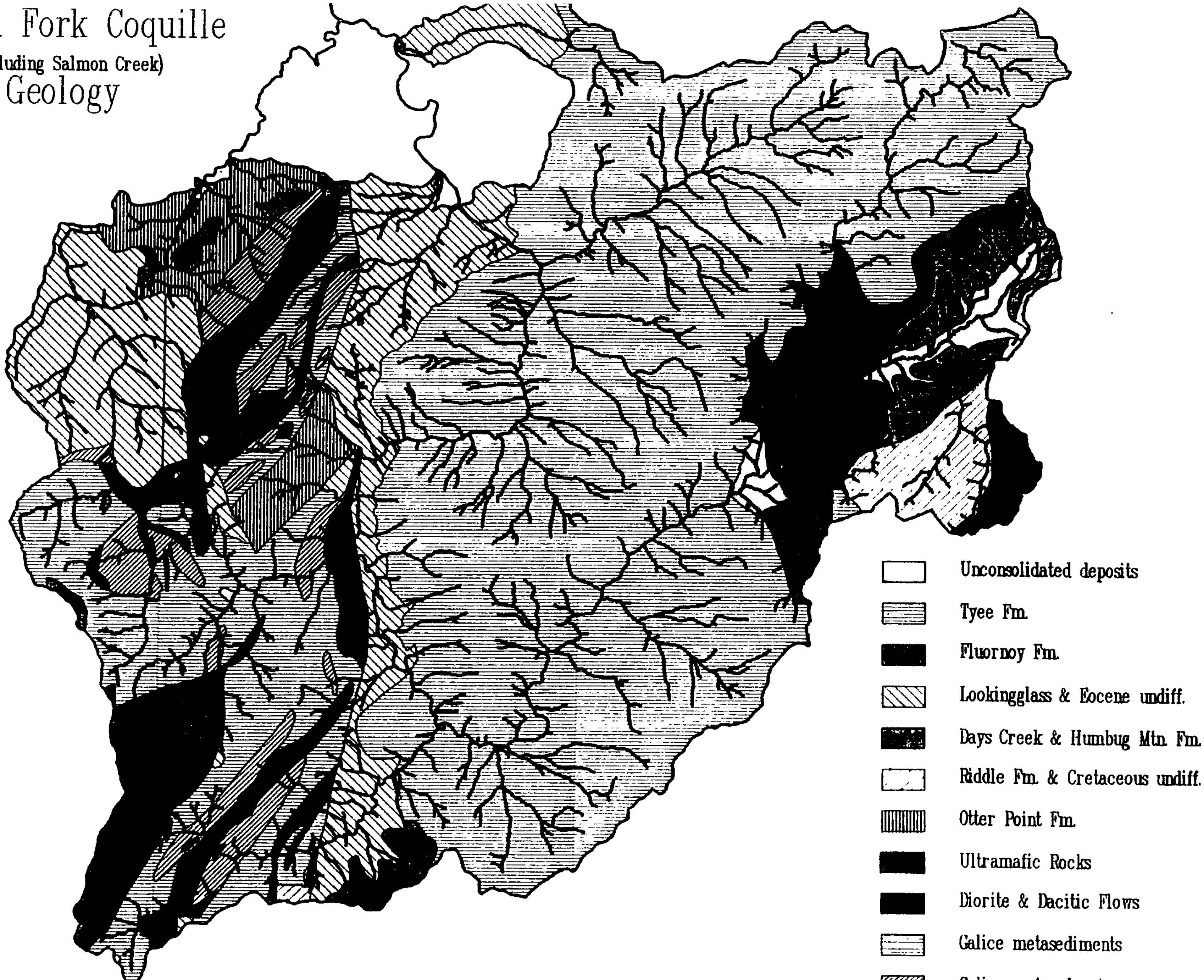

Figure A-1

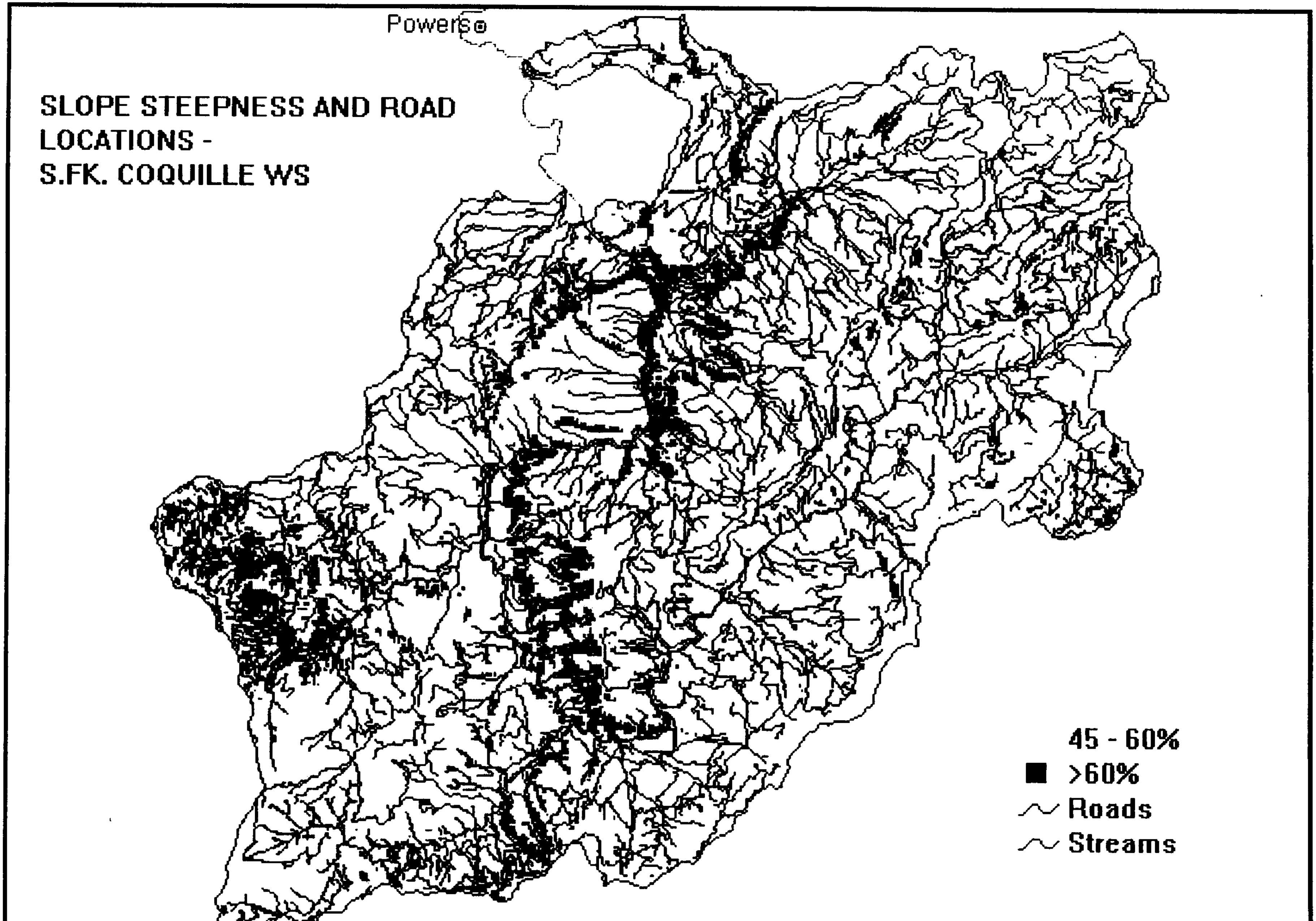
Powers
SLOPE STEEPNESS AND ROAD LOCATIONS - S.FK. COQUILLE WS
45 - 60%
>60%
Roads
Streams

Figure A-2

At China Flat, the river flows eastward through Lookingglass into Tyee Formation. At McCurdy Creek, the flow turns northward, with cliffs on the east and a plateau on the west. Downstream of Sand Rock Creek, cliffs appear on both slopes. The river again flows through more moderate slopes in the Lookingglass, from downstream of Coal Creek to the National Forest Boundary.

Much of the area west of the mainstem lies in the Klamath/Siskiyou Province which consists of metamorphosed sedimentary rocks of the Jurassic Galice and Otter Point Formations with associated volcanics, diorite and serpentinite (Fig. A-1). These rocks are commonly faulted and sheared, juxtaposing resistant and weak materials with mixed gentle and steep slopes (Fig. A-2). The southwesternmost part of the basin drains Iron Mountain; an exposure of serpentinized periodotite. Younger Cretaceous sedimentary rocks overlie the Klamath rocks in a small area on the western margin (Humbug Mountain conglomerate) and are exposed beneath the Coast Range sediments to the east (Days Creek and Riddle Formations).

East of the fault, the Coast Range Province consists of the Tertiary Tyee Formation with subordinate amounts of the Tertiary Lookingglass and Flournoy Formations. The Tyee consists of massive, greenish-gray, coarse- to fine-grained, lithic wacke and rhythmically bedded sandstone and siltstone (Baldwin et al. 1973). Tyee sandstones form distinct gently sloping plateaus that parallel the dip slopes, and steep bluffs on the opposite scarp slopes (Fig. A-2).

II. Aquatic Ecosystem Processes, Conditions, and Trends

Aquatic ecosystem processes operate on elements such as sediment, large wood, water quality and quantity, and channel morphology and substrate. Each of these elements is discussed separately below, followed by sections on fish habitat and fish species, distribution and population.

A. Sediment Delivery

Key questions: What processes deliver coarse and fine-grained sediment to the watershed?

≈ Where are they delivered?
≈ In what magnitude?

How much sediment is delivered naturally and how much is derived from human activity?

Mechanisms of sediment transport and delivery differ by geologic and geomorphic setting, due to differences in rock structure, hillslope angle, soil strength and depth, moisture-holding capacity, and root anchoring types.

Within sheared and serpentinized rocks of the Galice and Otter Point formations, earthflows deliver fine-grained sediments by debris slides from their toes and by erosion of marginal gullies. These features range in size from the massive slump-earthflow complex that includes Azalea Lake as a sag pond, to small creeping areas with high groundwater levels. Large debris slides also result from soil accumulation on slopes that become oversteepened by channel erosion (see Section III for examples - Rock Creek, Sucker Creek, and Johnson Creek Slides).

Soils on the steep Tyee sandstones have a tendency to fail as debris flows which scour streams to bedrock and deposit sediment and large wood at tributary junctions. Road construction along these bluffs has increased the natural rate of debris flows (based on interpretation of air photos, see Appendix A). Analysis of road construction dates, ditch drainage distances, and high hazard areas is ongoing. A preliminary list of road segments with past or high potential for debris flows is attached in Appendix B.

Where Tyee bluffs overlie softer siltstones such as the Lookingglass rocks, the process of rock fall is common, generally following winter freeze-thaw cycles. Where road cuts intercept these contacts, the process is aggravated (Forest Road 33, Gunsight Pass, Elk Creek and Coal Creek bluffs). Benches within the bluffs often result from large naturally-occurring deep-seated slumps and translational failures (e.g. Forest Road 3348 above Drowned Out Creek, before the 3rd falls, Townsend, 1995). Because roads and landings have been constructed on these benches in the past, some instances of human-caused large slides have been reported (USDA, 1986).

Thick deposits of colluvium have been transported downslope from weathered Lookingglass Formations. These unconsolidated materials are susceptible to disturbance, and are the source of the numerous buttressed cutbank failures along Forest Road 33 at Daphne Grove and above the 3347 road junction. Increased erosion of road ditches and channels has been observed, particularly where road grades are steep and/or culverts are widely spaced.

The magnitudes of sediment delivery from landslides and surface erosion have not been measured. Where channel morphology is a limiting factor for fish habitat, this data gap may be crucial for understanding sediment storage and routing. However, areas that are prone to sediment delivery from road construction and timber harvest (high watershed sensitivity) were mapped on aerial photographs (described in Appendix A). The miles of road and acres of harvest on these "high watershed sensitivity" lands were tabulated. These data provide a relative disturbance index for magnitudes of sediment delivery over time.

While results of these plots are discussed in detail for each subwatershed (Section III), some general trends and relationships are evident for the watershed. The timing varied for each subwatershed, but most disturbance was concentrated between the mid-1930's and mid-1970's.

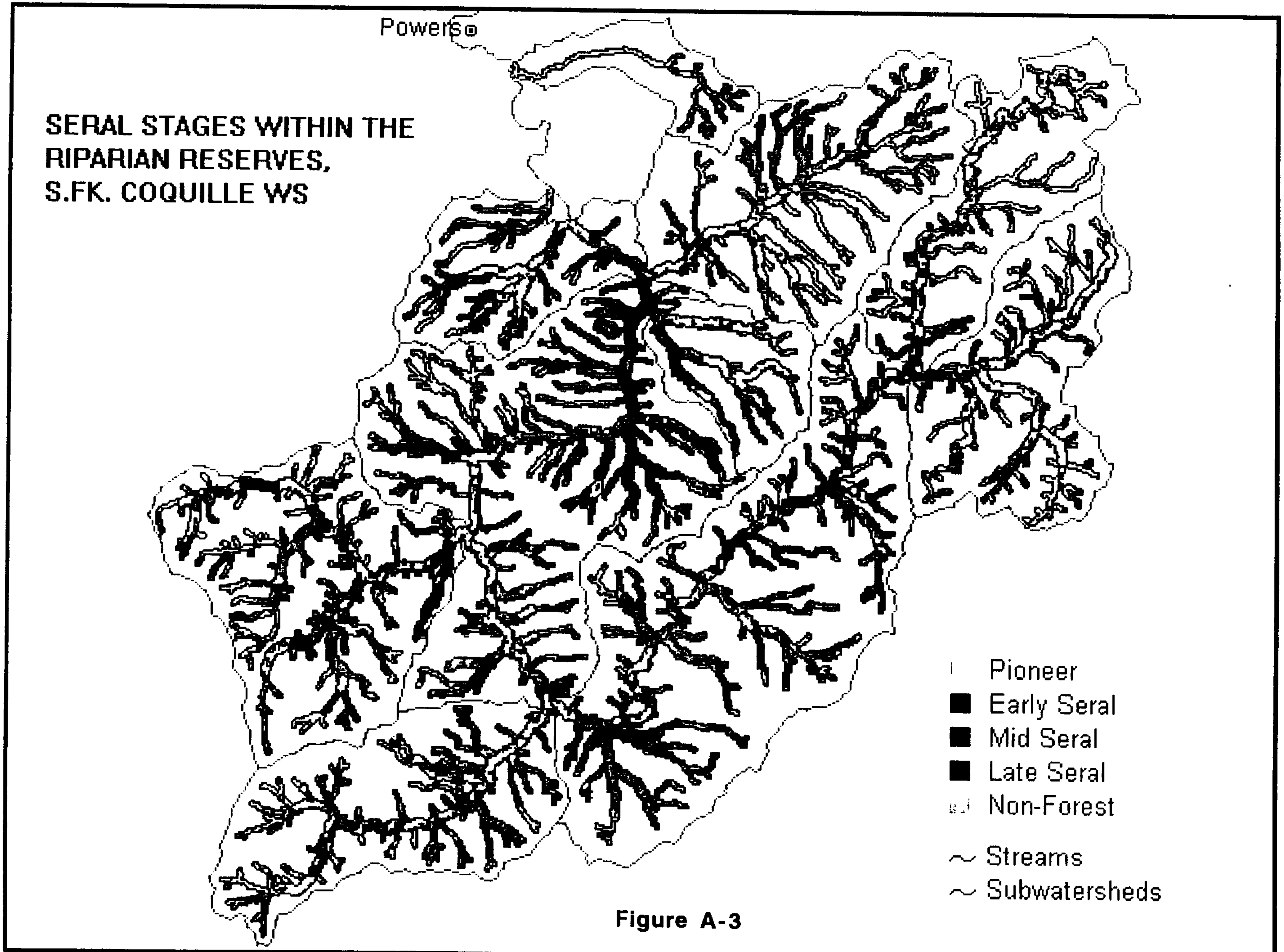
SERAL STAGES WITHIN THE
RIPARIAN RESERVES,
S.FK. COQUILLE WS
Powers
Pioneer
Early Seral
Mid Seral
Late Seral
Non-Forest
Streams
Subwatersheds

Figure A-3

Surface erosion associated with mining disturbance is not included in the above disturbance index. Prospecting and associated mining disturbance has been limited to local areas in Rock and Johnson/Sucker Creeks. Hillslope erosion from mining disturbance is evident in the Azalea Lake, and Lake, Crater, and Manganese Creek areas, and includes some serpentinite areas that are difficult to revegetate.

Future trends are for less of the human-caused sediment because of reduced roading and harvest in sensitive areas. However, reduced maintenance on existing roads would result in drainage diversions and continued road-related debris flows. Road drainage design may need upgrading in addition to continued maintenance. Appendix B lists roads subject to debris flows on Federal Lands. A list of debris-flow prone roads will be provided to private landowners also.

On Federal Lands, new standards and guidelines apply to riparian reserves which include unstable and potentially unstable lands. The 1994 amendments to the State of Oregon Forest Practices Act will apply to future harvest on private lands.

B. Large Wood

Key questions: What processes deliver large wood?

Where have management activities reduced the large wood supply below natural levels?

How can the supply of large wood be restored?

"Large wood" is defined by Region Six stream survey protocol as wood that is a minimum of 50 feet long with a diameter of 24 inches at the small end. Large wood is delivered to stream channels by debris flows and streamside landslides, by recruitment from adjacent riparian forests, and by transport from upstream sites. It influences many of the streams' characteristics as well as serving as habitat cover and nutrient storage.

Standing large wood has been lost from riparian areas in this watershed primarily by harvest, scouring of debris flows, and salvage following windthrow. Within National Forest lands, the river was spared splash damming and log drives that have affected other tributaries in the Coquille River.

Areas delineated as high watershed sensitivity for delivery of sediment are also important for delivery of large wood. Table A-7 shows the area of harvest on high sensitivity lands for each tributary watershed. The history of harvest on Federal and private lands is illustrated in Figures A-11 through A-17. Riparian areas that were harvested in the mid-1930's have regrown to the early-seral stage (Figure A-3). Figure A-3 reflects a growth model using methods discussed in Appendix A. This map does not reflect areas where the riparian forest species composition has been altered, thereby providing more hardwoods and fewer conifers. Hardwoods are smaller and decay faster making them a poor source of large wood.

Human-caused debris flows have increased the frequency of disturbance in channels that are subject to periodic scouring of riparian vegetation. The result is delivery of smaller sizes of wood to larger channels. These smaller pieces flush out of the watershed during high flows. Roads near the mouths of these debris-flow prone channels commonly intercept both sediment and large wood deposits. For roads such as the primary access between Powers and Agness (Road 33), this effect can be mitigated by crossings that are designed to pass debris flows.

A 1964 flood following a major storm likely mobilized considerable quantities of instream wood, but the input, storage, and transport volumes are unknown. To evaluate the storm damage, the Forest Service assembled an evaluation committee in 1966. The committee found that "woody debris" buildup in streams greatly contributed to stream damage, and recommended that debris be removed from the stream channel. In response to that recommendation, state and federal regulations were made requiring remocal of all debris from streams. As a result, private and federal activities removed massive amounts of wood for salvage or stream cleaning in the 1960's and 1970's.

Large wood was removed from the channel in association with placer mining and during some logging operations in the mid-1960's to mid-1970's (Townsend, 1995). Riparian forests were not burned extensively in association with placer mining in this watershed. Losses of instream wood from mining are evident by comparing the relatively intact riparian forest along Reach 1 of Johnson Creek (Figure A-3) with the relatively low abundance of large wood in the channel as seen in Table A-5.

The past and potential future loss of Port-Orford-cedar (POC) from root disease is discussed in the Terrestrial Ecosystems Section. POC decays more slowly than other species making it more valuable for nutrient supply, sediment storage and dissipating flow in the channnel. Infected areas may contribute some trees to streams through mortality or limited areas of salvage. Areas of known infection vary in the amount of mortality and dead trees may stand for a long period of time before being delivered to a stream.

C. Water Quality

Key question: What are the factors and processes affecting water quality in the South Fork Coquille Watershed?

Within the watershed analysis area, the South Fork Coquille is not Water Quality limited for dissolved oxygen and there are no known sources of pollutants affecting water chemistry. The two elements of water quality that are affected by processes in the watershed are turbidity (water clarity) and stream temperature.

1. Turbidity

Turbidity, or water clarity, affects fish habitat and recreational uses such as fishing and sightseeing making it a critical component of the river value. Water samples in the analysis area were rated as first, second and third lowest in turbidity (highest quality) of all samples (DEQ, 1993) from Coquille (RM 24.5) to above Rock Creek (RM 81.0)

The water of the South Fork is clear most of the year except during winter storms when sediment from banks and slides can cloud the water for short periods. During these higher flows, it has been observed that streams flowing through the Klamath Province rocks (Sucker, Johnson, and Rock Creeks) are less turbid than streams on the Coast Range rocks (Yager, 1995). An exception to this tendency is the turbidity contributed by slides and surface erosion from road construction, timber harvest, and natural landslides. Without historical turbidity measurements, water clarity changes can only be pieced together by anecdotal accounts from long time residents and historical sediment delivery estimates. The following is a summary of representative historical accounts:

From 1934 to the 1940's:

> "The river stayed clear during storms. There was only the Agness Road and the Pepper Road over Sand Rock Saddle down to Johnson Creek. The rest of the drainages had no roads. ... After the increase in logging and roads, the river started running muddy during high water and lots of debris was in it." (Townsend, 1995)

From the 1970's until recently:

> "The river would take up to a week to clear. It now clears in a couple of days." (Hallett, 1995)
>
> "In the past, the clarity of the stream would return to normal in 8 days, but today it takes only 2-3 days. Decreased logging, improved practices within the last decade, and paving of Forest Service Road 33 located along the river have improved the stream's clarity." (Stinson, 1995)

Sediment delivered from timber harvest and road construction significantly increased from 1940 through the early 1970's which would be associated with higher turbidity levels. The passage of time, decreases in logging activity, decreases in road construction, and improved practices have recovered water clarity from past decades.

Recreational suction mining during low summer flows can cloud the water for a short section below the mining activity. As river gravels are suctioned from the streambed, fine particles are released causing a cloudy plume downstream of the suction dredge. Current operating plans for suction dredging include a number of requirements to mitigate potential effects on water clarity and fish habitat. The greatest potential for loss of water clarity comes from having multiple suction dredges operating on the same section of the river at the same time. This problem has a minor effect in the analysis area.

South Fork Coquille
Stream Temperature Monitoring
1993

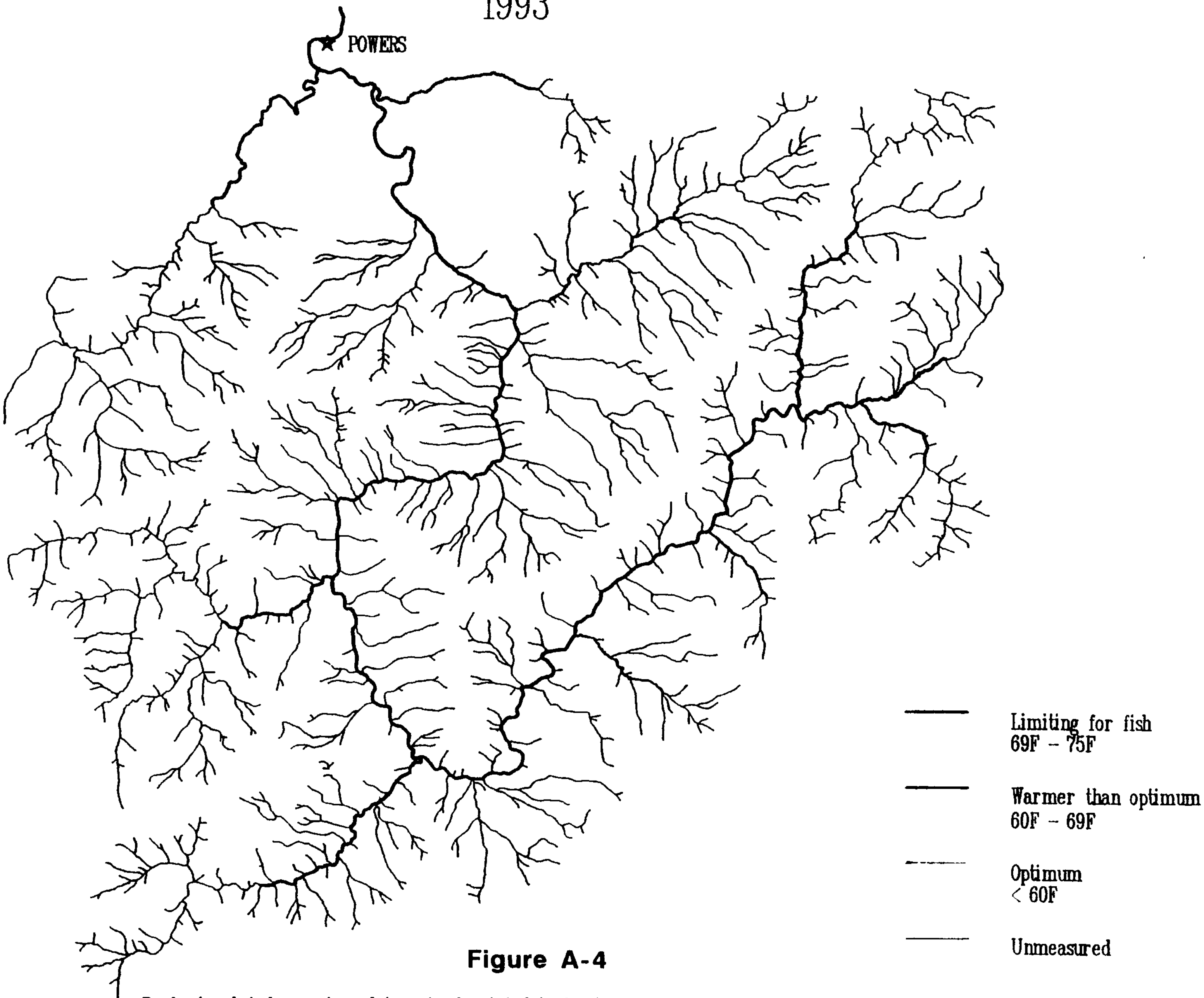

Figure A-4

Professional judgement used to extend point data to stream reaches for visual display.

2. Stream Temperature

Streams are heated by the sun's solar radiation hitting the water surface. The Regional Ecosystem Assessment Project found that temperatures in most streams in Western Washington and Oregon are higher now than historically. Of concern for the South Fork Coquille is high or peak summer temperatures occurring in July and August, which can limit water quality when at or above 70°F. Increases in water temperature on the South Fork Coquille are attributed to: (1) loss of stream shade from large storms, timber harvest and road construction; (2) change in stream channel shape caused by excessive sediment from both natural and human-related sources. Excessive sediment increases the stream's width and decreases its depth allowing it to heat up faster; (3) loss of stream flow from natural drought conditions and water withdrawal for agriculture or domestic uses below the analysis area; and (4) its natural east-west orientation.

A stream temperature study by the Forest Service in 1991 and subsequent years on the South Fork above the Forest boundary concluded that summer stream temperatures are a concern (Bakke, 1991). The study concluded that efforts should be made to reduce temperatures within the Forest boundary. This will help reduce temperatures and dissolved oxygen levels below the analysis area.

The temperature regime of the South Fork mainstem shows that summer stream temperatures are high in the upper reaches, then decrease, and again dramatically increase below the Forest Boundary (Figure A-4). The greatest heating occurs in the upper reaches: 72.5°F (seven day moving mean) near Lockhart Bridge; and below the Forest Boundary to Powers: 81°F (seven day moving mean) near the Powers Ranger District Office (1994) and 81.5°F at the Broadbent Bridge. Riparian vegetation and stream shade have decreased over the last several decades (see Section II. B, Large Wood), contributing to temperature increases.

Tributaries to the mainstem play a key role in helping to reduce high summer stream temperatures. A recent study by the Forest Service showed that the cool water contributed by Johnson and Coal Creek reduces the mainstem temperature by slightly more than a degree as it passes each of their confluences (Bakke 1993).

When summer stream flows increase, summer temperatures are expected to drop. More shade tends to further reduce maximum temperatures as vegetation continues to grow along streambanks. However, seven years of lower summer stream flows have offset any benefit from returning vegetation. Storms can be expected to continue to periodically remove stretches of riparian vegetation. Therefore, vegetation may grow and provide increased shade in some areas, and be periodically cleared off in others.

D. Channel Morphology and Substrate

Key questions: Where are channels sensitive to increased sediment and decreased large wood?

Is there evidence that channel morphology and sediment storage have changed from historic conditions?

What are the expected channel morphology and storage condition trends?

How can channel conditions be improved?

Sediment delivered to the stream channel may be transported or stored, depending on the amount, particle size, and timing of the input. Increased sediment input may cause channel widening and braiding; increased frequency of bed sediment transport; and storage of sediment on floodplains, in gravel bars, and within the channel, all of which decrease pool area (Sullivan et al. 1987). These effects, known as "aggradation," may be observed in channels with lower stream gradients where velocities are infrequently high enough to transport the sediment. Sediment delivered to the stream channel by management practices has changed the channel form and function in areas of the South Fork Coquille watershed.

Observed channel morphology changes and channel disturbance are discussed for each subwatershed in Section III. Conditions in the Lower Mainstem result from processes throughout the watershed. Several of the fish habitat analysis variables, or indicators, are sensitive to changes in channel morphology, especially in wide, low-gradient reaches. These indicators include pool frequency, width/depth ratio, and large wood frequency.

E. Key Fish Habitat Reaches and Fish Habitat Indicators

Key question: *Where are the key spawning and rearing areas?*

Figure A-5 illustrates key spawning and rearing areas for anadromous and resident fish. The productive flats are characterized by low gradient reaches (less than 2%) in unconfined valleys. These types of stream segments are important aquatic production areas and generally sediment and wood deposit in these areas. Flats support a variety of habitat types that are critical components for salmonid production. Fish productivity and diversity are highest along these reaches and a high percentage of spawning occurs within these areas. Flats are sensitive to disturbance from upstream sources and have been utilized as barometer areas to measure the relative health of instream salmonid habitat. Monitoring programs should focus on these flats.

An analysis of fish habitat includes the following indicators:

Pool frequency
Width-to-depth ratios
Large wood frequency
Riparian seral stage

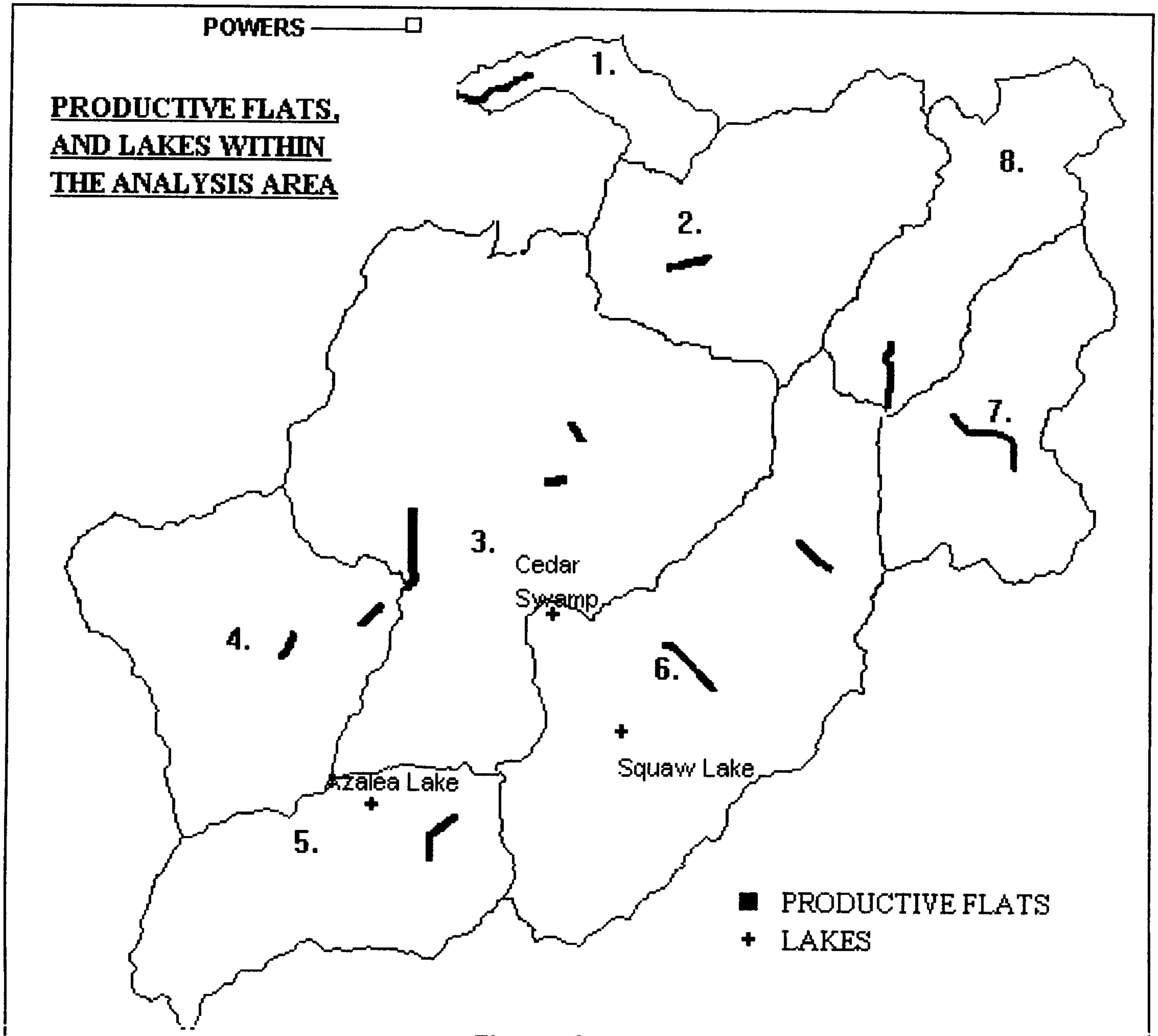
POWERS
PRODUCTIVE FLATS, AND LAKES WITHIN THE ANALYSIS AREA
1.
2.
3.
4.
5.
6.
7.
8.
Cedar Swamp
Squaw Lake
Azalea Lake
PRODUCTIVE FLATS
LAKES

Figure A-5

Upland seral stage
Roads constructed in high and moderate sensitive lands
Temperature (7-day moving mean)

These variables are broad indicators of watershed and riparian health. They respond to the processes that provide for fully functioning aquatic systems and salmonid habitat. The effects of each of these indicators on salmonids are described below. Other potentially limiting factors such as sediments, cover, and fish passage are also discussed. Current values for each subwatershed and for some stream reaches are outlined in Section III.

Several assumptions were made in this analysis:

*Natural disturbances within the subwatersheds are generally acute, localized and infrequent.

*Human disturbances within these subwatersheds are generally chronic, but distributed and frequent.

*Fish populations reflect the inherent productive capacity of the analysis area.

*Columbia River basin channel variables are comparable to the South Fork Coquille.

• Effects of Pools on Salmonids

Pools provide critical habitat for both juvenile and adult salmonids. Pools store nutrients, provide refuges during high winter and low summer flows, and buffer the effects of sediment pulses (Columbia River Basin, 1992). Pool tailouts generally provide well sorted gravels that are frequently used for spawning. Sedell and Maser (1994) determined that primary pools, which are critical for optimum salmonid survival, should occur at a minimum of one per six wetted channel widths for Columbia River Basin streams.

• Effects of Width-to-Depth Ratios

Width-to-depth ratios are derived by dividing the bankfull width by the mean depth in riffle type habitats (Region 6 protocol). This ratio is an indicator of the balance between sediment load and transport capacity. Natural and man-caused increases in sediment, will often exceed a stream's capability to transport sediments, resulting in channel widening and decreased depths (Meehan 1991). This widening reduces a stream's suitability to support salmonids by filling pool habitat, eliminating fish cover, and increasing summer temperatures. A width-to-depth ratio of less than 10 was determined to be desirable in Columbia River basin streams.

• Effects of Large Wood on Salmonid Production

Bisson et. al. (1987) found a direct relationship between large wood and salmonid production. Large wood can influence pool formation, channel meandering, habitat complexity, stream velocities, bank stability, sediment storage, and gravel bar stability (Lisle, 1986). Large wood is also an important source of habitat cover and nutrient storage. Sedell and Maser (1994) determined that key pieces of large wood should have a frequency of one piece per 15 linear meters for optimum survival of anadromous salmonids in third to fifth order Columbia River basin streams. This frequency is higher on lower order streams. The desired frequency of large wood for Columbia River westside (1st through 4th) order streams was determined to be a minimum of 80 pieces per mile (Columbia River Basin, 1992).

All streams within the key watershed have less than desirable levels of large wood. The riparian zones within the key watershed are lacking late seral conditions that were present historically which serve as a recruitment source for large wood.

- Effects of Riparian and Upland Seral Condition

Both riparian and upslope seral conditions are important factors in determining peak flow run-off, groundwater inflow, sediment delivery, solar temperature inputs, and recruitment of large wood and other organic debris. These factors can be related to the quality and quantity of salmonid habitat (Meehan 1991). Processes such as sediment and large wood delivery are better represented by a more specific indicator such as harvest on high watershed sensitivity lands.

A late seral upland zone provides a buffer for precipitation by helping to decrease winter runoff peak flows and possibly increasing summer flows. Peak rainfall is intercepted and allowed to infiltrate into the ground. Summer radiation is intercepted allowing cooler ground temperatures and less evaporation. The main net benefit of a late seral upslope condition may be increased summer flow and cooler water temperatures from groundwater sources.

A late seral riparian zone directly intercepts solar radiation, thereby reducing stream temperatures. In addition, a mature riparian zone provides bank stability, cover elements, a nutrient source, and long-term recruitment of large wood. For this analysis, a riparian buffer was generated using 400 feet on Class III and Class IV streams, and 800 feet on Class I and II (see Appendix A, Methods, for more information). Site-specific buffers will be established prior to project implementation, as directed by the Northwest Forest Plan (USDA and USDI 1994).

- Effects of Roads in Sensitive Areas

Roads can interfere with natural watershed flow regimes. Downhill subsurface flow is intercepted by compacted roads and ditches that run perpendicular to the slope. Where stream channels are in close proximity, or where gullies are created by erosion at culvert outlets, intercepted water may result in higher peak flows and divert summer groundwater flow. These hydrologic effects are most likely where roads cross streams, therefore we have used "miles of road in sensitive areas" as an indicator, rather than simply road density.

• Effects of Stream Temperature on Salmonids

Salmonids are coldwater fish with definite temperature requirements. Although salmonids may survive at high temperatures, their growth is reduced or ceases completely due to their increased metabolic rate. Summer high temperatures, fluctuations, and durations of highs and lows are important parameters in analyzing salmonid production. Flow velocity, flow depth, groundwater flow, and riparian canopy interception of solar radiation affect stream temperature. Temperatures of 70 degrees Fahrenheit are approaching lethal limits for salmonids.

Data from Forest Service thermograph testing indicate that summer heating takes place high in the headwaters of the South Fork Coquille (Figure A-4). Temperature maximums in excess of 70°F (near lethal limits) have been recorded in Foggy/Eden, Wooden Rock, Upper Mainstem (Lockhart Bridge), and at the lowest point of the key watershed. Based on Forest Service thermograph data, downstream temperatures can increase 10 degrees in a distance of five miles. Due to these temperature limitations downstream, the analysis area is a critical adult spring chinook and salmonid rearing habitat. Late seral upland and riparian areas help to reduce summer water heating and may increase available habitat below the key watershed.

• Effects of Sediments on Salmonid Production

Excessive sediments can limit salmonid production. Deposition of fine sediments on the stream bottom eliminates habitat for aquatic insects and reduces the permeability of spawning gravels (Meehan, 1991). Deposition of larger sediments from landslide and road failure events can fill pools, decrease available cover, and increase both width-to-depth ratios and stream temperatures. The natural sediment supply, such as roads and timber harvest activities, have increased rates of sediment delivery. Roads have been identified as the major impact on the forest environment (Johnson, 1995). Subwatersheds with roads in sensitive areas have been identified.

• Effect of Culverts on Salmonid Production

If not designed appropriately, culverts at road crossings can limit access to upstream spawning and rearing areas. An impassable culvert directly reduces available salmonid habitat. Species that spawn in first and second order streams or rear in fresh water for one or more years (e.g., coho, steelhead, sea-run cutthroat, and all resident species) are affected most by these barriers. Culverts must have adequate jump pools, velocities, gradients or heights to allow passage. Juvenile passage is especially important during winter high flow and summer low flow. Juvenile salmonids seek out smaller tributaries with slower velocities for winter refuge and cooler tributary temperatures during summer months. Criteria adapted by the ODFW (1994) indicate that jumps over six inches can limit access for juvenile salmonids.

• Effects of Cover on Salmonid Production

Cover has been directly correlated with salmonid abundance (Wesche, 1974). Cover provides security from predation and allows salmonids to inhabit areas that they might not otherwise occupy. Cover in the form of depth, water turbulence, substrate, undercut banks, overhanging riparian vegetation, aquatic vegetation, and woody debris can increase the carrying capacity of streams for salmonids (Meehan, 1991). Cover is especially important during high winter and low summer flows. During winter high flows, cover provides velocity refuge areas. Large wood and side channels are crucial to over-winter juvenile survival during high water events.

Summer low flows become limiting for juvenile salmonids that spend one or more years in fresh water. As the wetted width drops, the amount of available habitat decreases. Available cover becomes crucial in the summer when the low flows and increased temperatures substantially limit available habitat. Displaced juvenile fish travel downstream looking for unoccupied cover. Territories established by dominant fish are defended from downstream intruders, and the juveniles eventually end up below the key watershed where water temperatures often exceed 70 degrees.

F. Fish Species, Distribution, and Population

Key questions: What fish species are present in the South Fork Coquille Watershed and what is their known distribution?

What population trends have these species exhibited?

Fish species, life history, distribution, and population trends and current status are tabulated (Table A-1). A summary of salmonid life cycles (including spawning and fresh water rearing times, and years spent in the ocean) and critical forest habitat is provided for reference in Table A-2. Following is a narrative description of each species life cycle, habitat requirements, and reference condition and current condition of the population. The distribution of the anadromous and resident fish is illustrated in Figure A-6.

1. Spring Chinook

The Coquille River is one of the few coastal rivers in Oregon that supports a native run of spring chinook.

Life Cycle

Spring chinook enter the South Fork Coquille from June through August, spend the summer maturing in deep, fresh water pools, and initiate spawning with the first fall rains. Spawning has been observed from Rowland Creek to Daphne Grove (Rumreich, 1995). Chinook are primarily mainstem spawners. There are unconfirmed reports of spring chinook spawning at Rock Creek. Fry emerge from the redds during the spring (February through May), depending on water temperature. The presmolts outmigrate towards the estuary through

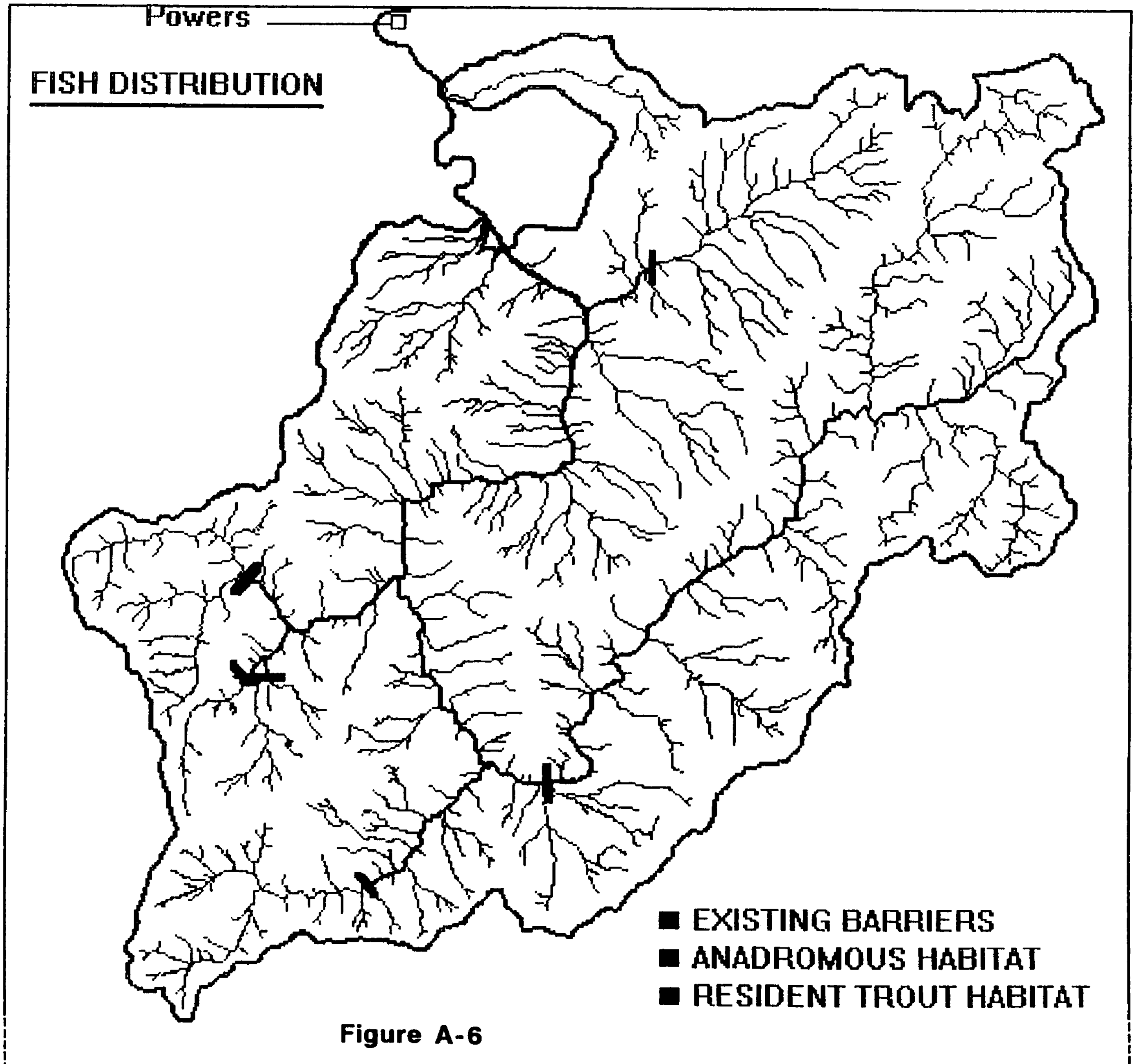
Powers
FISH DISTRIBUTION
EXISTING BARRIERS
ANADROMOUS HABITAT
RESIDENT TROUT HABITAT

Figure A-6

NUMBER OF ADULT SPRING CHINOOK OBSERVED IN 3 HOLDING POOLS BY YEAR

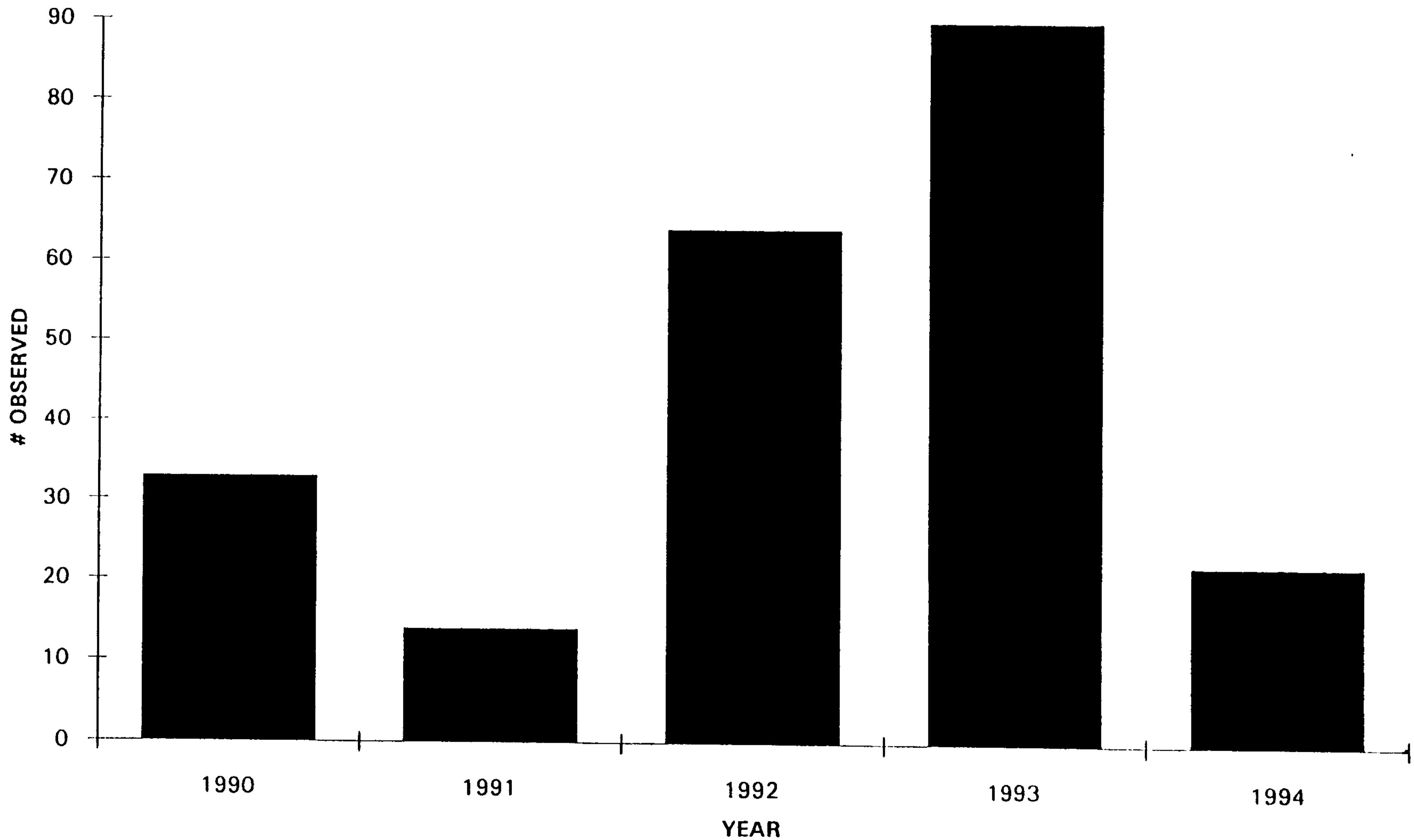

Figure A-7

the summer months and into the fall. Chinook typically spend three to five years in salt water and return to natal streams to complete their life cycle.

Habitat Requirements

Because of their large body size, both fall and spring chinook require greater water depths for upstream migration and holding areas. The requirement for these holding pools is especially critical for spring chinook which may be in fresh water for four to six months during summer low flows prior to spawning (Nickelson et al. 1992). If holding or spawning areas have little cover, spring chinook are vulnerable to disturbance, predation, and harassment over a long period.

Temperature also plays a role in fresh water adult habitat. Lower temperatures within the key watershed are critical for spring chinook survival. The disease *Culumnaris*, which afflicts salmonids in warm water, is known to cause mortality in adults.

Reference Conditions for Spring Chinook

Historically (compared to fall chinook, coho and winter steelhead), spring chinook have never been abundant on the South Fork Coquille River. However, stock numbers may have numbered as high as 2,000 spawners at the turn of the century (ODFW, 1992). Spring chinook were consistently seen in every deep pool from Gaylord to Rock Creek (Grandmontagne, 1995 and Shorb, 1995).

Some historically deep holding pools (e.g., Green Hole and the mouth of Johnson Creek) have filled in with gravels and sand which has reduced available summer habitat (Shorb, 1995 and Grandmontagne, 1995). Low clear water during summer maturation make spring chinook especially prone to poaching through snagging and even dynamite. Depressed populations on the South Fork Coquille have been attributed to past poaching mortalities (Rumreich, 1995). Low flow, elevated summer temperatures, loss of deep pool habitat, and poaching have adversely affected the population of spring chinook.

Current Conditions of Spring Chinook

Problems associated with hatchery production on native stocks are well documented (Ryman and Utter, 1987). A spring chinook hatchery smolt program utilizing native brood stock has been in effect since 1984 on the Coquille River to supplement runs. In 1993, a hatchbox program was initiated to replace the smolt releases; this program will continue for a life cycle at which time it will be evaluated. (Note: The 1994 returns were too low to collect brood for this program).

Currently, spring chinook levels are depressed (Nickelson et.al., 1992) and the species is considered to be at "high risk of extinction" (Nehlson et al. 1991). Population trends are variable. ODFW has been monitoring returns of spring chinook. Each year, three deep pools in the Powers vicinity are counted to serve as an index for escapement (Figure A-7). The high return in 1993 correlates to a smolt release of 32,450 in 1990. Monitoring, habitat management, and habitat restoration will be of crucial importance for the continued viability of spring chinook.

2. Fall Chinook

Life Cycle

Fall chinook enter the South Fork Coquille River during the first significant rains of the year, usually October through December. Spawning is initiated shortly after their spring counterparts and almost entirely in the mainstem. Fall chinook have been observed spawning from Broadbent to Island Campground (Shorb, 1995). The lower portion of the analysis area from China Flat downstream has the greatest number of spawners and juveniles (USDA various years). Fry emerge from the redds during the months of February through May and follow the same cycles as their spring counterparts.

Habitat Requirements

Like their spring counterparts, fall chinook require deep holding pools to rest during upstream migration. Due to their body size, chinook salmon are not able to negotiate some barriers that are accessible to coho, steelhead, and anadromous cutthroat. Because of their late spawning migration, fall chinook are not exposed to elevated summer temperatures that spring chinook endure. However, temperatures are important in chinook rearing. Because most South Fork Coquille mainstem rearing areas are quite warm during the summer, most juvenile chinook are forced to move downstream to tidewater (ODFW, 1992).

Reference Conditions of Fall Chinook

Fall chinook populations in the South Fork Coquille have been historically consistent within expected natural variation. Fall chinook populations boomed during the early 50's, but sharply declined during the late 50's (Grandmontagne, 1995). Since then, decreasing numbers of fall chinook have returned to the upper reaches near Rock Creek. Since the 1960's, there has been a general trend of spawning shifting downstream (Hamilton and Remington, 1962).

Current Conditions of Fall Chinook

In the South Fork Coquille, fall chinook runs are healthy. ODFW spawning ground surveys from 1958 to present show higher than average counts in the last eight to ten years. This population boom is expected to eventually level out. Spawning surveys and juvenile counts are needed to determine the extent density of habitat utilization within the analysis area.

3. Coho Salmon

Life Cycle

Adult coho migrate into the South Fork Coquille from September to December, depending on rainfall. Spawning occurs shortly after migration and primarily in smaller tributary streams.

Fry emerge from the redds from January to May depending on water temperature. Juvenile coho will spend one summer and one winter in fresh water. Smolts head to the estuary approximately one year after emergence. The coho will typically spend two to four years in salt water before returning to their natal streams to complete their life cycle.

Habitat Requirements

During summer low flow periods, coho prefer pool habitat associated with cover elements. During the winter, coho utilize off-channel alcoves and dam pools with complex cover and relief from high flows. Connectivity to these refuge areas and cover in the form of wood are very important in determining over-winter juvenile survival (Nickelson, 1992).

Reference Conditions of Coho Salmon

Historic coho salmon use in the analysis area is illustrated in Figure A-8. Large numbers of coho salmon were observed in the early 30's and 40's from Rock Creek on downstream (Grandmontagne, 1995 and Shorb, 1995). When a person went salmon fishing, they went after coho (Shorb, 1995), and it was not uncommon to catch "a pick-up full of coho." The mouth of Johnson Creek used to be a deep pool that held many coho. It is currently filled in with sediments and is no longer a deep pool.

During the early 1930's, a hatchery was operated on Lower Land Creek. As part of the hatchery operations, a picket fence type diversion wall was placed across the mainstem South Fork Coquille. The fence blocked migration of anadromous species upstream of Lower Land Creek. The diversion fence blew out during a winter storm after four years of operation, but in that time the dam reduced salmonid populations above that point (Hoffman, 1995). While data from hatchery operations is missing, anecdotal accounts indicate that numerous coho were diverted into Lower Land Creek and the coho carcasses were used to feed hatchery progeny (Grandmontagne, 1995). Around 1936, the hatchery raised and released 1 million coho, 250,000 chinook and 250,000 steelhead (Hoffman, 1995). This hatchery obviously influenced salmonid migration and production within the analysis area, but to what extent is unknown.

The coho population within the analysis area declined rapidly during the 1960's and 1970's (Grandmontagne, 1995 and Shorb, 1995). Two factors have been associated with this decline. One factor in the early 60's was the initiation of intensive stream cleanout projects to remove large wood and debris, a practice that biologists then believed would benefit anadromous stocks during their upstream migration. Timber volume was considered a secondary benefit to this practice and a market for cull peelers opened.

Another possible factor in the coho decline was an intensive hatchery steelhead program begun in the late 1960's The program utilized Alsea steelhead stock which tended to spawn earlier than the native South Fork Coquille steelhead stock. The spawning cycle of the introduced steelhead and the native coho overlapped and resulted in direct competition.

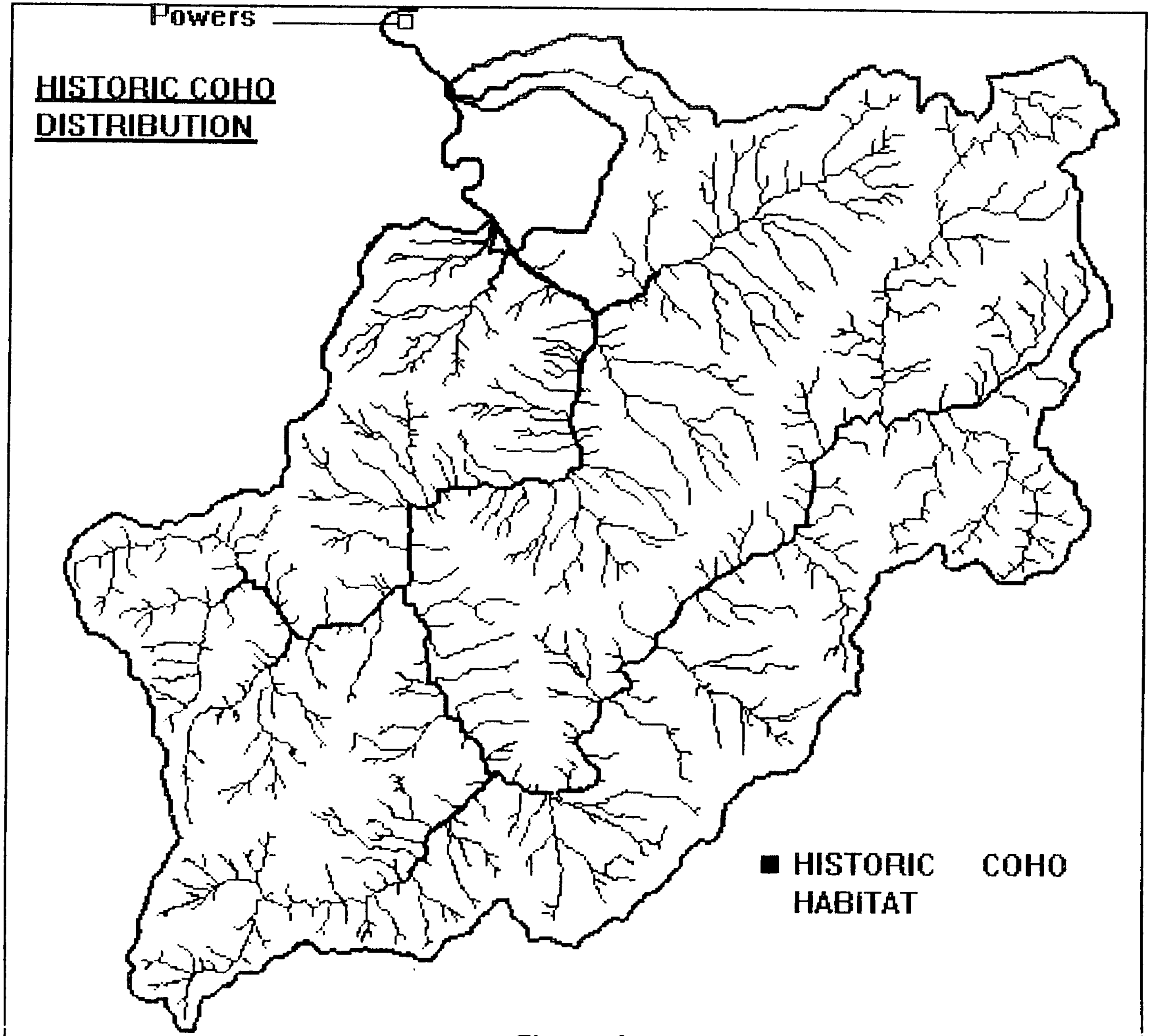

Figure A-8

Current Condition of Coho Salmon

Present (1995) coho salmon distribution is illustrated in Figure A-9. The current upstream extent of coho correlates with the location of the hatchery and diversion dam. The population of coho is depressed over historic levels (Nickelson, 1992). Oregon coho stocks are being reviewed by the National Marine Fisheries Service for listing as "Threatened" under the Endangered Species Act. Nehlson et.al. (1991) found that coho within the South Fork Coquille are at a moderate risk of extinction citing loss of habitat and overutilization. Within the key watershed, coho currently spawn and rear in Hayes Creek, Lower Land Creek, and Upper Land Creek. A pair of spawning adults were observed in Rock Creek during December of 1989 (Grandmontagne, 1995). Since that sighting, no coho adults or juveniles have been observed in the anadromous portion of the key watershed other than the three tributaries listed above.

4. Winter Steelhead

Life Cycle

Winter steelhead enter the South Fork Coquille from November through April. Sexual maturation occurs during their upstream migration. Winter steelhead have been observed spawning in Rock Creek as early as December and as late as May (USDA various years). Fry emerge in late spring and occupy the stream margins. Summer rearing takes place in the faster parts of pools although young-of-the-year are abundant in glides and riffles (Nickelson 1992). During the winter, steelhead juveniles disperse and utilize a wide range of refuge habitats. Connectivity to the floodplain and refuge areas during winter flows are important for steelhead juveniles which may spend from one to four years in fresh water before migrating to the ocean. Steelhead can spend another one to four years in salt water before migrating back to natal streams. Fish that spend two years in fresh water and two years in the ocean predominate the spawning population (ODFW 1992). Unlike coho and chinook, winter steelhead are able to repeat spawn.

Reference Conditions of Winter Steelhead

Winter steelhead have always been abundant in the South Fork Coquille and could be found in every accessible tributary (Shorb, 1995). According to one story, two local people caught 96 fish in one day below Powers (Goebl, 1995). In another story, three locals bet how many fish they would legally catch (no snagging allowed) during the run. The low man caught 240 fish, and the high man caught over 600. If two fish weren't caught after school, something was seriously wrong.

From anecdotal accounts (Goebl, oral communication), the average size of the South Fork Coquille winter steelhead appears to have decreased in weight from 12 pounds in 1935, to the current average of 8-9 pounds.

Native wild steelhead on the South Fork Coquille have been heavily influenced with mixing of hatchery steelhead (ODFW, 1993). The first hatchery introductions began in 1948. Alsea

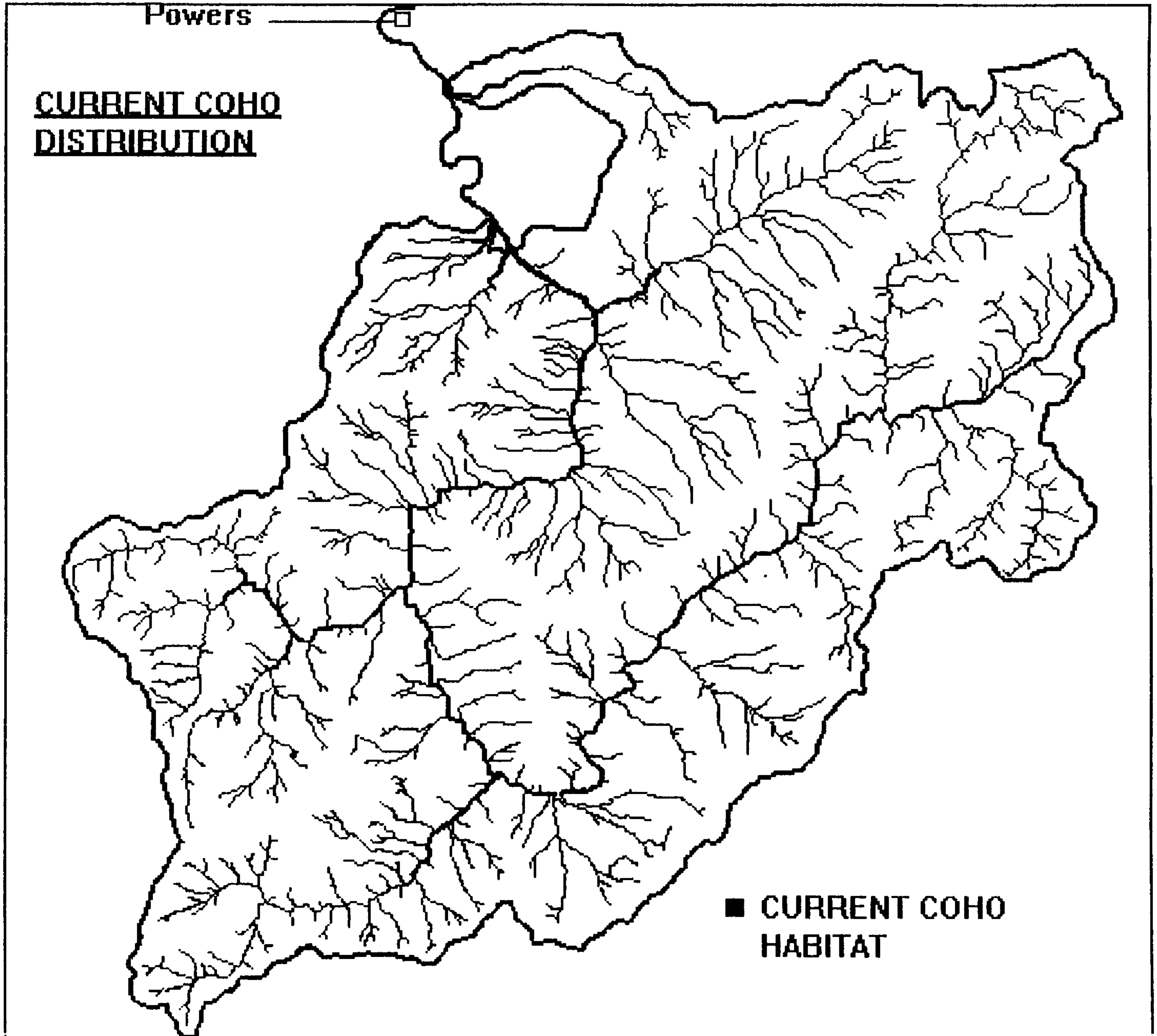

Figure A-9

stock was imported and used as brood from 1968 until 1985, at which time ODFW began using a Coquille stock for brood selection.

In 1990, ODFW initiated a program that used native South Fork Coquille broodstock for hatchery production. An acclimation site was constructed at Beaver Creek approximately 14 miles below the key watershed. Smolts are acclimated for 3 weeks prior to release. While the program's main objective was to prevent mixing with wild steelhead, another objective was that, if mixing occurred, at least the fish would be genetically compatible. The conversion was complete during the 1993-94 run year, and preliminary reports are favorable. During the 1993-94 broodstock collection on Sucker and Rock Creeks, over 70 percent of the fish netted were native. This program is consistent with the goals of the Wild Fish Management Policy (ODFW, 1992).

Changes in angling regulations in the South Fork Coquille have benefitted wild steelhead. Starting in 1992, only barbless hooks were allowed and anglers were required to release all non-clipped wild steelhead. The intent of this regulation was to increase the proportion of wild steelhead on the spawning grounds. Then, in 1994, the anadromous portions of the South Fork Coquille (Coal, Lower Mainstem, Johnson/Sucker, and Rock Creek) were permanently closed to all fishing. The intent of this regulation was to restrict harvesting of the older juvenile steelhead which are indistinguishable from resident rainbow trout and to provide refuge for adult spawners. Since most wild steelhead spawn and rear within the key watershed, these regulations will have a strong effect on preservation and protection of wild steelhead as well as salmon.

Current Conditions of Winter Steelhead

The hatchery conversion program combined with the recent fishing regulations is showing signs of success. The population of wild winter steelhead in the South Fork Coquille are listed as "healthy," and there is a "low probability of extinction" (Nickelson et.al., 1992 and Nehlson, 1991). The run year of 1994-95 looks favorable with local people catching lots of fish and praising the ODFW's hatchery conversion program. While it is premature to determine the amount of wild spawners in important tributaries (e.g., Coal, Johnson, Sucker and Rock Creeks), the outlook for winter steelhead looks promising.

5. Sea-run Cutthroat

Life Cycle

Sea-run cutthroat enter the South Fork Coquille from June through October and spawn between December and May. Fry emerge from the redds from March to June. Juveniles spend one to four years in fresh water before migrating to the ocean. Adults typically spend less than one year in salt water before returning to their natal streams to complete their life cycle. Like steelhead, sea-run cutthroat may spawn more than once.

Sea-run cutthroat tend to spawn in many first and second order streams. This selection of small tributaries for spawning and early rearing may help reduce the competitive interactions between cutthroat, steelhead and coho (Nickelson et al. 1992). Culvert design on smaller tributaries, however, might be limiting within the analysis area by directly blocking passage to upland habitat.

Habitat Requirements

During the winter, juvenile cutthroat trout use low velocity pools and side channels with complex habitat created by large wood (Trotter, 1989). Since sea-run and resident cutthroat spawn and rear in many first and second order streams they are particularly vulnerable to logging activities in these areas (Behnke, 1992).

Reference Conditions of Sea-run Cutthroat

While historical accounts of sea-run cuthroat trout are limited, locals agree that sea-run cutthroat populations have declined since the early 30's and 40's. One historical account relates that three people in three hours caught 125 sea-run cutthroat near the Forest Boundary (Hoffman, 1995). Hatchery introductions of cutthroat trout began in the 1950's and were discontinued in 1985. The impact of these past hatchery releases on native anadromous cutthroat trout is unknown (ODFW, 1992).

Current Conditions of Sea-run Cutthroat

Nehlson et.al. (1991) found native coastal cutthroat trout in California, Oregon and Washington to be at some risk of extinction, citing continuing decline in population size. Populations of coastal sea-run cutthroat have been petitioned for listing under the Endangered Species Act, and the National Marine Fisheries Service is investigating this issue. During the summer of 1994, a school of over 40 sea-run cutthroat was observed in the Johnson Mountain Bridge hole approximately five miles downstream of the key watershed boundary near Powers (USDA, 1994).

6. Resident Rainbow and Cutthroat Trout

For ease of analysis, rainbow and cutthroat above anadromous barriers are considered resident populations. Below the barriers, they are considered steelhead and sea-run cutthroat even though a small percentage of the population are resident.

Life Cycle

Rainbow and cutthroat trout spawn in first and second order streams in early spring when water temperatures start to rise. Fry emerge from the redds during the late spring. The first and second order streams are important rearing and winter refuge areas. Accessibility to these areas is an important migrational concern. After a year or two of growth, trout seek out larger streams and establish territory. Resident rainbow and cutthroat trout reach sexual maturity predominately at three or four years of age.

Reference Conditions of Resident Rainbow and Cutthroat

Historical fishing accounts relate abundant cutthroat populations. It was common to catch dinner within an hour (Goebl, 1995). Fish under 12 inches were kept only if injured, and fish over 20 inches were caught but not very common (Magill, 1976). Most of the upper Eden Valley area consisted of large log jams or beaver dams. Much of Foggy Creek, Wooden Rock Creek, and the upper South Fork Coquille consisted of wood jams (Shorb, 1995). Early settlers cut the log jams in the summer to let winter flows carry them away. Many of these streams were required by state and federal regulations to be cleaned out and salvage logged between the late 50's and early 80's when large wood was believed to inhibit fish passage.

Introduced stocks of rainbow and cutthroat have influenced native populations. Early settlers, miners, and fur trappers collected juvenile trout for transplanting in any stream that looked suitable, which was known as the "Johnny Appleseed" approach. Hatchery releases of both rainbow and cutthroat were common between the 1950's and mid-1980's to provide recreational fishing opportunities. Squaw Lake, which does not have spawning tributaries, is frequently planted with catchable rainbow trout to supplement the recreational fisheries.

Current Conditions of Rainbow and Cutthroat Trout

Populations of rainbow and cutthroat trout within the key watershed are below historical levels. The Eden Valley area (Upper Mainstem, Foggy/Eden, and Wooden Rock) contains the most resident trout habitat within the analysis area. Most of the trout in Foggy/Eden and Wooden Rock streams are associated with cover elements (Chen, 1991). High numbers were associated with large debris jams (USDA various years). The removal of instream wood appears to have had a significant effect on populations of native trout. Densities of cutthroat trout have been directly correlated to the amount of available cover (Wesche, 1974). Cover elements (in the form of wood, hanging vegetation, undercut banks, substrate, and depth) appear to be limiting trout abundance within Eden Valley (Upper Mainstem, Foggy/Eden, and Wooden Rock).

7. *Brook Trout*

Brook trout were planted in Azalea Lake during the fall of 1987 (Figure A-8). Brook trout are able to reproduce without a tributary by utilizing gravel in the shallows of a lake to spawn. Earlier plantings of rainbow trout failed due to the absence of a inlet for spawning. Azalea Lake is the only lake within the analysis area that contains brook trout. Fish were observed during the summer of 1994 in Azalea Lake, which indicates reproductive success (Yager, personal observation, 1994).

8. Other Species

Although limited, information available on the other five fish species is provided below.

Speckled Dace: Speckled dace are native to the South Fork Coquille. They are found in both the anadromous and resident portions of the watershed. They are very common and can represent over half the total population of fish found in certain pools and glides (USDA various years).

Large Scale Sucker: Large scale suckers are also native to the South Fork Coquille, but are only found in the lower portion of the analysis area (ODFW). Trap data indicate suckers migrate upstream on spawning runs during the early spring. The portions of the analysis area that are utilized by suckers during spawning and rearing are unknown.

Prickly Sculpin: This South Fork Coquille native is not very abundant and information is limited. Like the sucker, the prickly sculpin is found only in the lower portion of the analysis area.

Pacific Lamprey: Pacific lamprey are native to the South Fork Coquille. They are anadromous and spawn in the lower portions of the key watershed. From anecdotal accounts, Pacific lamprey populations are severely depressed. After high spring flows, lamprey carcasses used to be found in piles up to one foot deep (Lowell Shorb, 1995). Reasons for this decline are unknown.

Black Bullhead: Black bullhead are not native to the South Fork Coquille. They were introduced into Cedar Swamp through an unknown source. Population size and trends are unknown.

III. Subwatershed Processes, Conditions, and Trends

The discussion of the eight subwatersheds of the analysis area includes data on sediment delivery, large wood, fish habitat, fish populations and distribution as they relate to each specific subwatershed. Specific road segment and harvest unit locations are grouped by Forest Watershed Analysis Areas (WAA). The road and unit locations are mapped on Land Use History maps (paper copies are included in process records and entered in a Lotus 1-2-3 spreadsheet). A summary of land ownership and federal designations by subwatershed is illustrated in Figure A-10. Tables A-1 through A-8 and Figures A-11 thru A-17 displaying data by subwatershed have been grouped at the back of the Aquatic Section. The combination of the tables and discussion will be valuable to land managers as a reference point.

Key questions: What are the current habitat conditions in the South Fork Coquille Watershed?

What and where are the factors limiting salmonid abundance?

How can fisheries habitat on the South Fork Coquille River be maintained and or restored? (see also Section IV, A. Restoration Opportunities)

A. Foggy/Eden

The upper South Fork Coquille flows primarily westward. In the upper Eden Valley area, the habitat consists of slow water glides and pools with shallow featureless riffles (Stream survey, Summer 1989). Where larger pieces of wood are located, deeper pools form with adequate cover. Nearly all trout encountered in this section were associated with these areas (Chen, 1991).

The lower reach of Foggy Creek flows through alluvial deposits of Eden Valley before entering the Coquille (Figure A-1). It is not known whether Foggy Creek gains or loses flow to the aquifer in this reach. The lower two miles of Foggy Creek provide important spawning habitat for resident trout (Figure A-5). Gradients and gravel are favorable and many young of the year have been observed in this tributary (USDA various years).

Resident cutthroat, rainbow trout, and speckled dace are found in these streams. Cutthroat trout far outnumber the rainbows (USDA various years). High numbers of speckled dace are also present.

Foggy Creek may be utilized as a summer high temperature refuge. Historic temperature data are limited to a spot check on August 12, 1969, recording 60°F with a flow of 3 cfs. Table A-7 shows 1994 temperatures.

<u>Disturbance History, Sediment and Large Wood</u>

Anecdotal historic accounts relate abundant log and beaver jams. Most historic log jams have been removed.

Minor amounts of Cretaceous Days Creek and Riddle Formations in Foggy Creek support steeper slopes that may develop ravel, particularly in conglomerate units, contributing to sediment.

Included in Table A-7 are 470 acres harvested in what are now defined as sensitive areas on private lands (1938). This harvest was not associated with roads constructed on highly sensitive areas. The Foggy Creek BD timber sale in 1965, salvaged a total of 287 acres of windthrown timber from the 1962 Freida windstorm. This sale included 49 acres in sensitive areas, and likely removed instream wood from the channel.

National Forest roads 5521010, 5521011, and 5521015 (in 1949, 1960, and 1965) were constructed in sensitive areas in the Foggy/Eden subwatershed.

B. Wooden Rock Creek

Wooden Rock flows primarily southward into the South Fork Coquille. Summer flows at its mouth have been determined to be roughly twice the volume as the mainstem South Fork Coquille, which makes Wooden Rock a significant tributary. The lower 2.5 miles flows into a wide valley floor located on the gently dipping bedrock surface. Wooden Rock flows over both Tyee and Flournoy Formations. The Flournoy is also a micaceous sandstone which yields sand and gravel-sized substrate to the channel. The low gradient channel provides the best existing resident trout habitat above the Coquille River falls.

Cutthroat and rainbow trout are present, as well as speckled dace. Wooden Rock has the highest densities of both trout and large wood in the upper basin (Chen 1991).

Three large wood jams exist in the lower 2.5 miles of habitat. One jam has been estimated to contain over 50,000 cubic feet of wood. Increased trout densities appear to be related to increased amounts of cover. Three distinct reaches are separated by a series of barrier falls (at the 2.5-mile and 4.0-mile marks) in a stairstep formation that prohibit upstream migration (Stream Survey, Summer 1992). Populations above the barriers appear to be exclusively rainbow trout, but at much lower densities.

A historic spot temperature check (8/25/1979) revealed 54°F with a flow of 5 cfs. Summer temperatures for 1994 are displayed on Table A-7.

<u>Disturbance History, Sediment, and Large Wood</u>

Anecdotal accounts indicate abundant log and beaver dams, most of which have been removed in association with timber production.

Included in Table A-7 are 410 acres harvested in sensitive areas in 1938 and 220 acres in 1945. The Bryant Fire started in slash near the mouth of Wooden Rock Creek in 1939

(Appendix C). Fifty years of regrowth along the lower part of the channel is reflected as predominately early seral stage in Riparian Reserves.

Parts of National Forest roads 3348240B, 3348240A, and 3348240.4 (1937) and 3358150.28B, 3348241A, and 3358020J (between 1957-1960) were constructed in sensitive areas in the Wooden Rock subwatershed.

C. Upper Mainstem

Most spawning and early rearing occurs in the main tributaries of the Upper Mainstem. Important spawning tributaries include Panther and Buck Creeks. Much of the mainstem South Fork below Eden Valley is slightly higher gradient with more boulder or bedrock plunge pools and higher energy riffles.

Both resident cutthroat and rainbow trout are present, with the cutthroat being far more abundant (USDA various years). The Upper Mainstem provides most of the adult trout habitat within the South Fork Coquille Watershed. Chen (1991) cited 1989 stream surveys showing that trout densities were limited by cover. Where cover existed, trout densities were high; and where cover was minimal, trout densities were low. Speckled dace are abundant in slower moving pools and glides.

The east to west orientation of the upper mainstem makes this section especially susceptible to solar inputs. Temperatures in the tributaries are cooler than the mainstem (Bakke, 1993). In 1992, summer peak temperatures (using 7-day moving mean) ranged from 66 to 68° F at mouth of Buck Creek and averaged 72.5° F near Lockhart campground. These data illustrate that summer heating is appreciable in this section (Bakke, 1993 and Hyland, 1992). Note the 100 year change in riparian seral state as illustrated in Table A-6.

Disturbance History, Sediment and Large Wood

Anecdotal historical accounts report abundant instream wood (Shorb, 1995). Log jams were frequently cut during the summer to allow winter flows to carry them away (Magill, 1976). The present lack of wood in the Upper Mainstem appears related to stream cleanout activities during the 1960's and 1970's. Forest Service personnel described the removal of one log jam estimated at 200-300 feet long and over 3 feet deep. Altogether, an estimated 200,000 board feet (200 MBF) of wood has been removed from the Upper Mainstem (Chen, 1991).

Sediment delivered to the Upper South Fork stream channel from timber harvest and road construction was highest in the 1930's and 1940's (Figure A-13). The channel became wider and the overall depth decreased as sediment storage increased. The low gradient and increased width-to-depth ratio decreased the stream's energy and the ability to transport sediment, slowing recovery.

Broad ridges are relatively gently-sloping and stable on the dip slopes of the Tyee Formation, but steep and susceptible to debris avalanches on the scarp slopes (Figure A-1). Figure A-14 illustrates the long history of sensitive road construction and harvest that occurred in different tributaries of the Upper Mainstem.

Harvest in sensitive areas included 320 acres on private land (1938), 160 acres (1945), and 95 acres (1970) (Table A-7).

A partial list of road construction in sensitive areas includes 3300000G, 3348000C,E,J,K,L, 3358000A,B, 5520230, and 5520000H,I in this subwatershed.

D. Rock Creek

Rock Creek flows primarily eastward into the South Fork Coquille River about 0.5 mile below the South Fork Coquille falls. Rock Creek is one of the larger tributaries to the South Fork. The lower mile flows through a confined inner gorge. The channel is primarily boulder and bedrock with areas of cobbles, cascades, and plunge pools. This substrate reduces the sensitivity to disturbance and make its recovery potential excellent. The channel appears to be in good condition except where the gradient decreases just before the confluence with the South Fork. There the channel gently meanders though gravel deposits.

There is a sharp decrease in the gradient of the middle section as Rock Creek enters a broad valley. The substrate is typical of low gradient areas, predominantly sands, gravels and cobbles. This reach contains low gradient glide and riffle habitat with some deep pools associated with bedrock and wood accumulations. The flat is located near the Rock Creek campground and is a key spawning and rearing area for steelhead (Figure A-3). Sediment transport capabilities are reduced in these low gradient, unconfined channels, increasing the channel's sensitivity to disturbance from increased sediment loading.

In the upper reaches of Rock Creek, the gradient increases and the channel is confined by hillslopes. The stream is steep and entrenched with high debris transport capabilities. Rock Creek drains Iron Mountain which is characterized as rocky with shallow soils. Heavy storm runoffs from Iron Mountain dramatically increase stream flows on Rock Creek which could, in larger events, mobilize much of the small substrate found in the middle section.

Main tributaries to Rock Creek include Manganese, Lake, and Crater Creeks which are near Rock Creek campground. These streams have not been surveyed but flows and gradient are adequate to support salmonids. Other tributary gradients of Rock Creek are too steep, or their flows are too minimal, to support anadromous salmonids.

ODFW (1949) reported anecdotal accounts of coho spawning under the bridge approximately 1.9 miles up from the mouth of Rock Creek (Evans and Royer, 1948). The same survey also stated that spring chinook had not been seen for many years. Since 1989, there have been no reports of coho spawning nor any juveniles in Rock Creek (Grandmontagne, 1995; USDA various years).

Rock Creek has been the site for numerous in-stream habitat projects. Boulder weirs have created quality riffle-pool-tailout habitat. These structures are being utilized during the spawning and summer low flow periods as evidenced by spawning surveys and juvenile steelhead counts.

Historic spot temperature measurements include 54°F at a flow of 24 cfs (June, 1950) and 65°F at a flow of 7 cfs (July, 1962), illustrating that reduced flow correlates with increased temperatures and consequently reduces available salmonid habitat.

Disturbance History, Sediment and Large Wood

The upper Rock Creek watershed is located in the Klamath Province. Faulted and sheared contacts between Galice rocks and serpentinite contribute to widespread instability in the area. The lower quarter of the watershed is underlain by softer Lookingglass Formation, and Tyee bluffs. The Rock Creek watershed includes numerous large natural and harvest-related earthflows and debris slides.

The Rock Creek landslide is located approximately four miles upstream from the mouth and has been an active debris slide since before the earliest aerial photographs. Based on the area of exposed soils, the slide has been progressively enlarging since at least 1964 (Barr and Suitt, 1980) involving an estimated 90 acres of area in slide blocks and debris. Movement of this slide is assumed to cause the periodic blue-gray turbidity which is visible at least as far downstream as Powers (Townsend, 1995).

The Rock Creek slide is likely the largest source of sediment, but mining, roads, and timber harvest have also contributed. Since the late 1800's, mining has occurred within the Rock Creek subwatershed. Other landslides and earthflows have also played an important role in sediment input. Over the years, many wood jams were removed for mining purposes and timber salvage operations. The effects on the channel are unknown.

Rock Creek has efficiently transported sediment to the middle reach where it is stored, increasing the width-to-depth ratio and filling the pools. Considerable amounts of large woody material should be deposited within this section; however, during the 1970's, a salvage operation removed an estimated 125,000 board feet of wood from Rock Creek (Chen, 1991). Stream survey records (USDA 1994) indicate an average of 4.2 large pieces per mile in this section. Over much longer periods of time, the middle reach moves the sediment out, gradually restoring pool frequency and depth. It is speculated that sediment stored in the middle section of Rock Creek reached its peak in the 1970's and has been decreasing.

In the Rock Creek watershed, 130 acres of private lands in WAA R07 (1960) was harvested in sensitive areas (Table A-7). The 200 acre patented Nielson claim in the Upper Rock Creek watershed was logged in 1940 (Appendix C).

Parts of Roads 3347020A-H, 3347000A-C, 3347334, 5325000A,C,E,F, 3343000E,G,I,J, 3300000A-D, 5325530A-C were constructed in sensitive areas of the subwatershed. (Table A-7)

E. Johnson/Sucker Creek

Johnson Creek flows primarily eastward into the South Fork Coquille about 1 mile upstream of China Flat campground. It is a large tributary that includes Sucker and Granite Creeks. All three creeks have channels confined by gorges and are generally steep with cascades, step pools and high gradient riffles. The streambed material is primarily cobbles and boulders. The creeks have high energy and large wood transport capabilities and are considered stable creeks. There are a few short, unconfined, low gradient reaches on Johnson Creek that are adjacent to large earthflows (Chen 1991). These flats are approximately 0.25 mile long and display slower velocities, more wood accumulations, spawning gravels, wider floodplains, and more side channel habitat. The most extensive flat is near the confluence of Jim Hayes Creek and upstream from the mouth of Sucker Creek (Figure A-3). During 1951, a partial falls barrier was blasted to ease access and increase available anadromous habitat.

Other tributaries in this watershed are too steep, or their flows are too minimal, to support anadromous salmonids.

The Johnson/Sucker subwatershed reportedly supports approximately 50 percent of the wild winter steelhead production within the South Fork Coquille Watershed (Chen, 1991). Significantly reduced flows during summer and fall (from 20+ cfs to under 6 cfs) shrinks available cover and habitat. This flow reduction forces some juveniles downstream from Johnson and Sucker into the mainstem. In 1949, a miner named Moore claimed he saw coho salmon spawning at the forks of Sucker and Johnson Creeks that year.

Historic spot temperature measurements include 66°F at a flow of 6 cfs (8/3/1949), and 58°F at a flow of 24 cfs (6/21/1950).

Disturbance History, Sediment and Large Wood

Over the years, many wood jams were removed for mining purposes. What effects mining had on the stream channel are unknown. At this time, information on the stream channel condition and how the channel has responded to natural and human disturbance is limited. Large sediment sources have been detected from natural landslides and roads.

Johnson Creek is located within the Klamath Province. The headwaters flow over sandstones and volcanics, which are relatively resistant, underlying steep slopes. Above the upper bridge, the channel flows subsurface most of the year and appears aggraded from high sediment delivery relative to the stream capacity. The reduced stream flow in the upper section limits the ability of the channel to move large amounts of sediment and hinders recovery. Below the upper bridge, resistant rocks form falls which create a barrier to fish migration. Downstream, hillslopes of serpentinite are subject to active earthflows which overwhelm the channel with sediment and large wood. At the mouth of Boulder Creek, an extremely resistant diorite dike forms steep slopes. The character of the formation changes to more typical mudstone and siltstone downstream, and is subject to active streamside slides and earthflows, particularly below Sucker Creek. The lower 1/2 mile of Johnson Creek is in serpentinite.

Upper Johnson Creek, Poverty Gulch, and Granite Creek watersheds include steep areas in Galice Formation that have produced areas of continuous ravel and debris chutes following disturbance. A limited area of Humbug Mountain conglomerate on Barklow Mountain (headwaters of Granite Creek and Poverty Gulch) also underlies steep slopes, and is prone to ravel when disturbed by harvest, wildfire, and road sidecast. Despite the high energy for transport, there are four massive log jams with large volumes of sediment stored in Poverty Gulch below Granite Creek. This suggests that very large amounts of sediment and wood have entered the stream channel. These log jams may have helped to buffer the effects downstream.

Large debris slides occurred 3/4 mile up Sucker Creek, and near the mouth of Sucker Creek during the winter of 1891 (Cooper, 1939). Both slides dammed Sucker Creek, and released a scouring flood into lower Johnson Creek, leaving up to 20 feet of boulders and debris over the old creek bed. About 1/2 mile above the mouth of Johnson Creek, a waterfall over 20 feet high was formed as the material lodged in a confined part of the channel (likely at the exposure of Galice metavolcanics). Today bare soil is exposed at the toe of the upper Sucker Creek slide, indicating that the toe deposit was reactivated more recently. The slope adjacent to the lower Sucker Creek slide failed during the February 1986 storm, when permeable soils overlying Galice bedrock became saturated and temporarily dammed Johnson Creek.

Figure A-15 illustrates the high sediment delivery potential from roads constructed in sensitive areas of the subwatershed.

Table A-7 includes 102 acres WAAs J05, J06, and J07 concentrated during the 1960 Barklow Timber Sale that were harvested in sensitive areas.

Road construction in sensitive areas include parts of road segments 3353000I,J,K,M, 5591000A,C,D,G,H, 3353160A, 3353000AA-CC,EE,FF, 3353180A,B, 3353000R,U-X,Z, 3353260A-F,H, and 3353264 in Johnson Creek subwatershed.

F. Coal Creek

Coal Creek flows westward into the mainstem of the South Fork Coquille approximately one mile upstream of the Forest Boundary. Coal Creek derives its name from short-lived coal mining operations that existed there. It is unknown what effect these activities may have had on the stream channel. The relatively steep, confined character of the channel has high energy and debris transport capabilities and is very stable. Its sensitivity to disturbance is considered very low and recovery potential excellent. This accounts for fairly quick recovery from repeated past large disturbances.

The Coal Creek watershed has a broad upper flat and is steeply incised into the Tyee sandstones. A series of falls at the 1.4 river mile mark create an anadromous barrier for salmonids (Stream Surveys, 1989, 1992). Resident cutthroat and rainbow are present above this barrier.

The lower reach flows through a narrow confined canyon with substrates dominated by bedrock with boulders. The gradient for the most part is steep exceeding 4 percent. Deep plunge pools, cascades, and high gradient riffles are abundant. Cover for fish is provided in the way of depth, surface turbulence, and bed roughness elements (Chen, 1991). A few large wood accumulations are present, but average only two pieces of large wood per mile. The remaining wood is composed of smaller pieces resulting from logging (Stream Survey, 1992).

In the upper portion of the surveyed reach, Coal Creek enters a wider valley floor which changes the gradient, wood accumulations, and habitat composition. There are deep pools created by large wood, cascades, low gradient glides, slower riffle habitat, and complex side channels (Chen, 1991). Streambed substrate changes from dominantly bedrock, to gravel and cobble. The channel is no longer confined and floodplains appear. The channel sensitivity to disturbance increases and its recovery potential decreases in this area. The lower gradient, variety of habitat types, density of juveniles, and deep holding pools indicate this section is key spawning and rearing area for winter steelhead (Figure A-5).

Summer temperatures are 55° to 62° F. which are cooler than the mainstem. When the mainstem's summer temperatures approach 70° F., juvenile salmonids congregate in Coal Creek. Debris flows from Coal Creek have deposited a large fan in the South Fork Coquille. Numerous juvenile steelhead were observed in summer 1994 in the pools just below the culverts on Forest Road #33 (USDA, 1994).

Disturbance History, Sediment and Large Wood

Over the years, many wood jams were removed for merchantable timber and firewood, or to aid fish passage.

A debris flow that swept down the channel from a debris avalanche in the gorge was triggered by a 1974 storm, a 25-year storm event. The channel was scoured down to bedrock in many places. This event destroyed riparian vegetation up to 200 feet laterally along the channel, allowing alder to become established and dominate the riparian area. The absence of historical stream survey records make it difficult to determine how the channel has changed as the result of the debris flow; however, the channel appears to have recovered from both the natural and human disturbances. The debris flow may have altered the channel shape and substrate composition by creating more bedrock reaches.

Coal Creek differs somewhat from the other tributary watersheds in having extensive harvest in sensitive areas which contributed to sediment and loss of large wood. There were lesser effects from road construction (Table A-7).

Harvest in sensitive areas included 830 acres on private lands in WAAs C03 and C04 (1946 - off the scale of the plot).

Road construction in sensitive areas occurred on parts of Forest Road 3358 (1955).

G. Lower Mainstem

The Lower Mainstem in the analysis area is habitat for a variety of anadromous species in high numbers. It serves as a spring travel corridor for outmigrant wild coho, chinook, and steelhead smolts. During late summer low flows juvenile salmonids travel downstream from natal tributaries into the mainstem.

Where the stream valley broadens, key spawning areas are characterized by lower gradient pools, riffles, and side channels (Figure A-5). The most utilized section is the reach from Johnson Creek downstream to Sand Rock Creek where chinook and steelhead have been observed spawning. Other key spawning flats occur from Daphne Grove downstream to Kelly Creek.

Lower Mainstem habitat is also critical for maturing adult spring chinook and adult wild winter steelhead. Cooler water with deep pools and adequate cover within the analysis area are vital to their survival.

Summer peak temperatures approach 70° F at the Forest boundary. From there downstream to Powers (5 miles), water temperatures increase approximately 10 degrees during the summer (Bakke, 1993). These temperature limitations make the Lower Mainstem the primary rearing area for chinook, coho, sea-run cutthroat, and steelhead. Historic temperatures (1956 to 1960) included daily peaks of 76° F near the mouth of Hall Creek, and 74° near the mouth of Rock Creek (Hamilton, 1962).

<u>Disturbance History, Sediment and Large Wood</u>

Channel changes from sediment delivery within the watershed resulted primarily from large natural landslides, gold mining, and road and harvest-related landslides (see Sediment

Delivery section). Over the years, wood jams were removed for merchantable timber and firewood, or to aid passage.

As the South Fork drops down from Eden Valley and its flows increase from the tributaries, the stream becomes efficient in transporting larger amounts of sediment. Throughout this portion there are several large gravel bars created during major flood events in past decades. They are found in low energy, deposition prone areas of the channel such as the inside of bends. The size and height of the gravel bars are a good indication of the massive amounts of sediment that moved through the system in the major storms of 1955, 1964 and 1974. The age of the vegetation found on the gravel bars correlates to this period of high flows and sediment loading.

The number and size of gravel deposits in the stream channel probably increased in the 1950's and continued to increase into the early 1970's, which correlates with increased activities and storm events. The overall active channel appears to be in good condition. Most sediment that has been delivered to the South Fork in the past either still resides in the upper reaches in Eden Valley, or has moved through this sediment transport section to low gradient reaches below the Forest Boundary.

Figure A-17 exhibits a similar pattern to that of the Upper Mainstem, with a long history of road and harvest disturbance in different parts of the watershed. Much of this subwatershed is privately owned and has been managed for timber production.

Extensive acreage was harvested in sensitive areas in WAAs A01-A11 (1920) and WAAs B06-B08 (1930). This period is not included in Figure A-17. 615 acres concentrated in McCurdy Creek, Hall Creek, and Elk Creek (B04, B05, E01, E02) was harvested in sensitive areas (Table A-6).

Roads constructed in sensitive areas include extensive mileage in 1919, 1924, and 1925. (Note, this period is not included in Figure A-17.) Other notable segments include 3300000H,M,L, 3363000E,J 3300FFB, 3358000M,N,P, 3300.10A,B, 3363170R,F, and 3358160A,B,E,F.

H. Hayes Creek

Hayes Creek flows westward into the mainstem South Fork Coquille approximately four miles downstream of the Forest Boundary. Winter steelhead, fall chinook, coho, sea-run cutthroat and resident rainbow and cutthroat trout are present (Grandmontagne, 1995). Juvenile coho salmon are found within first 1.5 miles of habitat and resident trout above the barrier falls (Figure A-6). A large culvert at the Road 33 crossing creates a difficult passage for adults and may be a juvenile barrier during low summer flows.

ODFW survey (6/27/1950) of 2.75 miles of Hayes Creek, starting at its mouth, measured flow at 3 cfs and recorded temperature at 60 degrees Fahrenheit.

Disturbance History, Sediment and Large Wood

Historical data are limited. As in many streams over the years, many wood jams were removed for merchantable timber and firewood, or to aid fish passage.

IV. Findings of Fact

Fish Habitat and Water Quality

1. The South Fork Coquille analysis area provides high quality, low turbidity water, particularly from tributaries draining the Klamath/Siskiyou Province. Water clarity has improved since the period of intensive harvest practices from 1940 to the early 1970's.

2. Roads have increased sediment and decreased large wood delivery, and may have altered the normal hydrologic flow.

3. Reduced maintenance on existing roads would result in drainage diversions, and continued road-related debris flows.

4. Large wood is lacking in all streams in the analysis area as a result of timber harvest, debris flows, and direct removal especially from streams in the Foggy/Eden and Wooden Rock watersheds.

5. Riparian and upland seral stages have shifted from late to early seral over the last 100 years, primarily due to timber harvest activities.

6. There is limited historic stream temperature data.

7. Summer temperatures are near lethal limits for resident trout (i.e., 70°F.) in Foggy/Eden and Upper Mainstem, and for juvenile anadromous salmonids at the lowest point of the Lower Mainstem (i.e., Forest Boundary).

   - Johnson and Coal Creeks each reduce the mainstem temperature by slightly more than a degree.

   - Below the National Forest Boundary, clearing of riparian forest for agriculture and water withdrawals appear to have contributed to elevated stream temperatures.

8. Channel form and function have changed in response to increased sediment delivery and large wood loss.

9. Based on anecdotal accounts, deep historic pools have filled with sediments.

10. Other major changes include aggradation in Rock Creek below the large natural slide, increased storage behind large wood jams in Johnson Creek, and bedrock exposure from debris flow scour in Coal Creek.

Hatchery Operations

1. Hatchery introductions appear to have had an influence on wild stocks of salmonids within the analysis area.

2. The hatchery and diversion fence at Lower Land Creek had a significant negative effect on anadromous salmonids within the analysis area.

Spring Chinook

1. The amount of available habitat within the mainstem South Fork Coquille River appears to be reduced from historical levels due to temperature limitations and sedimentation.

2. Spring chinook populations are depressed from historic levels.

3. Poaching has been a factor to declining runs of spring chinook.

4. Summer temperatures have reduced the range of adult spring chinook habitat.

5. Historic spring chinook summer maturing pools have filled from aggradation and/or loss of large wood.

Fall Chinook

1. Fall chinook populations are healthy and have increased over the last 10 years.

Coho Salmon

1. Coho salmon populations within the key watershed are depressed from historic levels.

Winter Steelhead

1. Wild winter steelhead populations have decreased from historic accounts.

2. The winter steelhead broodstock conversion program appears to be working.

3. Recent changes in fishing regulations on the South Fork Coquille are benefitting wild steelhead.

4. Johnson and Sucker Creeks are very important wild winter steelhead spawning and rearing areas.

Sea-run Cutthroat

1. Sea-run cutthroat populations are depressed from historic levels.

2. Culverts could be limiting access to first and second order spawning and rearing areas for sea-run cutthroat.

Trout

1. Available cover in the form of large wood appears to be directly correlated with resident trout abundance in the Foggy/Eden and Wooden Rock subwatersheds.

2. Brook trout are reproducing naturally in Azalea Lake.

Other Species

1. Pacific Lamprey populations are depressed from historic levels.

V. Summary of Data Gaps

Information on the following data gaps is needed:

1. Inventory of historic air photographs to determine natural and management-related landslide frequencies and volumes for channels where sediment storage and transport is needed to project channel recovery.

2. Rates of recovery of deep and frequent pools, and desired width/depth ratios in productive flats. This can be determined by repeated measurements of channel cross-sections.

3. Historic temperature and pool frequency data for all subwatersheds, except some temperatures available on Lower Mainstem.

4. Hayes Creek stream survey (Hankin and Reeves method) for baseline data including width-to-depth ratio, pools/mile, large wood/mile, and summer temperatures.

5. Extent of habitat utilization and escapement within the analysis area for coho salmon, fall and spring chinook, and sea-run cutthroats.

6. Extent of streams that are utilized by non-salmonid species during spawning and rearing, and population stability in the key watershed.

7. Inventory of culverts to determine potential barriers for fish migration.

8. Aquatic macroinvertebrate community diversity in subwatersheds.

9. Extent of Lower Mainstem used by large scale suckers during spawning and rearing.

10. Information about prickly sculpin found in Lower Mainstem.

11. Reasons for decline of Pacific lamprey populations.

12. Population size and trends of black bullhead in Cedar Swamp

VI. Management Recommendations

A. Collect data to fill data gaps.

B. Restoration Opportunities

From an ecological standpoint, physical components have changed or been altered within the watershed from historic conditions. These components influence the environmental factors and processes with which wild South Fork Coquille salmonids adapted and evolved. Projects that maintain or restore these habitat components and processes would be consistent with the objectives of the Aquatic Conservation Strategy outlined in the Northwest Forest Plan (USDA, USDI, 1994). Six main management guidelines have been identified below to maintain and enhance the integrity and long term viability for the South Fork Coquille aquatic resources.

1. Reduce sediment delivery from road-related debris flows, surface erosion, and ravel. Priority subwatersheds have high density of roads relative to steep and unstable slopes, e.g. Johnson/Sucker and Rock Creeks. (See also list of roads in Appendix B.) Some options include hydrologic decommissioning, stormproofing, increasing frequency of road drainage outlets, and revegetating fillslopes.

2. Add large wood to streams utilizing blowdown, hazard, slide, and adjacent riparian trees.

3. Evaluate any district-wide project for its potential to increase the amount of available cover during low flows and winter peak flows, and make adjustments where possible to increase such cover. High Priority Areas: Upper Mainstem, Foggy/Eden, Wooden Rock, Johnson/Sucker and Rock Creeks.

4. Treat roads to allow debris flow passage and delivery of large wood to channels. Some options include hydrologically decommission roads or redesign of road crossings. Priority Locations: Road 33

5. Conduct silvicultural treatments to enhance riparian and upland zones to hasten development of late seral conditions. Some options include planting of appropriate conifers, moderate thinning, and manual release. High Priority for Riparian Areas along reaches where heating is occurring: Rock Creek, Upper Mainstem, Foggy/Eden, and Wooden Rock.

6. Fix road-related barriers to fish migration, identified during culvert inventory. Give priority to anadromous habitat where species of concern exist: Hayes, Coal, Lower Mainstem, Rock Creek, and Johnson/Sucker. Some options include: Remove, replace or alter culverts to allow salmonid passage.

C. Monitoring

1. Develop monitoring plan and establish baseline data to determine consistency of restoration and management projects with the objectives of the Aquatic Conservation Strategy (USDA and USDI, 1994).

2. Focus monitoring efforts on detecting changes in productive flats.

Table A-1.
Fish Species Found Within The South Fork Coquille River key watershed (1995)

SPECIES	LIFE HISTORY	DISTRIBUTION	POPULATION	STATUS
Spring Chinook: *Oncorhynchus tshawytscha*	Anadromous: Native	Lower Mainstem	Depressed	Concern
Fall Chinook: *Oncorhynchus tshawytscha*	Anadromous: Native	Hayes, Lower Mainstem	Healthy	No Concern
Coho Salmon: *Oncorhynchus kisutch*	Anadromous: Native	Hayes, Lower Mainstem	Depressed	Concern
Winter Steelhead: *Oncorhynchus mykiss*	Anadromous: Native	Hayes, Lower Mainstem, Coal, Johnson, Rock	Depressed	No Concern
Sea-run Cutthroat: *Oncorhynchus clarki*	Anadromous: Native	Hayes, Lower Mainstem, Coal, Johnson, Rock	Depressed	Concern
Rainbow Trout: *Oncorhynchus mykiss*	Resident: Native	All Subwatersheds	Stable	No Concern
Cutthroat Trout: *Oncorhynchus clarki*	Resident: Native	All Subwatersheds	Stable	No Concern
Brook Trout: *Salvelinus fontinalis*	Resident:Non native	Azalea Lake	Stable	No Concern
Speckled Dace: *Rhinichthys osculus*	Resident: Native	All Subwatersheds	Healthy	No Concern
Large Scale Sucker: *Catostomus macrocheilus*	Resident: Native	Lower Mainstem	Unknown	No Concern
Prickly Sculpin: *Cottus asper*	Resident: Native	Lower Mainstem	Unknown	No Concern
Pacific Lamprey: *Lampetra tridentata*	Anadromous: Native	Lower Mainstem	Depressed	No Concern
Black Bullhead: *Ameiurus melas*	Resident:Non native	Cedar Swamp	Unknown	No Concern

Table A-2.
Salmonid Life Cycles and Critical Watershed Habitat.

SPECIES	SPAWNING	FRESH WATER REARING	YEARS IN OCEAN	CRITICAL FOREST HABITAT
Spring Chinook	Oct-Dec	Mar-Sept	3-5 years	Cool, deep summer pools with cover elements.
Fall Chinook	Oct-Dec	Mar-Sept	3-5 years	Pool habitat for juvenile rearing.
Coho Salmon	Oct-Jan	1 year	2-4 years	Cool pools with adequate cover elements preferably in the form of wood. Side channels and winter refuge areas.
Winter Steelhead	Dec-Apr	1-3 years	2-4 years	1st year-Cool pool tailouts and glide habitat. 2nd year- Cool riffle habitat. Winter refuge areas.
Sea-run Cutthroat	Dec-Apr	1-2 years	1-3 years	Access to spawning tributaries. Cool summer water with ample cover elements.
Rainbow Trout	Feb-Apr	Entire life cycle	None	Access to spawning tributaries. Cool summer water with winter refuge areas and cover elements.
Cutthroat trout	Feb-Apr	Entire life cycle	None	Access to spawning tributaries. Cool summer water with winter refuge areas and abundant wood as cover elements.

Table A-3
Subwatershed Area, Habitat Miles

		MILES OF HABITAT	
SUBWATERSHED	AREA (AC)	ANADROMOUS	RESIDENT TROUT
FOGGY/EDEN	7,602	0	9
WOODEN ROCK	6,779	0	7
UPPER MAINSTEM	17,111	0	21.5
ROCK CREEK	8,730	3.3	6
JOHNSON/SUCKER	10,449	6.0	9
COAL CREEK	9,952	1.4	NOT MEASURED
LOWER MAINSTEM	24,098	15.6	NOT MEASURED
HAYES	2,346	1.5	NOT MEASURED
TOTAL	87,100	27.8 MILES	52.5 MILES

Table A-4
Current Physical Habitat Variable by Subbasin

SUBBASIN	RIP. LATE SERAL	UPSLOPE LATE SERAL	W:D RATIO	POOLS PER MILE	LWM PER MILE	ROADS MI.SQ.	TEMPS
HAYES CREEK	2%	2%	GAP	GAP	GAP	2.6	GAP
COAL CREEK	1%	1%	8	29	60	4.3	LOW
LOWER MAINSTEM	23%	18%	10-40	8-13	0-5	3.3	MOD
JOHNSON/SUCKER	22%	19%	10-19	16-23	1-8	3.1	LOW
ROCK CREEK	20%	16%	16-32	19-110	3-4	3.1	MOD
UPPER MAINSTEM	13%	9%	29	5	1	4.0	HIGH
FOGGY/EDEN	2%	6%	16	36	6	3.9	HIGH
WOODEN ROCK	1%	3%	24	15	12	4.6	HIGH

Priorities for Restoration:

☐ = High Priority

☐ = Moderate Priority

☐ = Low Priority

Table A-5.
Stream Survey Data.

SUBWATERSHED	REACH #	WIDTH TO DEPTH	POOLS /MILE	LW /MILE	MAX TEMP	KEY SPAWN /REAR	SCORE
HAYES CREEK	GAP	GAP	GAP	GAP	GAP	YES	DATA GAP
COAL CREEK	1 & 2	8	29	60	GAP	YES	GOOD
LOWER MAINSTEM	1	27	11.4	2.3	69.2	YES	FAIR
LOWER MAINSTEM	2	17	11.3	0.6	GAP	NO	FAIR
LOWER MAINSTEM	3	10	8	0	GAP	NO	FAIR
LOWER MAINSTEM	4	40	7.2	1.6	GAP	YES	POOR
LOWER MAINSTEM	5	21	6.6	3.3	GAP	NO	FAIR
LOWER MAINSTEM	6	17	13	4.7	67.5	NO	FAIR
SUCKER	1	14	18	3.8	GAP	YES	GOOD
JOHNSON	1	19	20	0.4	64.5	YES	FAIR
JOHNSON	2	10	15.7	7.6	GAP	NO	GOOD
JOHNSON	3	14	22.9	4.7	GAP	NO	GOOD
ROCK CREEK	1	32	110	3.3	68.1	NO	FAIR
ROCK CREEK	2	23	21.4	4.2	GAP	YES	GOOD
ROCK CREEK	3	16	19.3	4.4	GAP	NO	GOOD
UPPER MAINSTEM	ALL	29	4.7	1.3	72.5	NO	POOR
PANTHER CREEK	1 & 2	11-18	23	27-39	55	YES	EXCEL
BUCK CREEK	1	12	47	41	53	YES	EXCEL
FOGGY CREEK	1	16	36	5.8	66.6	YES	GOOD
WOODEN ROCK	ALL	24	15	12.4	69	YES	GOOD

Source: Hankin and Reeves, various years (1992-95)

Table A-6 gives the miles of high and moderate sensitivity roads constructed and acres of high sensitivity timber harvest for each subwatershed, on National Forest, BLM and private lands. Figures A-XX to A-XX show the timing of the disturbance. The longest roads and largest harvests in sensitive areas are discussed in by subwatershed in Section III. This table does not reflect the large naturally-occurring landslides that delivered large volumes of sediment and in some cases caused scouring dam-break debris floods.

Table A-6:
Miles of High and Moderate Sensitivity Road

Subwatershed	Miles Hi	Mi/sq mi	Miles Mod	Mi/sq mi	Acres Hi	% Area
Foggy/Eden	1.9	0.16	11.7	0.99	787	10
Wooden Rock	1.9	0.18	8.6	0.81	658	10
Upper Mainstem	6.0	0.22	22.3	0.83	1006	6
Rock	5.7	0.42	21.8	1.60	351	4
Johnson/Sucker	11.8	0.72	22.8	1.40	467	4
Coal	2.7	0.17	17.5	1.13	1649	17
Lower Mainstem * (inc. Hayes)	10.7	0.26	46.7	1.13	2174	8

* If pre-1934 activities were included, these values would be higher.

Table A-7
1994 Maximum Water Temperatures by Subwatersheds
South Fork Coquille Key Watershed

SUBWATERSHED	LOCATION	MAX TEMPS	YEAR	NOTES
FOGGY/EDEN	SFC @ Eden Valley Foggy Creek @ mouth	69.4 F 66.6 F	1994 1994	7 day moving mean 7 day moving mean
WOODEN ROCK CREEK	Wooden Rock @ mouth	68.7 F	1994	7 day moving mean
UPPER MAINSTEM	SFC below Buck Cr. SFC near Lockhart Panther Creek Buck Creek	68.4 F 72.5 F 55.0 F 53.0 F	1994 1994 1994 1994	7 day moving mean 7 day moving mean Spot checks * Spot checks *
ROCK CREEK	Rock Creek @ mouth	68.1 F	1994	7 day moving mean
JOHNSON/SUCKER	Johnson @ mouth Sucker Creek	64.5 F 54.0 F	1994 1994	7 day moving mean Spot Checks *
COAL CREEK	Coal @ mouth	60.9 F	1994	7 day moving mean
LOWER MAINSTEM	SFC abover Rock SFC @ FS Boundary	67.5 F 69.2 F	1994 1994	7 day moving mean 7 day moving mean
HAYES CREEK	NO DATA AVAILABLE	NA	NA	NA

* = Data gathered from 1994 stream survey.
Other data gathered utilizing thermographs.

Table A-8.
Change in Late Seral Successional Stage of Uplands and Riparian Reserves.

	UPLAND SLOPES				RIPARIAN RESERVES		
SUBWATERSHED	100 YEARS AGO	PRESENT	CHANGE		100 YEARS AGO	PRESENT	CHANGE
HAYES	56%	2%	- 54%		57%	2%	- 55%
COAL	87%	1%	- 86%		85%	1%	- 84%
LOWER MAINSTEM	73%	18%	- 55%		84%	23%	- 61%
JOHNSON/SUCKER	61%	19%	- 42%		63%	22%	- 41%
ROCK	61%	16%	- 45%		58%	20%	- 38%
UPPER MAINSTEM	68%	9%	- 59%		68%	13%	- 55%
FOGGY/EDEN	73%	6%	- 67%		82%	2%	- 80%
WOODEN ROCK	81%	3%	- 78%		89%	1%	- 88%

Source: see Appendix A

LAND OWNERSHIP AND FEDERAL DESIGNATION BY SUBBASIN

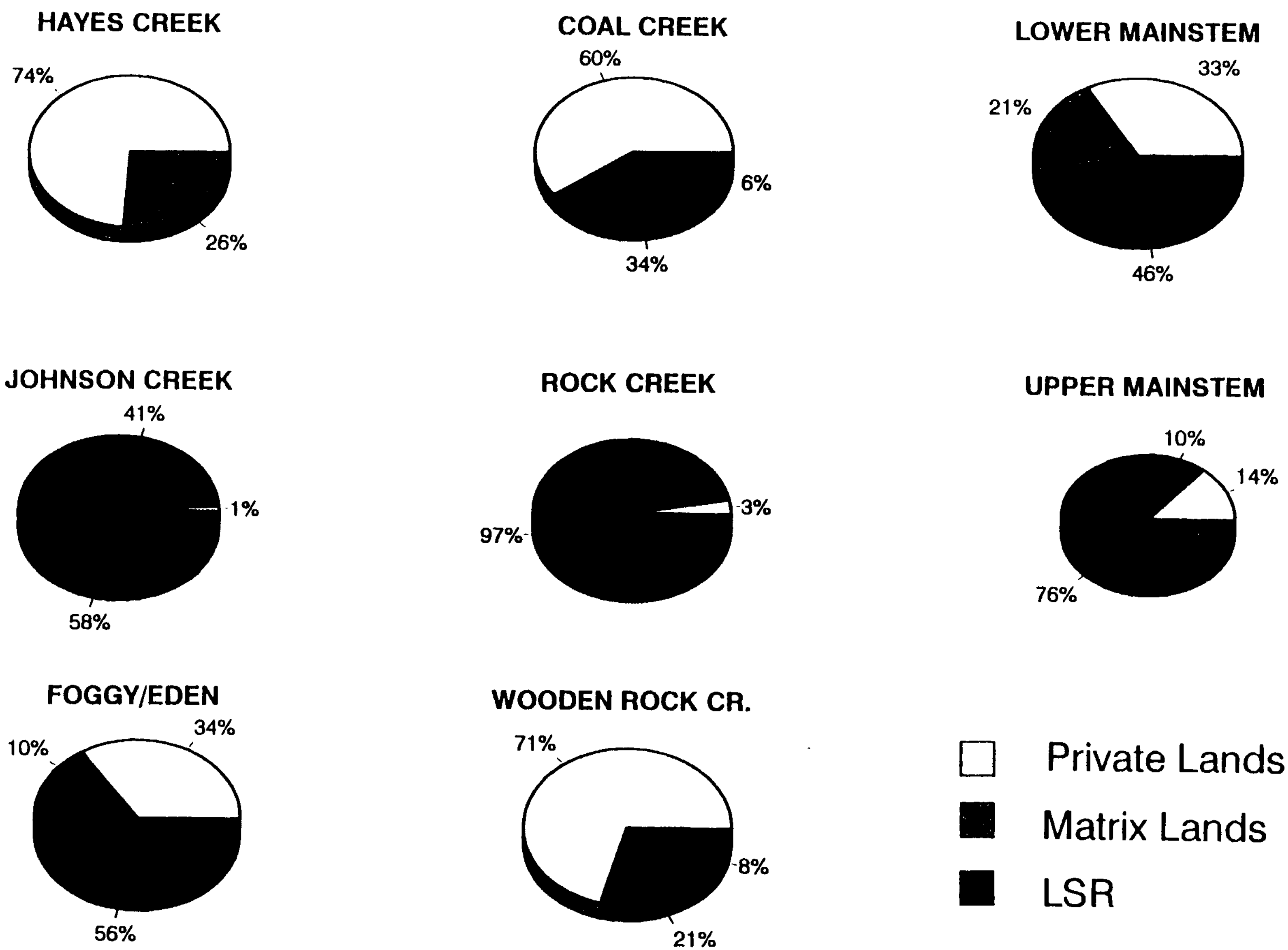

Figure A-10

A52

Foggy Creek Watershed

Sensitive Area Disturbance History

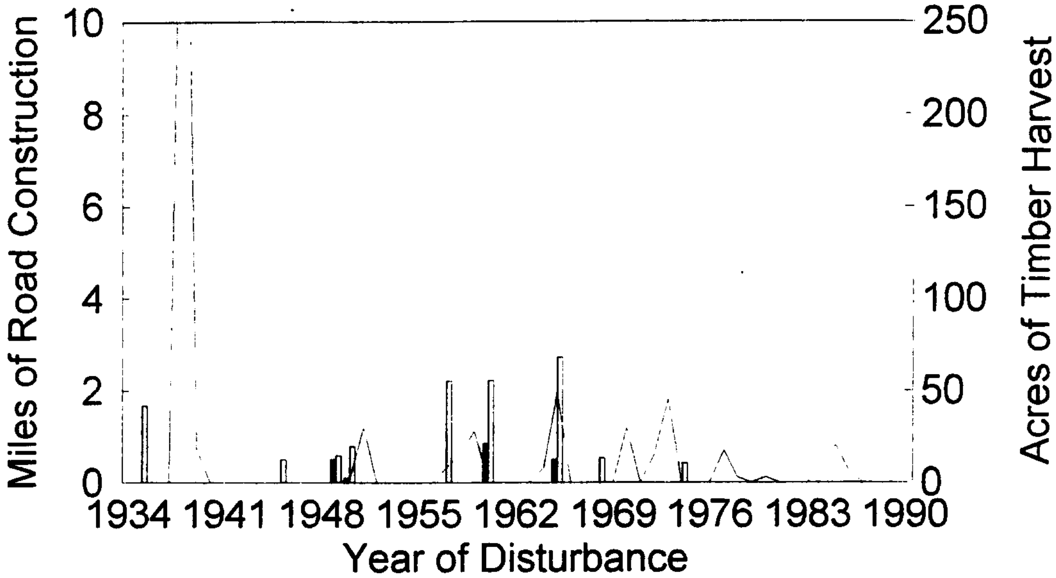

Figure A-11

Wooden Rock Creek Watershed

Sensitive Areas Disturbance History

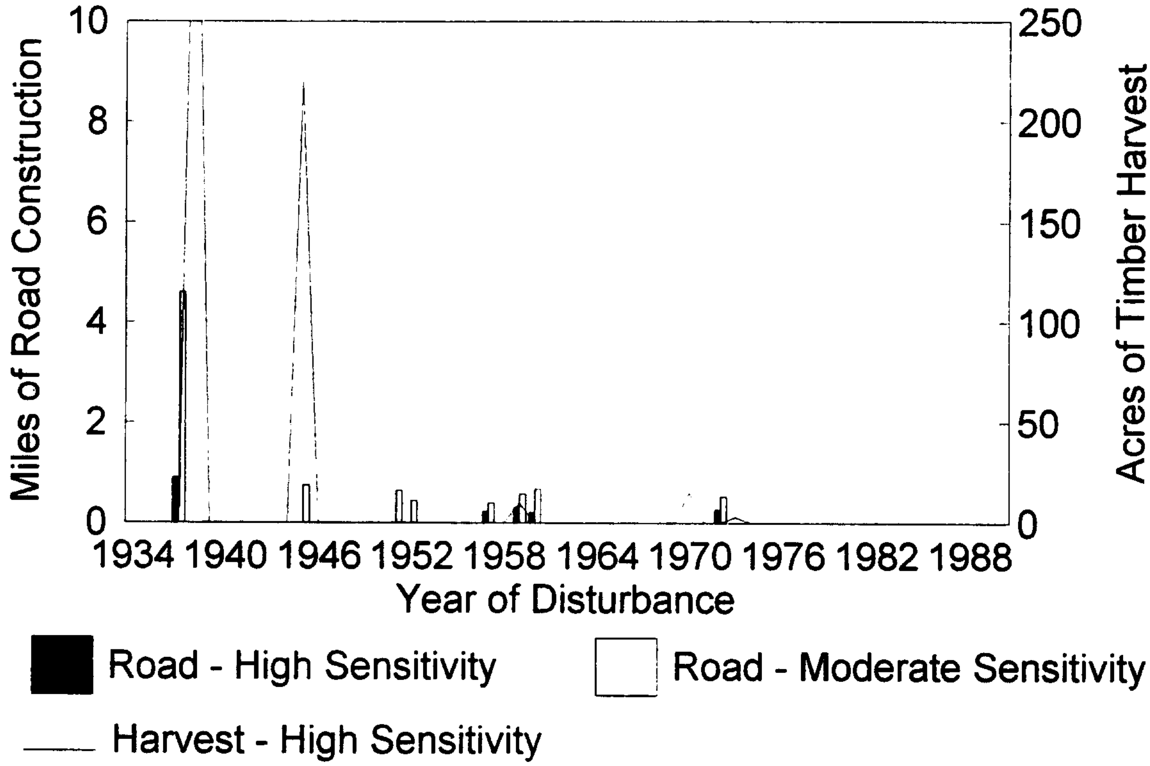

Figure A-12

Upper Mainstem Facing Watersheds
Sensitive Areas Disturbance History

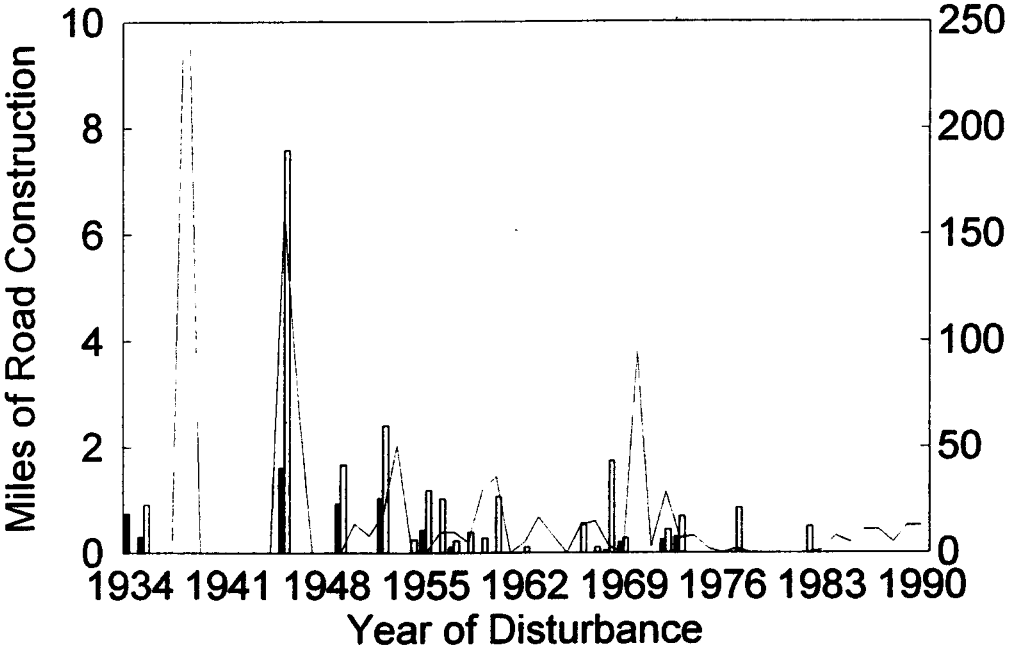

Figure A-13

Rock Creek Watershed
Sensitive Areas Disturbance History

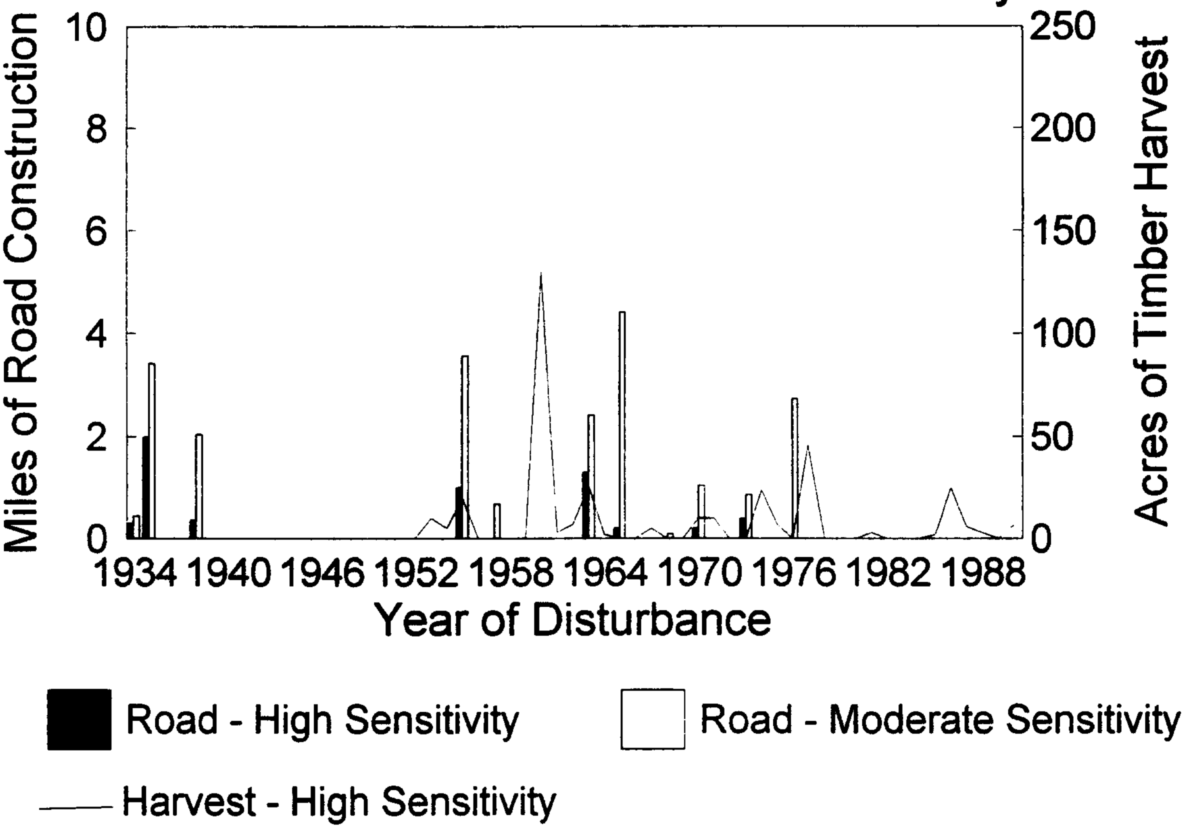

Figure A-14

Johnson Creek Watershed

Sensitive Area Disturbance History

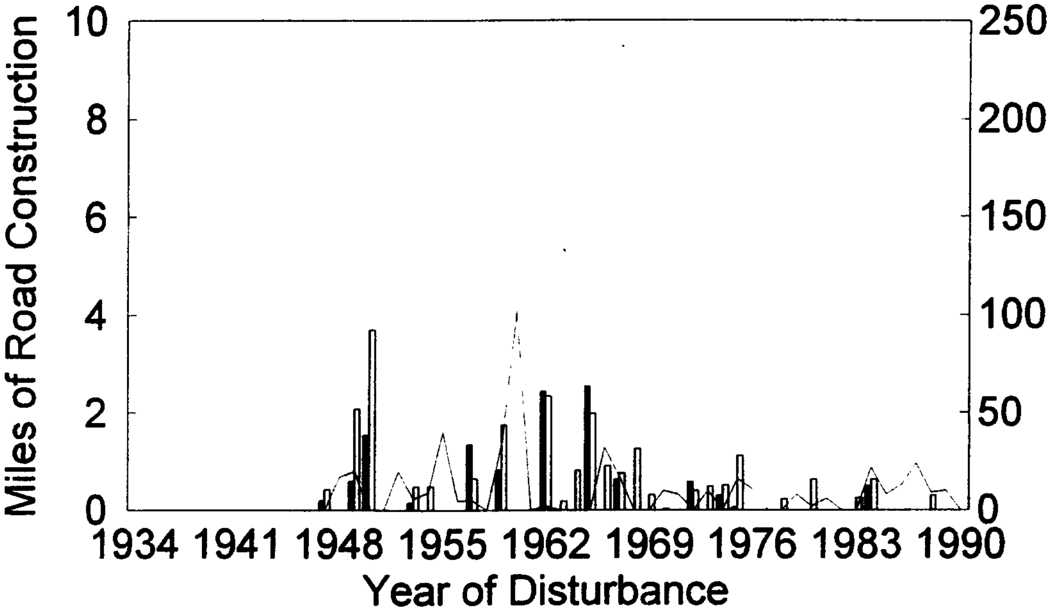

Figure A-15

Coal Creek Watershed

Sensitive Area Disturbance History

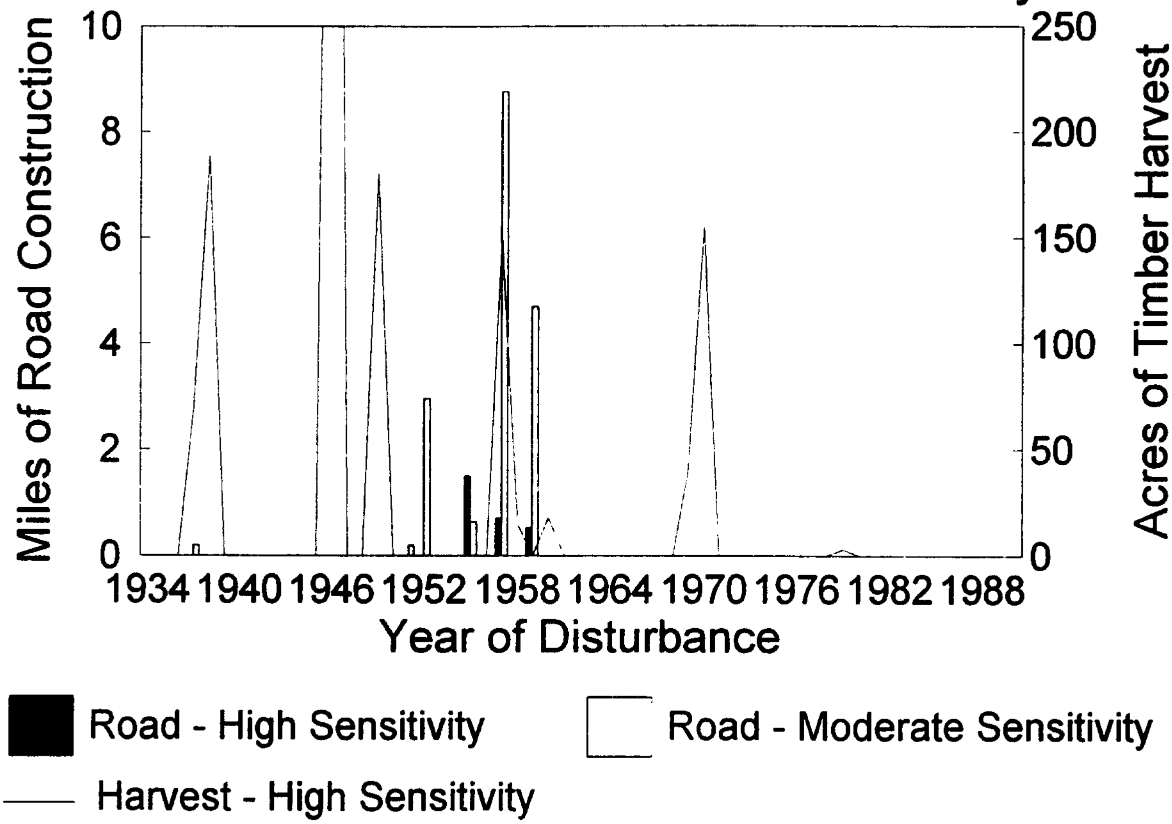

Figure A-16

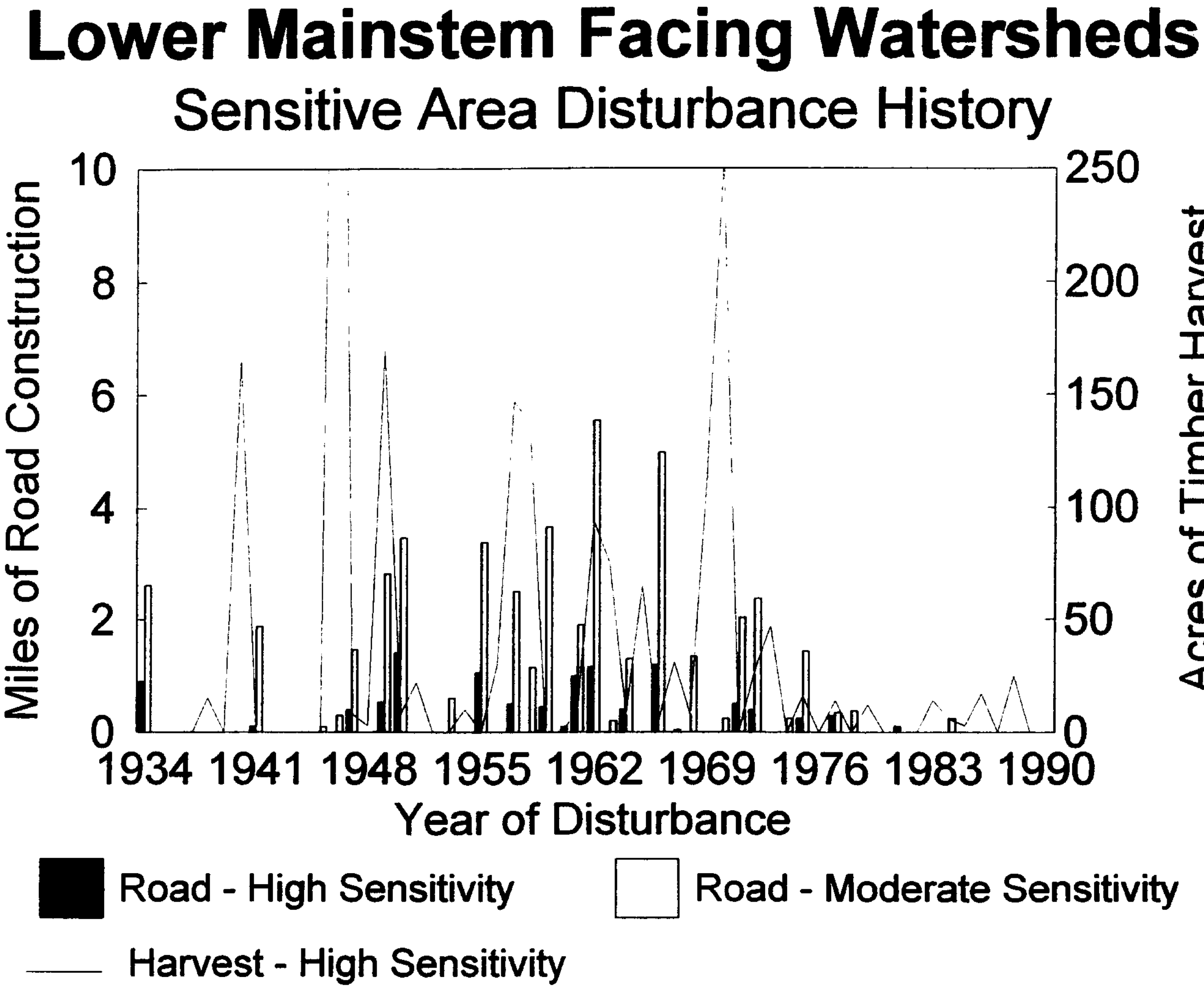
Lower Mainstem Facing Watersheds
Sensitive Area Disturbance History
Miles of Road Construction
Acres of Timber Harvest
0
2
4
6
8
10
0
50
100
150
200
250
1934 1941 1948 1955 1962 1969 1976 1983 1990
Year of Disturbance
Road - High Sensitivity
Road - Moderate Sensitivity
Harvest - High Sensitivity

Figure A-17

SOCIAL DISCUSSION

The public has identified a number of values that have social implications. These values include the future levels of timber harvest and the employment that it creates, access to National Forest lands, recreational opportunities, and the land allocations and management policies on National Forest lands. Key questions were developed to address these public values which are divided into three subheadings:

* *Timber Commodity (and its effect on employment)*

* *Non-Timber Commodities (products sold via permits or permitted activities that could generate a product for sale)*

* *Non-Commodity Amenities (such as recreation and access).*

TIMBER COMMODITY

Key question: What is the future potential for timber harvest from matrix lands within the South Fork Coquille?

Processes

Currently the Federal timber land base available specifically for harvest falls into the land allocation titled "matrix". The matrix land allocation is defined in the Siskiyou National Forest Land and Resource Management Plan (LRMP) as those Federal lands outside the six categories of designated areas. These six categories of designated areas are (1) Congressionally Reserved, (2) Late-Successional Reserves, (3) Adaptive Management, (4) Managed Late-Successional, (5) Administratively Withdrawn, and (6) Riparian Reserves (ROD 1994). This matrix land allocation is that portion of the land base in which most timber harvest and other silviculture activities will be conducted. However, the matrix also contains non-forested areas as well as forested areas that may be technically unsuited for timber production. The manageable matrix (8% of analysis area) is shown in Figure S-1. (USDA-Forest Service, 1994b)

Reference/Historical Condition

The economy of the southern coast of Oregon has been dominated by the use and extraction of natural resources. Timber harvesting and processing has been a major component in the local economy throughout the twentieth century. Timber harvest in the South Fork Coquille watershed and in other watersheds surrounding the town of Powers began early in the century and developed steadily up to the 1980's. During the 1980's

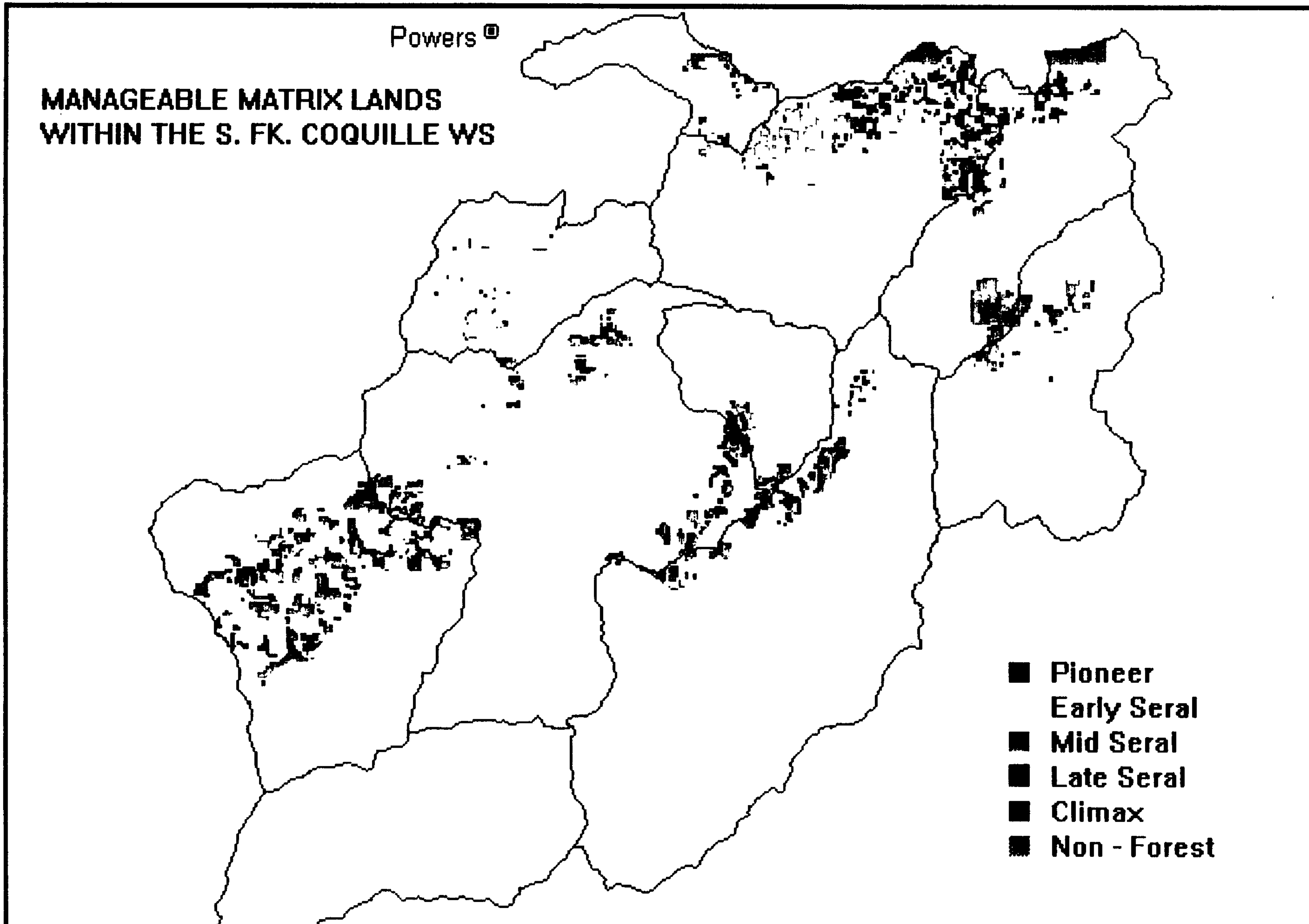
Powers
MANAGEABLE MATRIX LANDS
WITHIN THE S. FK. COQUILLE WS
Pioneer
Early Seral
Mid Seral
Late Seral
Climax
Non - Forest

Figure S-1

approximately 19 MMBF was harvested annually from National Forest land within the watershed. In contrast volume harvested during the early 1990's has only been 4 MMBF annually.

Private lands were logged early in the century. These private land holdings have been reforested and now have stands nearing commercial sawlog size. They are being harvested as second growth forest.

Railroad and road construction was instrumental in opening new areas and providing access to the timber resources in the watershed. Privately owned timber from the area surrounding Powers was transported by railroad to Coos Bay, from 1915 to 1972. The largest mill to operate in the town of Powers was Georgia-Pacific's veneer mill which operated from the late 1950's to 1971. A small cedar sawmill operated briefly during 1980's outside of Powers. Transportation of timber products by truck from the South Fork drainage developed since the 1960's and 1970's.

Small scale logging on Federal lands began around 1920. The Forest Service began building roads and increased harvesting in the 1930's. After World War II the Forest Service began more intensively managing timber and building roads. Since 1948, development in the watershed has been rapid.

Current Conditions

The analysis area is 87,100 acres of which 26% is managed by the Forest Service. Non-federal lands make up 29% of the managed stands in the area. A majority of this private land is owned by Georgia-Pacific and is being actively managed for timber/fiber production (see Figure A-11, Aquatic section). It is assumed that the harvest quantity from private lands within the watershed will remain fairly constant and that the private land will be maintained on an approximately 50-year rotation.

Timber harvest from Federal lands in the South Fork Coquille has dropped significantly from historical levels. Current timber harvest on Federal lands has been impacted due to court injunctions and increased protection for the Northern spotted owl and marbled murrelet. Recently there has been a trend toward increased protection of resources which has been a major factor in reducing harvest levels. This trend of decreased timber output from Federal lands in the analysis area is consistent with a similar trend throughout western Oregon.

As a result of these reduced levels, Oregon's wood products industry has been in the midst of a major transition for more than a decade. Between 1980 and 1990 the number of sawmills in Oregon dropped by 25% and the number of veneer and plywood mills by 42%. Employment in the lumber and wood products sector has declined 32% between 1979 and 1993.

Unlike urban areas, small rural communities like Powers do not have the highly developed infrastructure and services that are attractive to high technology and other growth industries. Their greatest advantage is to diversify into other natural resource-based industries.

Future Trends

Private timberlands will continue to be intensively managed to provide raw materials. The Federal matrix land allocation will also be managed to provide raw material.

With implementation of the LRMP, future timber harvest will come from the manageable matrix within the watershed which currently consists of the following seral stage acreage breakdown:

Climax Seral Stage	159 acres
Late Seral Stage	811 acres
Mid Seral Stage	469 acres
Early Seral Stage	3,314 acres
Pioneer	1,494 acres
Non-Forest	1,174 acres
	7,421 acres (total)

For analysis purposes, the following assumptions were made to develop future trends for harvest volume within the watershed:

* One half of the early seral stage acres will be of commercial thinning size now or within the next 50 years.

* Climax, late, and mid seral stage when harvested will be treated silviculturally with regeneration harvests.

* Early seral stage acres will be treated with commercial thinnings.

* Pioneer and non-forest (390/1,174 acres) seral stages are stands at or near age zero.

Not all of these acres are available for regeneration harvests or other silviculture treatments within the next 50 years. Approximately 3,096 acres will most likely be available for some form of harvest over the next 50 years.

The acreage breakdown is as follows:

Climax Seral Stage	159 acres
Late Seral Stage	811 acres
Mid Seral Stage	469 acres
Early Seral Stage	1,657 (of 3,314) acres
	3,096 acres (total)

With this acreage breakdown an annual estimated timber harvest was determined. Based upon the assumptions stated above, 1.7 MMBF would be available from the climax, late, and mid seral stages. Another 0.2 MMBF would be obtained from the early seral stage through commercial thinnings. This would result in a 1.9 MMBF harvest figure per year over the next 50 years from manageable matrix within the watershed.

During the next 50 years the younger seral stages will increase in size and structure and advance to the next seral stage.

Early Seral	1,657 (of 3,314) acres
Pioneer	1,494 acres
Non-Forest	390 (of 1,174) acres
	3,541 acres (total)

The remainder of the "non-forested" 780 (of 1,174) acres are truly "non-forested" areas that are or will be very valuable as islands of diversity. These areas are dominated by grass, forbs, rocks, or brush and are highly valuable as unique habitat for many plant and wildlife species, as well as for their scenic and recreational value. These areas will not be managed for timber, but will be actively managed to preserve and enhance landscape diversity and ecosystem function.

NON-TIMBER COMMODITIES

Key question: What non-timber commodities are present in the analysis area?

Non-timber commodities are those commodities sold and administered through permits for National Forest lands. For the purposes of this analysis, three non-timber commodities were identified: firewood, non-convertible forest products (also called "Other Forest Products"), and mining (minerals). Compared to timber harvest and timber processing, these non-timber commodities have a minor contribution to employment. Non-timber commodities generate hundreds of phone or personal contacts with the Powers Ranger District each year; therefore, a trend analysis for each of these commodities is included in this discussion.

Processes

Availability of firewood may be directly related to the size of the road network. An extensive and high quality road network was in place to support firewood extraction during the 70's and 80's. Almost all firewood was collected near the developed road system as most of the watershed is too steep to allow travel away from roads.

Large diameter limbless logs or snags were viewed as the best firewood because it required the least work to process into firewood for the home. Snags in particular were often sought out as firewood. Since Snags are an essential habitat component for many wildlife species, firewood gathering has likely contributed to a reduction in important snag habitat along the developed road system.

Trees blown down during windstorms were also extensively utilized as firewood. In a naturally functioning ecosystem these trees would contribute "large wood" to both the terrestrial and aquatic ecosystems. Much of this large wood was removed and was therefore not available to function in the ecosystem.

The third source of firewood has been unmerchantable wood that was left at logging sites. This debris would include both conifer and hardwood species. Utilization of the material has increased in the recent past as snags and blowdowns became harder to find.

Reference/Historical Conditions

Gathering and burning wood for heating and cooking has occurred since prehistoric times and is still popular in this area. Public interest in firewood may have peaked during the 1970's or 1980's decades as many homes converted to relatively abundant and inexpensive wood as a home heating source. There continues to be significant demand for firewood for personal use (i.e. use in the home). There is also some commercial firewood harvesting, where the wood is resold to individuals for use in their homes.

In the recent past the Powers Ranger District was selling approximately 680 cords of firewood per year, based on records from 1987 through 1990. Most firewood was coming from the South Fork Coquille watershed close to the town of Powers.

In the most recent years (1993 and 1994) the district sold only 230 cords per year; a reduction of two-thirds over the previous levels. This was caused by: 1) prohibiting the cutting of snags and blowdowns because of their value as wildlife habitat; 2) a reduction in the number of miles of maintained road system; and 3) a decrease in timber harvesting coupled with an increase in raw wood values further reducing the supply of logging debris that could be converted to firewood.

Current Conditions

Current firewood sales have been exclusively for personal use. Commercial permits are required if firewood is being harvest for resale. Firewood obtained under a personal use permit cannot be resold to the public. There have been no commercial firewood sales for at least 10 years; therefore the firewood product is not currently a source of employment.

Little wood fiber remains on private lands to be converted to firewood as market conditions are favorable for excellent utilization of all wood fiber. In addition, access to private landholdings may be restricted limiting access to other firewood areas.

Future Trends

Firewood will remain stable at current levels or decline so demand is expected to remain steady. Many local homes have wood heating appliances and, if it is available at a reasonable cost, firewood would be utilized over other heat sources. The processes that create snags and blowdowns will continue, but the value they play in ecosystem functioning will probably prevent them from being extracted as firewood. The amount of logging debris that can be converted to firewood is dependent on market conditions in the wood products industry. If prices for wood chips remain high very little wood is available to be converted to firewood.

Other Forest Products

Processes

Other Forest Products are sold under permit; they include mushrooms, salal, huckleberry, ferns, bear grass, seedlings and transplants, Oregon grape, Port-Orford-cedar (POC) boughs, other conifer boughs, and Christmas trees. They are reported as "non-convertible products" because they can not be measured in terms of board feet.

In the analysis area this whole group of products are harvested and removed in such small amounts that there is no quantifiable effect to the ecosystem. An exception is Port-Orford-cedar boughs. A change in policy resulted because trees were stripped of their branches and, in some cases, collection occurred at recreational sites. Both actions were violations of the permits. Since that time collection by permit has stopped for POC boughs. Some collection associated with service contracts does occur where there is better administrative control.

Reference/Historical Conditions

The current system of issuing permits for non-convertible products began around 1980. Some of the products were no doubt collected before 1980 but they were used used in the home rather than sold through established markets. Prior to that time there was not a commercial market for any of these products.

Current Conditions

The total value of non-convertible products sold on the district in 1992 was $5518 under 236 permits. Bough permits had the highest value at $1830. In 1993 the value of non-convertibles was $5011 with beargrass bringing in $2730. In 1994 the value of products sold dropped to $3302.

The most stable product is Christmas trees where 100 to 150 permits are sold each year. Interest in the other products is dependent on a highly variable market. If market conditions are poor (low prices are offered) there is little interest in collecting even though the product may be plentiful in the forest.

The cost for Forest permits is approximately 10% of the commercial value. A permit cost of $.13 per pound assumes a market value of $1.30 per pound for beargrass. Therefore, the total market value of non-convertible products for the Powers Ranger District is in the range of $30,000 to $50,000 per year.

Availability of permits continues to be stable with the exception of Port-Orford-cedar boughs.

Future Trends

The gathering of non-convertible forest products, including mushrooms, and boughs, may increase compatible with the goals and objectives of the Siskiyou National Forest Plan.

The value of non-convertible products will continue within the same range as the recent past. The "high value" products will change from year-to-year in response to the market. Land managers will likely develop more regulations for protecting the resources should harvesting levels increase significantly enough to impact processes or functions.

MINING

Processes

There is interest in gold mining both from local residents and others living outside the area. There has not been any successful commercial mineral extraction on the South Fork

Coquille for several decades. Current mining is generally done by suction dredge during summer periods of low water flow generally occurring within the river or stream channel. The primary effect of these operations would be to increase turbidity within the watercourse, to redistribute suctioned gravels, and to affect streambed and stream bank stability. There are a few individuals who desire to hard rock mine. In all cases the activity of mining is more recreational than commercial.

Reference/Historical Conditions

In the past, coal, gold and some other minerals were a significant attractant for miners. Gold mining was profitable during this early period, especially on some of the other rivers in the area such as the Rogue River and Elk River. The South Fork played out quickly and there have not been any successful commercial mining operations in recent times. There were hydraulic and lode mining operations in the past centered in the Rock Creek and Johnson/Sucker subwatersheds. These have not operated in at least 30 years, but the scars and tailing piles are still visible. These old mining activities have been a source of sediment filling deep pools in various watercourses within the watershed. (See Appendix C for more on the history of coal mining in this area.)

Current Conditions

No one is extracting enough gold to have it be a profitable occupation. There are approximately 140 claims on National Forest within the analysis area, with about 40 of those having valid operating plans or Notice of Intent. Many of these operations would likely be active on the average summer weekend.

On operating claims on National Forest Lands suction dredges are limited to 4 inches in diameter or less. Only one dredge can be used per claim, and dredges are spaced along streams no closer than every 300 yards. These measures were instituted to limit turbidity. These small diameter dredges do increase turbidity and affect other hydrologic and biotic processes that occur within the stream. The effect of suction dredging increases geometrically with the diameter of the intake hose. The magnitude and significance of the affects from small suction dredges seems minor when compared to larger suction dredges and other past management activities. The direct and indirect effects of small scale suction dredging have not been thoroughly evaluated (American Fisheries Society, 1982).

The hot spots for gold mining are Johnson Creek, Sucker Creek, South Fork Coquille below Johnson Creek, and Rock Creek. Operations in the river on private lands inside the analysis area (China Flat) are suction dredged with greater intensity and therefore produce greater turbidity and other aquatic affects.

There are a limited number of dredges working at any given time within the watershed. Some claims do have short access roads. Sediment production from these roads is probably the same as for forest roads of native material elsewhere in the watershed.

Areas that were lode-mined in the past have tailing piles which are contributing and will continue to produce sediment which can move into the streams.

Future Trends

The current level of suction dredge mining will remain stable or increase. Several TV programs on cable networks have been promoting small scale mining on federal lands. (Personal communication, Rennay Stinson, 1995).

It is expected that the future condition will remain about the same. Turbidity caused by suction dredging is small scale and of short duration. If there were opportunities for commercial scale mining within the watershed they probably would have been exploited already. Therefore, large new sources of sediment production from mining or mining-related roads seem unlikely.

It is desirable that there be no increases in turbidity or other undesirable aquatic affects, even if they are small in scale and short term. However, all current mining is legal under the 1872 Mining Law, and current operations are complying with that law and other administrative policies designed to regulate mining.

NON-COMMODITY

Key Question and sub-questions:

How does the South Fork Coquille River watershed provide for human consumptive and nonconsumptive uses?

≈What recreational activities have occurred and presently occur in the watershed?

≈What recreational facilities are presently available?

≈What are the future predicted human uses in the watershed?

Processes

Nonconsumptive uses are typically defined as those activities that do not result in a direct monetary return. They are affected by access to the watershed, the type of use, landownership patterns, management area designations (on Forest Service land) and other state and federal regulations. Consumptive and nonconsumptive uses including recreation and hunting have developed along with an expanding road system. These public uses are strongly linked to road access.

Reference/Historical Condition

Access to the watershed has been an important factor for the type and amount of human use, both consumptive and nonconsumptive. Early access was by way of trails used by Indians, miners, and early settlers. Logging was the primary reason many roads were built. Up until the 1980s, the roads that wound in and out of drainages were tortuous, remote endeavors without many amenities for tourists or travelers. Today's road system allows faster, smoother travel than the pre-1980 road system. The paving of the main South Fork road as well as designation of the section from Powers to Agness as a Scenic Byway has encouraged an increase in motorized tourism. Campgrounds and trails were relatively primitive prior to 1980.

There was a proposal to dam the South Fork Coquille above the Coquille River Falls to provide hydropower. One of the major attributes would have been the creation of a lake and related recreation opportunities. This concept remains today but it does not have large or powerful public support. Hamilton and Remington (1962) examined the environmental effects for this project

The Forest Service required the dismantling or burning of cabins on abandoned mining claims in the late 1960's and early 1970's. There are now no permanent residents within the National Forest.

One unique facility that remains today is the Ferris Ford Administrative site. The Ferris Ford Cedar Bark House is located here. The site was a Forest Service guard station for many years. As the road system and access became better the administrative and work functions could be easily accomplished from the Powers Ranger Station; therefore, the house was not maintained and fell into disrepair. The house is unique as it is built entirely out of Port-Orford-cedar, including POC bark as the siding. The house is historically significant, and restoration began several years ago. This site has some potential for development as an interpretive site, group camp facility, or rental.

Current Condition

A number of factors have been working to change the way in which humans utilize and enjoy the South Fork watershed. Access, consumptive and nonconsumptive uses, land ownership and designations and federal and state regulations all have directed and shifted peoples' needs and desires from the land.

In recent years, and as the result of new direction and legislation, the Forest Service has moved from focussing on timber outputs to an ecosystem management. Private landowners within the watershed will need access to their lands for timber management activities. In addition, consumptive recreation such as hunting and fishing are important social processes occurring now in the watershed, largely replacing the more subsistence nature of the area during the first part of this century. Recent changes in state game regulations, for example, have concentrated fishing activity below the Forest Boundary, i.e., off the District and have thus affected the types of users in the analysis area. Fishing and hunting tend to be a modest part of the local economy.

Campgrounds and trails within the analysis area are listed in Table S-1 at the end of the Social Discussion.

Future Trends

Road access will continue to be of importance. The condition and size of the road system will hinge on availability of Forest Service road maintenance funds (Figures A-2 and O-3). Due to greatly reduced timber cutting on Federal lands, there will be less funds available for road maintenance. Many roads will likely be maintained to a lower standard of maintenance. User comfort will be less of a consideration and drainage control will be a higher consideration. This will change the makeup of the users in the area.

Recreational use of the South Fork watershed will increase slightly. Due to its location, the watershed is not likely to be heavily used as there is not a nearby population center of significant size. However, judging from public reaction to road closure proposals and other access-related issues and changes, the watershed is clearly important from a recreational aspect. Hunters will continue to hunt in modest numbers. Some camping and hiking use will increase, though not in large amounts. Fishing will remain concentrated below the Forest boundary as the waters above the Forest boundary remain closed to fishing for salmon and steelhead. Some people will still fish the upper South Fork Coquille for native trout. Trails and campgrounds will continue to be adequate for the amount of use expected. The bike trail from Glendale through Eden Valley to Powers is intended to increase use and diversify the local economy.

Two recreational sites within the Forest Boundary, China Flat and Ash Swamp, are privately owned. China Flat is managed as a recreation site by Georgia Pacific West, Inc., Coquille Timberlands Operations. Ash Swamp is managed for several wildlife objectives by Pacific Power & Light. There have been proposals that these two sites be acquired by the Forest Service. It is the opinion of some agency personnel that the sites could be more efficiently managed to meet recreation and wildlife objectives if they were owned or administered by the Forest Service.

FINDINGS OF FACT

Timber Commodity

1. Managed stands previously harvested under Federal jurisdiction make up 23% of the watershed.

2. Approximately 8% of the analysis area is in matrix available for timber harvest.

3. Managed stands under private jurisdiction make up 29% of the watershed.

4. Managed stands make up 52% of the total watershed (Federal and non-federal). These would be younger, seral stage stands.

5. Annual estimated timber harvest over the next 50 years is 1.9 MMBF.

6. Current harvest levels are one-fifth of harvest levels during the 1980's.

Non-timber Commodities

1. No commercial firewood sales have been offered by the Powers Ranger District in the last 10 years; therefore firewood has not contributed to local employment.

2. Demand for personal use firewood will remain steady.

3. Supply of personal use firewood is only one-third of past levels. The public has a desire for plentiful easy-to-get firewood that will go unmet.

4. Little firewood will be available from private lands.

Other Forest Products

The total market value of non-convertible products in the $30,000 to $50,000 range per year. They do make a minor contribution to local employment.

Mining

1. Commercial mining within the analysis area is unlikely.

2. Recreational scale gold mining with suction dredges will continue. Small scale short term affects to the aquatic system (such as increases in turbidity) during summer low flows will be likely.

3. There are 40 valid operating plans on National Forest in the analysis area.

Non-Commodity

1. The watershed has seen a change in human use from a subsistence nature to a recreational pastime focus
2. Recreation activities are becoming more diverse.
3. Overall recreational use may increase in the watershed.

OPPORTUNITIES

Timber Commodity

Implement a program of scheduled timber harvest within matrix lands to produce wood product outputs and local employment opportunities.

Non-timber Commodity

Most firewood collection opportunities will come from trees blown down onto, or next to, roads, and from closed timber sales.

Other Forest Products

Collect Port-Orford-cedar boughs concurrent with POC sanitation activities.

Mining

Revegetation of tailings in Rock Creek subwatershed.

Non-Commodity

1. Expansion of recreation facilities

≈Bike Route on Road 33 and 3348 (Figure O-3)

≈Campground expansions

Eden Valley Campground
Island Campground

Buck Creek Campground

≈Mountain Bike Loop off Glendale-Powers Bike Route

2. Improvement of current recreational facilities

   Myrtle Grove Campground
   Squaw Lake Campground
   Trailheads and trails
   Cedar Bark House and Group Camp area

3. Manage road system to provide a wide range of recreational opportunities

4. Look at opportunities to acquire or assist in enhancing China Flat and Ash Swamp areas.

DATA GAP

Lack of dispersed recreation information

MANAGEMENT RECOMMENDATIONS

Timber Commodity

Any harvest and silvicultural activities will meet all Standards & Guidelines stated in the Siskiyou National Forest Land and Resource Management Plan as amended by the Northwest Forest Plan.

Non-timber Commodity

Where wood is available for conversion to firewood, it should be made available to the public. There could likely be trade-offs between utilizing blowdown as wildlife habitat, sawtimber, or firewood.

Other Forest Products

1. Monitor for permit compliance and ecosystem impacts.

2. Continue management at current intensity consistent with the Forest Plan.

Mining

1. Continue administration of the minerals and mining programs at their current levels.

2. Monitor for compliance.

Non-Commodity

1. Roads and access into the watershed needs to be maintained for private ownership access, resource protection including fire suppression, through routes, any product removal on public lands, and recreation.

2. Monitor and document recreation use of campgrounds and trails within the watershed.

3. Continue with the restoration of the Cedar Bark House as a cultural resource.

4. Investigate and implement interpretive opportunities in the watershed:

   Cedar Bark House
   Azalea Lake
   Eden Valley Meadows
   Cedar Swamp
   Squaw Lake
   Bike Route

5. Continue to support and work with various local cooperators interested in partnerships to maintain and enhance recreation facilities, eg. the work that has been started on the Delta Creek/Hall Ridge Trail by the Friends of the Coquille.

Table S-1: Recreation Sites and Trails Within the South Fork Coquille Watershed

	SUBWATERSHED*				
Recreation Site	Lower Mainstem	Johnson / Sucker	Rock Creek	Upper Mainstem	Wooden Rock Cr.
DEVELOPED RECREATION SITE					
Big Tree Day Use Area	X				
Buck Creek Campground				X	
Eden Valley Campground					X
Lockhart Campground				X	
Myrtle Grove Campground	X				
Peacock Campground				X	
Pioneer Campground					X
Squaw Lake Campground				X	
Wooden Rock Creek Campground					X
UNDEVELOPED RECREATION SITE					
Azalea Lake			X		
Cedar Swamp Day Use Area				X	
Elk Horn Campground				X	
Island Wayside	X				
Mud Lake			X		
FEE CAMPGROUNDS					
Daphne Grove Campground	X				
Rock Creek Campground			X		
TRAILS					
Azalea Lake Trail			X		
Barklow Mtn. Trail		X			
Coquille River Falls Trail				X	
Elk Creek Falls Trail	X				
Iron Mtn. Trail			X		
Johnson Creek Trail		X			
Panther Ridge Trail				X	

*No recreation sites or trails in Hayes, Coal or Foggy/Eden Creeks

TERRESTRIAL ECOSYSTEM

WATERSHED VEGETATION

A wide diversity of plant communities and habitats and several different plant associations occur within the watershed. This diversity is influenced by a number of factors including soil types, elevation, climate, succession, and various disturbances. For plant species, there is one key question, subdivided into seven parts. These come from social/legal obligations the Forest Service has for species management. These laws are incorporated within the USDA-Forest Service Manual (2620, p. 9) which requires that "management of habitat provides for the maintenance of viable populations of existing native and desired non-native, wildlife, fish, (26 CFR 219.19) and plant species (USDA regulations 9400-4) generally well distributed throughout their current geographic range." The South Fork Coquille watershed contributes to overall ecosystem sustainability through maintenance of its contributions to species viability and biological diversity.

Key Question: How does the South Fork Coquille River Watershed contribute to plant species diversity and viability?

≈What plant species exist in the watershed?
≈What important habitats for plants exist in the watershed?
≈How are these habitats arranged across the landscape?
≈How can these habitats be maintained and/or enhanced?
≈What has the influence of exotics been on the native populations?
≈What has the influence of human activities been?
≈What is the predicted future occurrence of plants?

Processes

Most of the north and east portions of the watershed are composed of sedimentary sandstones and shales (Figure A-1, Aquatic Module). Western hemlock, Douglas-fir, and Port-Orford-cedar plant communities predominate here. Large portions of Johnson Mountain, Iron Mountain, and Rock Creek in the southwest are composed of serpentine-peridotite derived soils, and several specialized rarer plant species such as *Darlingtonia californica* occur on these areas. The Iron Mountain Botanical Area, the only botanical area on the District, is composed of these serpentine soils. The Botanical Area lies at the northern limit of the Californian-type flora and the southern limits of the Pacific Northwestern flora, resulting in plant communities unique in structure and composition. The Ash Swamp and upper Eden Valley meadow areas are underlain with unconsolidated well-drained gravels and silts, and thus grasses thrive there.

Areas of similar vegetative composition are classified into plant associations. Western hemlock is the climax dominant species in the majority of the basin, though at present

Douglas-fir is dominant as the mid-seral stage. Without disturbance these stands will proceed to a hemlock climax condition as the Douglas-fir overstory deteriorates.

Several plant associations are recognized in the key watershed:

Western hemlock/Port-Orford-cedar
Western hemlock/Pacific rhododendron
Western hemlock/Western redcedar
Western hemlock/salal
Douglas-fir/Pacific rhododendron
Tanoak/Western hemlock
Tanoak/Port-Orford-cedar

On the following pages, Figure T-1 illustrates the existing vegetation and seral conditions in the watershed at present. Figure T-2 shows conditions in 1890 prior to any commercial timber harvest. Figure T-3 projects to the year 2040 more area in the pioneer seral stages within private and matrix lands as future logging activities will be concentrated here.

The seral stage map identifies a significant amount of climax forest in the lower mainstem in the vicinity of Hall, Delta, and McCurdy Creeks. These stands are dominated by large old trees and have been free from a stand replacement disturbance for 500 years or more. This is one of the largest blocks of western hemlock climax forest within the province. During the summer months the marine layer often fills the valley floor along this portion of the South Fork. An observer at Agness Pass or Bald Knob Lookout will notice that the Rogue River drainage will be fog free while the South Fork Coquille is still filled with fog. One of the last places in the South Fork to clear each day is this area around Delta Creek. This pattern of persistent fog in the Coquille drainage moderates daytime maximum temperatures and helps explain the vegetation differences between the Coquille and Rogue drainages.

Human activities also play a very large role in plant distribution and disturbance. Native Americans burned certain sites annually to maintain hunting areas such as meadows, as well as to improve berry and other vegetative productivity. Currently windstorms, road building, and timber management activities are the major human disturbance factors in the watershed. Other agents of disturbance include fire suppression, diseases, insects, landslides, ice and snow.

Dispersal of exotic plants by vehicles and logging equipment, and changes from native grasses to non-natives on formerly overgrazed meadows used as pastures are human related factors. New species tend to flourish in the fertile soils and forgiving climate of the region, and can quickly take over large areas if not controlled.

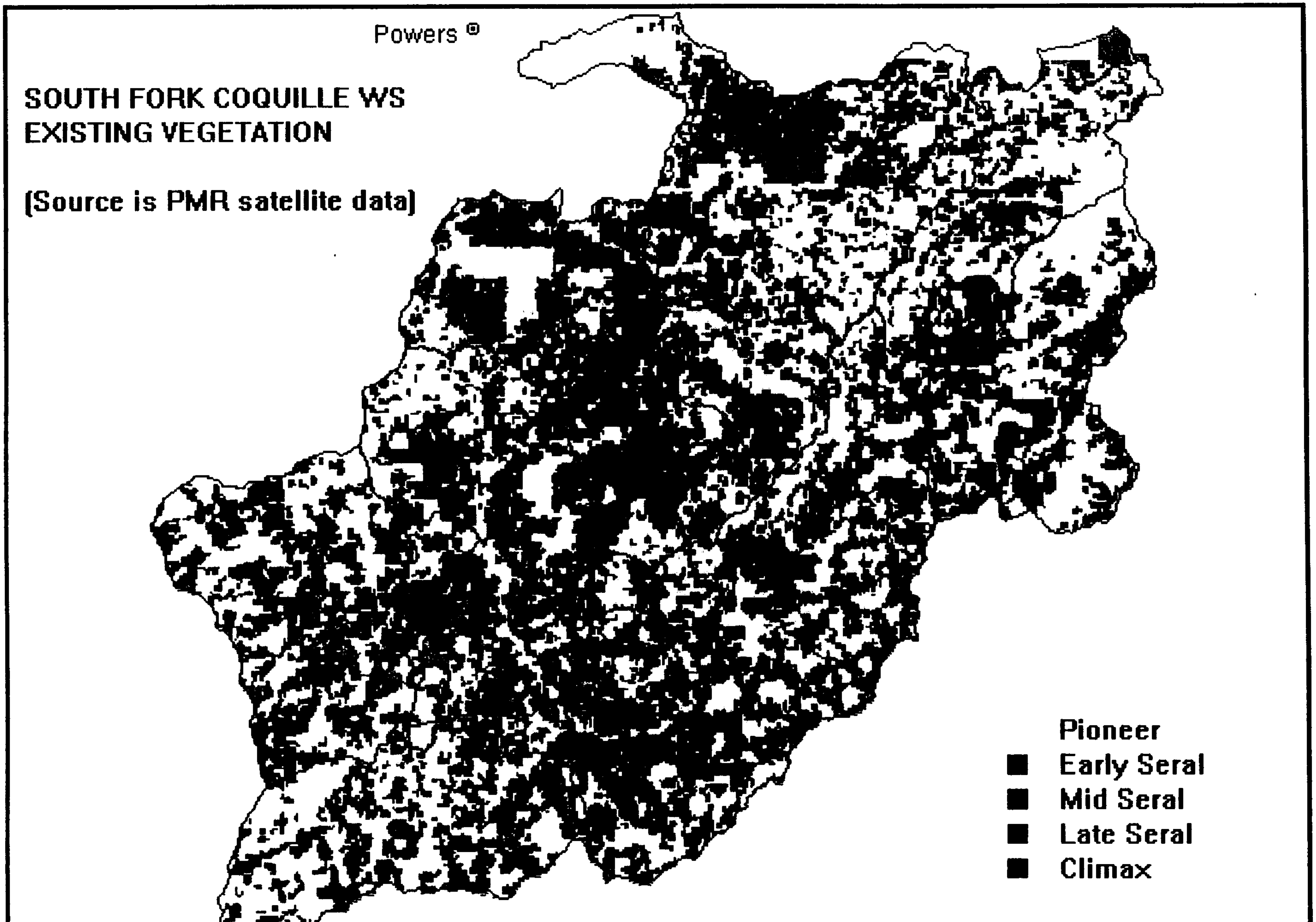
Powers
SOUTH FORK COQUILLE WS
EXISTING VEGETATION
(Source is PMR satellite data)
Pioneer
Early Seral
Mid Seral
Late Seral
Climax

Figure T-1

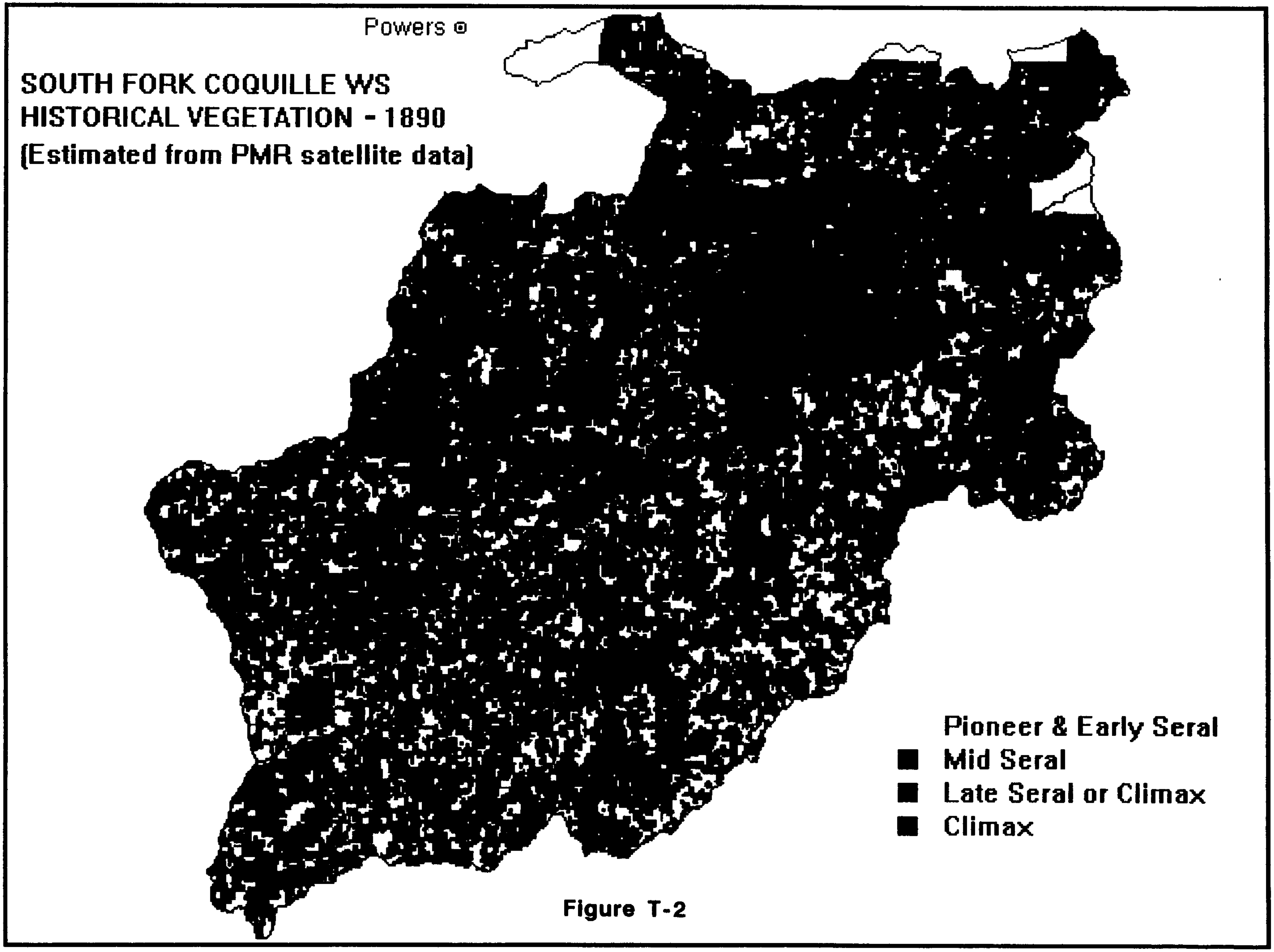
Powers
SOUTH FORK COQUILLE WS
HISTORICAL VEGETATION - 1890
(Estimated from PMR satellite data)
Pioneer & Early Seral
Mid Seral
Late Seral or Climax
Climax

Figure T-2

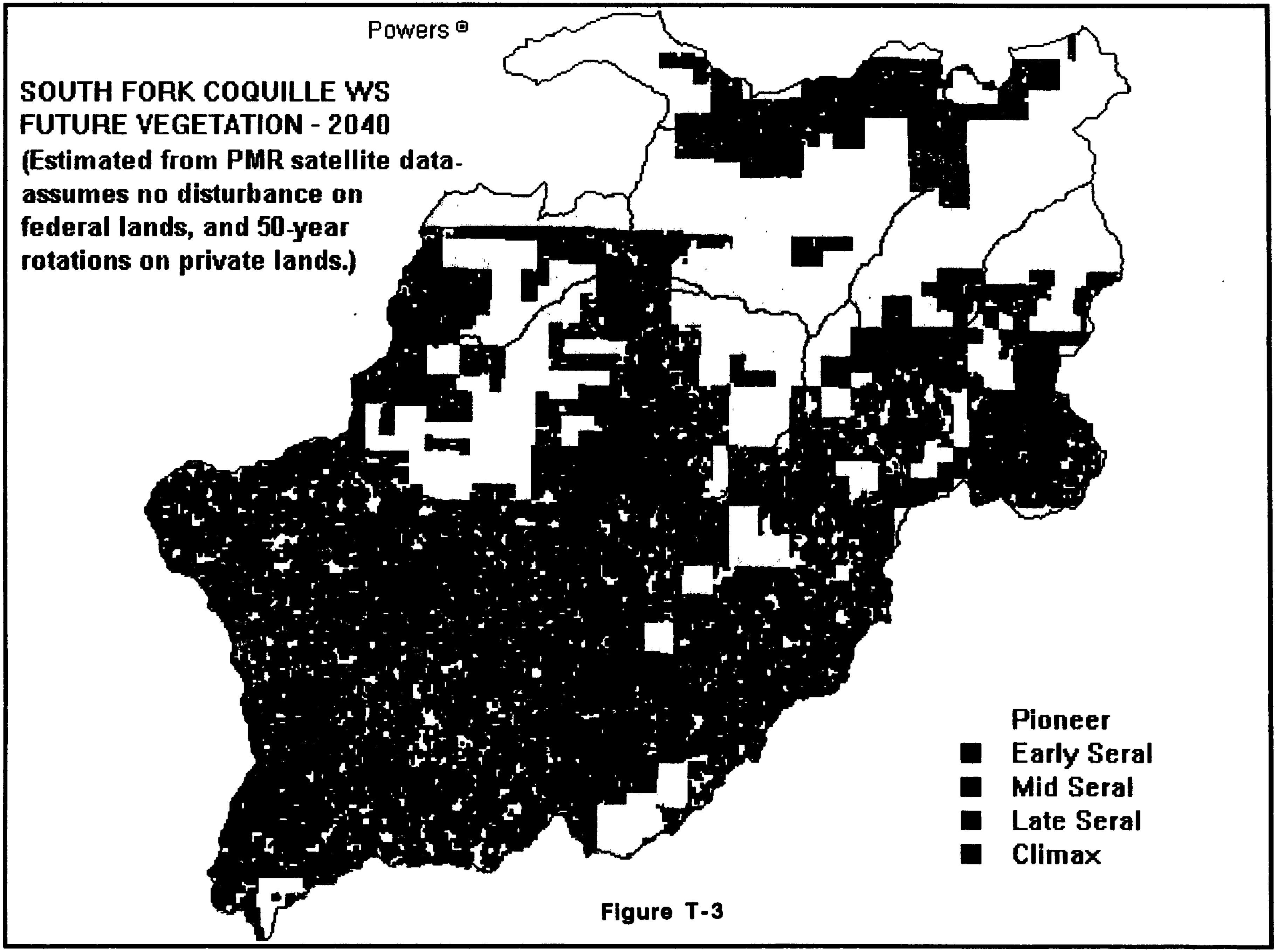
Powers ®
SOUTH FORK COQUILLE WS
FUTURE VEGETATION - 2040
(Estimated from PMR satellite data-
assumes no disturbance on
federal lands, and 50-year
rotations on private lands.)
Pioneer
Early Seral
Mid Seral
Late Seral
Climax

Figure T-3

Reference/Historical Condition

Vegetation composition, as displayed in Figure T-2, shows that the watershed was dominated by late seral to old growth Douglas-fir/western hemlock forests. The few natural meadows in the Eden Valley area have been present for thousands of years as they formed on level lakebed gravel sediments.

There is little evidence in the watershed of stand-replacing fires. Historical accounts from early in the century recall that there were large areas that were free of underbrush. Observations during pre-harvest reconnaissance show that blackened wood, charcoal, and burnt stumps were present in almost every stand. Fire has been present but was not intense enough become a 'stand replacing event'. It seems likely that fire intensity was in the low to moderate range and served to thin the stand or just remove the fuel concentrations. (Steve Harbert, oral communication, 1995)

During the early 1900's many of the meadow areas in the watershed were used by homesteaders as pastures for domestic sheep and cattle. These meadows include those in upper Eden Valley, Johnson Mountain summit area, Flannigan Prairie, Ash Swamp and Foggy Creek. Several of these pastures were overgrazed and, at present, exotic grass and forbs species predominate.

Current Condition

Special plant habitats in the watershed include a diverse mix of species and conditions (Table T-1). Good stands of native grasses may still be found in the meadows on Johnson Mt., Flannigan Prairie, the southwest side of Iron Mt., and parts of Eden Ridge. Other meadows (with mostly non-native species) are located in upper Eden Valley, along Foggy Creek, north of Salmon Creek, and the upper reaches of Hayes Creek. Large stands of old-growth Douglas-fir and Port-Orford-cedar are present in the Hall Creek headwaters and Port-Orford-cedar Research Natural Area. Doe and Ash Swamps provide a mixture of wetland grasses, sedges, and forbs. Dry, Mud, Azalea, and Squaw Lakes and Cedar Swamp provide aquatic habitat. Other unique plant habitats occur along the vernally wet sandstone cliffs of the lower Coquille River canyon and tributaries, and the serpentine-peridotite formations of Johnson Mt. and the Iron Mt. Botanical Area. All of the six Sensitive plant species are found in the above special habitats.

Sensitive Species

Bolander's hawkweed (*Hieracium bolanderi*) grows on somewhat disturbed serpentine soils on the east side of Iron Mountain in the headwaters of Rock Creek.

Piper's bluegrass (*Poa piperi*) is found barely within the watershed on the south and east sides of Iron Mountain.

California globe-mallow (*Iliamna latibracteata*) grows in small numbers in open woods and roadsides only in the headwaters of McCurdy and Elk Creeks in the watershed.

Leach's brodiaea (*Triteleia hendersonii*) grows in good numbers in open woodland habitat in several locations, most notably in Daphne Grove Campground.

Bensonia (*Bensoniella oregana*) is found growing in moist meadows and streamsides on sedimentary soils, and usually at higher elevations. Populations within the watershed are scattered but stable.

A small stand of Howell's manzanita (*Arctostaphylos hispidula*) occurs on the dry open south slopes of Iron Mountain.

Exotic (non-native) Vegetation

Approximately 70 species of exotic plants presently occur within the watershed (Appendix D). They consist mostly of grasses and forbs established by historic overgrazing, timber harvest, and other ground-disturbing activities. A seed mixture of several exotic species developed by the ODFW has been routinely broadcast-seeded for revegetation projects in the watershed for many years. As sources of native seeds become available in 1995 broadcast seeding with exotics will be discontinued.

Exotic grasses such as dogtail (*Cynosurus echinatus*) and velvetgrass (*Holcus lanatus*), forbs such as oxeye daisy (*Chrysanthemum leucanthemum*) and foxglove (*Digitalis purpurea*), and shrubs like Himalayan blackberry (*Rubus discolor*) and French and Scotch brooms (*Cytisus* sp.) are especially common. Of particular concern are the aggressive gorse (*Ulex europaeus*) and tansy (*Senecio jacobaea*). Tansy is widespread along roadsides throughout the watershed and has been biologically treated for several years with the tansy flea beetle (*Longitarsus jacobaeae*). Gorse is present in the watershed at 15 different locations, brought in accidentally from the Bandon area as seeds imbedded in dirt on vehicles. Gorse plants and shoots are pulled out of the ground by hand or by cable in the spring while the ground is loose and before the plants flower. An aggressive gorse control program is in operation within the watershed and will be continued in the future.

Further information on Powers plant species may be found in the Powers Herbarium reference collection, and in a Checklist of Common Plants on the Powers Ranger District (Shea, 1992).

Future Trends

Table C-3 in the 1994 Record of Decision, Standards and Guidelines, lists over 300 total species of fungi, lichens, bryophytes, mollusks, arthropods, amphibians, mammals, and vascular plants which are selected to be protected through survey and management standards and guidelines. Extensive surveys for these species will commence during 1996. Known sites (such as Bensonia) will be monitored and managed accordingly.

Under current Forest Service policies there will be less logging and thus less creation of early seral stage vegetation on Federal lands. The present aggressive program of controlling certain exotic plants and of cultivating native grass seeds should slow the spread of non-native species. Widespread seeding projects will replace exotic mixtures with native seeds.

On private lands within the watershed, it is expected that extensive logging and ground disturbance will continue and early seral stages will be maintained.

PORT-ORFORD CEDAR

Key Question: How is Port-Orford-cedar root rot (*Phytophthora lateralis*) affecting the vegetative makeup and management throughout the watershed?

Port-Orford-cedar (*Chamaecyparis lawsoniana*) is a valuable component of the South Fork Coquille Watershed. Any discussion of Port-Orford-cedar in the South Fork Coquille must include the effects of POC root rot in the ecosystem.

Processes

Port-Orford-cedar (POC) is found on a variety of geologic and soil types occurring as scattered individuals or as small groups within a stand. It occurs primarily at low-to-mid elevations within its natural range of Southwestern Oregon and Northern California. It has high value as a timber product as well as for special forest products. Large Port-Orford-cedar found within the analysis area may provide exceptional nesting and roosting habitat for woodpeckers and other bird species.

POC can be infected with a lethal root disease *Phytophthora lateralis* that currently has no cure. It is spread by way of infected soil, water, and, to a small extent, root grafting. The fungus produces spores during its life cycle (Zobel et. al. 1985) that can enter the watershed through transport in water or soil. The fungus is able to survive (in chlamydospore form) without a host for many years depending on soil moisture and temperature. Transport of soil on vehicles, machinery, and animals is the common method of spread.

Once the fungus is in a new area, it can move in water downslope from the infected site as an active zoospore or resting chlamydospore. The spread of the disease requires precise conditions of cool soil temperatures and saturated, to near-saturated, soil moisture over a period of time. Infection is highly dependent on the presence of free water in the vicinity of susceptible tree roots. High risk areas are streams, drainages, low lying areas downslope from infected areas, and roadways.

Reference/Historical Condition

This disease first entered ornamentals in the state of Washington in 1923. By 1942, the disease was discovered in the Willamette Valley of Oregon. Transportation and planting of ornamental cedar throughout Oregon spread the disease into Southwestern Oregon within 10 years (Roth et al. 1987). This lethal fungus was not native to the range of POC and may explain why the cedar appears to have no resistance to attack unlike the Asiatic species of *Chamaecyparis*.

Management activities of the past have led to the introduction of *Phytophthora lateralis* into the watershed.

Current Condition

The South Fork Coquille Watershed Assessment has a complete inventory of Port-Orford-cedar and related presence of *Phytophthora lateralis* on public lands within the watershed (see Figure T-5). Enough locations of infected POC exist that these may pose a potential risk to other populations downslope, downstream, and along roadways.

Once infected with the root disease, a POC tree may take one to several years to die. Depending on the severity of infection, a majority of the POC within the drainage could be killed by the disease leaving an excess of standing dead and, more importantly, a resultant loss of shade component in heavily infected drainages. Infection from the disease is present in numerous locations along roads and drainages throughout the watershed (See Figure T-5). These areas in red may appear to display areas of complete POC mortality from the disease, but this is not always entirely the case. Healthy POC exists throughout various age classes within these infected areas.

To aid in slowing and/or stopping the spread of the root disease, management mitigation has included road closures during wet weather, dry season haul, vehicle washing, and sanitization of POC along roads.

Future Trends

The desired future condition for this area is to stop the spread, stop introduction, and remove favorable environment for inoculum. At the same time current control strategies will be continued as other activities proceed in the watershed. If these cannot be accomplished, the spread of the disease has the potential to negatively alter the distribution and quantity of POC within the watershed.

WILDLIFE

Similar to vegetation, there is one key question which has been subdivided into five parts. The same social and legal obligations explained in the vegetation section apply to wildlife management on Forest Service lands.

Key question: How does the South Fork Coquille Watershed contribute to wildlife species diversity and viability?

≈What wildlife species exist in the watershed?
≈What is the predicted future use of the area by wildlife?
≈What important habitats exist in the watershed?
≈How are these habitats arranged across the landscape?
≈How can these habitats be maintained and/or enhanced?

Processes

The presence or absence of wildlife species in a given area is a direct result of what habitats are available. All mammals, birds, amphibians, and reptiles need certain types of ecosystems. Frequently more than one type is necessary during the course of a normal life cycle. Processes affecting wildlife distribution will be a result of habitat changes.

Changes in seral communities, i.e. succession, is a natural process and not always negative. Concern in recent years has been the *rate* at which areas are being altered. Timber management in the South Fork Coquille watershed has reduced late successional habitat. This has a great impact on species, particularly those which are almost entirely dependent on older forests such as spotted owls or marbled murrelets. In contrast, wildlife such as deer, elk, bluebirds, and bobcats more readily adapt to early vegetative stages and are not nearly so affected by this habitat change. A mixture of habitat types is important to maintain viability of all wildlife species.

Other special, unique habitats will affect location and breeding success of different species. Sites such as cliffs and scabrock slopes, ponds and small lakes, meadows and small openings, hardwood stands, riparian zones and associated upland sites provide habitat diversity that allow an array of creatures to coexist (Table T-2). These constitute macro-scale type habitats and additionally, microsite conditions that are important to different wildlife, i.e. snags, downed wood, and hardwood trees interspersed in coniferous forests.

The behavior of wildlife species is also an important process in terms of where species are found, which sites are most important and which areas are generally avoided. Seasonal migration patterns are significant and may either be altitudinal (deer and elk), east-west (harlequin duck and, to some extent, marbled murrelet), or north-south (neotropical songbirds).

The introduction of exotic species into an area can have an effect on the native wildlife. Negative consequences may occur as a result of species evolving based on the environmental stresses with which they are faced. Good examples of this include starlings competing with native swallows for nest sites and bullfrogs eating young western pond turtles.

Human consumption of wildlife is very important in the analysis of an area. This consumption may take the form of hunting or trapping, may be subsistence or recreational and depending on the affected area and intensity, may negatively or positively impact populations.

Reference/Historical Condition

Personal communication with local residents has helped to document the past populations of wildlife species in the watershed analysis area and for use as a comparison with present-day populations. (Magill 1995; Townsend 1995)

Mammals commonly found in the watershed over the past 40-60 years which continue to be quite common include mole, bats, bobcat, mountain lion, coyote, black bear, raccoon, mink, river otter, brush rabbit, mountain beaver, porcupine, meadow voles, beaver, black-tailed deer, and elk. Historically rare or nonexistent are gray fox, ringtail, mink, pine marten, fisher, and muskrat. Species no longer present include lynx, red fox, wolf, and grizzly bear.

Elk were present in good number historically but were exterminated by hide hunters in 1868. In the winter of 1936-37, a small herd from the Umpqua River drainage overwintered and eventually re-populated the entire watershed. (Shea, 1990)

Birds commonly found in the watershed over the past 40-60 years include red tailed and sparrow hawks, great horned, screech, and spotted owls, blue and ruffed grouse, California quail, band-tailed pigeon, pileated woodpecker, nighthawk, western bluebird, hummingbird, dipper (also known as "teeter-birds" or "river wrens" by settlers), red crossbill (also known as "saltbirds") and an occasional black billed magpie. (Webb, Shea 1991)

Reptiles and amphibians in the past included alligator and fence lizards, western skinks, and a variety of frogs.

Historically, the South Fork Coquille watershed had an abundance of Douglas-fir/Western hemlock forest ecosystem (Figure T-2). Because fire and other stand replacing events have never been common on the South Coast, there has not been large quantities of openings such as lakes or meadows. At the landscape level, the dominating habitat has been old growth forest while a minor component, in terms of actual acres, was "special habitats" such as cliffs, talus, meadows, and hardwood sites. Riparian areas, such as rivers and creeks, have been numerous in the watershed although ponds and lakes have not. Wildlife diversity, distribution, and abundance has varied since early times.

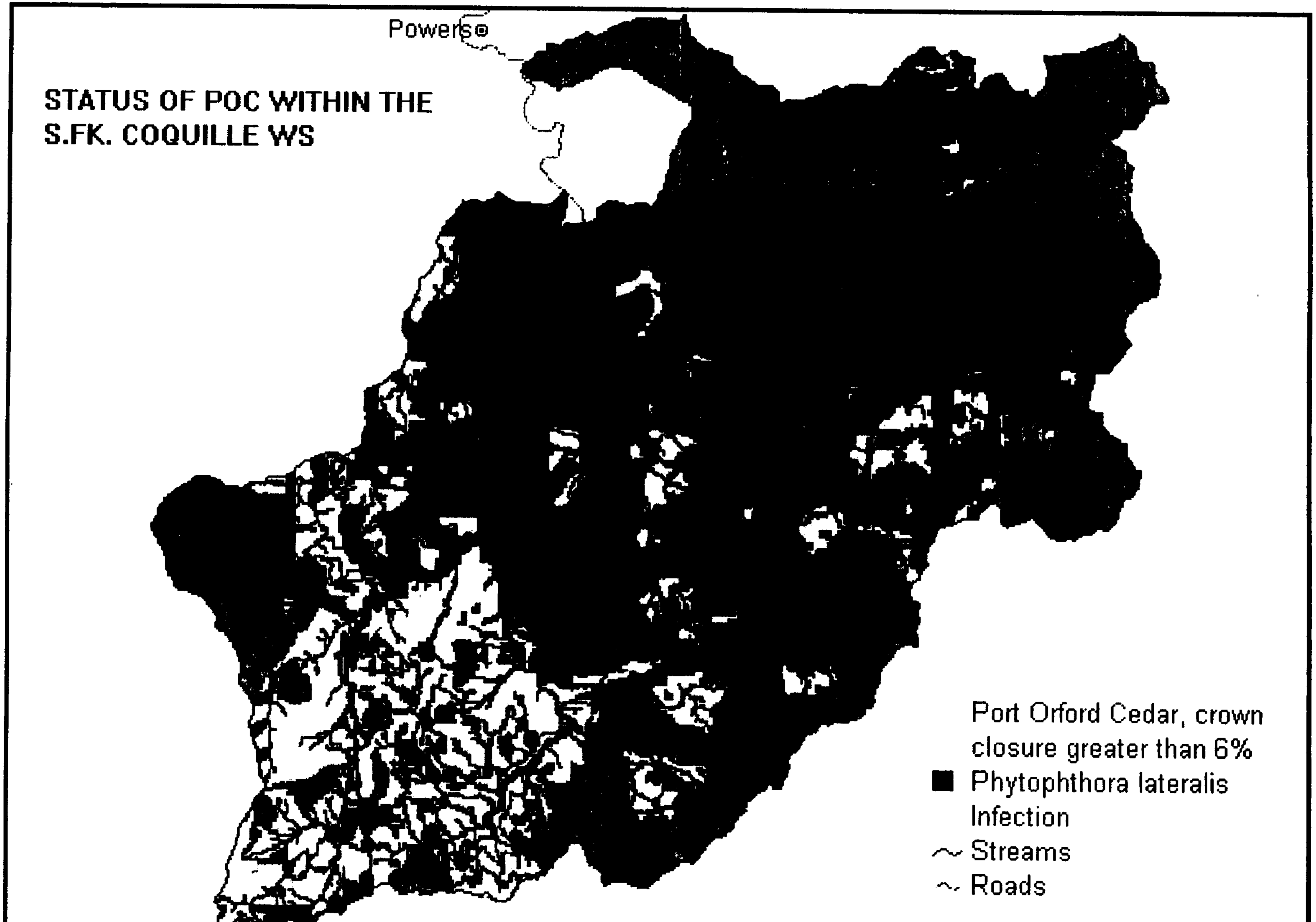
STATUS OF POC WITHIN THE
S.FK. COQUILLE WS
Powers
Port Orford Cedar, crown closure greater than 6%
Phytophthora lateralis Infection
Streams
Roads

Figure T-4

Current Condition

Mammals

Native Mammals:

Approximately 50 species of mammals are presently found in the watershed. (Webb and Shea, 1990) In addition, a few muskrats were planted into the Cedar Swamp area and are still present. They were not in the watershed in the early days. There have been a few sightings of fishers so they are assumed to be very rare in the area. Beaver populations crashed during the late 1980's but are recovering nicely. Deer and elk continue to be present throughout the watershed. Current elk populations are around 350-400. (Figure T-6) Bull/cow ratios are currently about 1.4/10 and cow/calf rations approximately 3/1. (Middlebrook, 1993)

Non-native Mammals:

The only exotic mammals present in or near to the watershed are the house mouse (*Mus musculus*) and the Norway rat (*Rattus norvegicus*), and these species are found only around human dwellings or structures.

The Virginia opossum (*Didelphis virginiana*) is a native of the eastern United States but was introduced into northwestern Oregon in the 1940's (Maser, C., et.al. 1981). They have since spread south along the coast and are now a part of the Coquille River wildlife community, having been observed as far east as upper Eden Valley (Shea, personal observation).

Threatened, Endangered, and Sensitive Mammals:

Western big-eared bats (*Plecotus townsendi*) are present in a variety of habitats along the coast ranges but have never been reported on the Powers Ranger District. They typically roost and hibernate in secluded caves and tunnels, and further efforts to verify their presence will be continued.

White-footed voles (*Arborinus albipes*) potentially occur in the watershed, in riparian alder - small stream habitat. None have been reported on the Powers Ranger District.

Birds

Native Birds:

Approximately 140 bird species remain relatively unchanged from the past (Webb and Shea, 1991). Band-tailed pigeons are uncommon and decreasing in numbers; causes for their continuing decline are unknown (Shea, personal observation). Although never observed by early upper valley residents, osprey are quite common at present and there are two active nests in the watershed.

Non-native birds:

Starlings (*Sturnus vulgaris*) and house sparrows (*Passer domesticus*) are locally common in the vicinity of human habitation. In some cases starlings establish wild populations and aggressively compete with native cavity nesters, particularly tree swallows (*Iridoprocne bicolor*), western bluebirds, (*Sialia mexicana*), and some woodpeckers.

Wild turkeys (*Meleagris gallopavo*) are also not native to Oregon. The Oregon Department of Fish and Wildlife has been periodically stocking them in the area for years, and turkeys have been sighted in numerous parts of the watershed (District files). This stocking program will likely continue, and the birds often successfully propagate on their own. Impacts of wild turkeys on native wildlife is probably slight though in some cases there may be competition for acorns.

Threatened, Endangered and Sensitive Birds:

The American Peregrine Falcon (*Falco peregrinus anatum*) is Federally listed as Endangered. There are several potentially suitable nest sites in the massive sandstone cliffs along the South Fork and on Eden Ridge, though no nesting activity has ever been recorded historically. At present peregrines are very rarely observed in the watershed, and only as transient individuals (District wildlife files), and the nearest known active eyrie is in the Rogue River drainage southeast of Panther Ridge.

Northern Bald Eagles (*Haliaeetus leucocephalus*) are Federally listed as Threatened in the lower 48 states. They are present in the watershed as transients, particularly during late autumn along the lower portion of the River near Powers when the fall chinook are spawning and dying. Large river valleys such as the South Fork potentially provide good feeding, nesting, and roosting habitat but the nearest active eyries at present are in the Rogue River drainage. There is no historical mention of bald eagles ever nesting in the watershed but they probably did in former times of fish abundance and less human disturbance. There are few good potential bald eagle activity areas at present because of lack of a steady food source and the presence of roads along the major drainages.

Marbled Murrelets (*Brachyramphus marmoratus*), are Federally listed as Threatened, feed in the ocean but have been observed as far as 32 miles inland on the Powers Ranger District, at the far eastern end of Eden Valley. The entire watershed lies within Marbled Murrelet Zone I (35 miles inland). There have been numerous detections of murrelets since 1990 in much of the watershed, including occupied behavior in the Hall

Ridge country. A .5 mile radius management area has been delineated for each occupied site. No nest sites are currently known, though a young bird was found dead in 1990 at the mouth of Coal Creek (District files). Murrelets usually nest near the tops of large (>40 inch DBH) Douglas-firs, often in moss depressions on large horizontal limbs. Fairly large stands of mature or old-growth Douglas-fir are the preferred habitat. Murrelets were more common historically in the watershed when more of this habitat was available (see 1890 seral-stage map). There are approximately 10,500 acres of currently suitable and 4,200 acres of potentially suitable murrelet habitat within the watershed (out of 87,065 acres total). The second year of marbled murrelet intensive surveys will be completed during 1995 along the upper South Fork from Wooden Rock Creek to the Coquille-Umpqua Rivers Divide.

Northern Spotted Owl (*Strix occidentalis*), Federally listed as Threatened, habitat is characterized by a multilayered, multispecies canopy dominated by large (>30 inch DBH) conifer overstory trees, with an understory of smaller hardwoods or conifers. Numerous large snags and decadent trees are present, with a ground cover of large logs and other woody debris. Canopy closure is high (60-80%), but open enough to allow owls to fly beneath it (ISC, 1990). There are presently about 14,625 acres of this type of habitat within the watershed, most of which has sufficient connectivity to allow for dispersal movement. Approximately another 32,000 acres is currently dispersal habitat. There are 43,816 acres (50% of total) of Late Successional Reserve and 11,030 acres (13% Of total) of Matrix lands within the watershed. Also about 45% of the drainage lies within a Critical Habitat Unit (42,476 acres), most of which overlaps with the LSR.

Extensive spotted owl surveys have been conducted throughout the watershed, starting in 1979. Owls are present in most areas of suitable habitat in good numbers and as a stable population. Currently, there are nine owl activity centers in the South Fork Coquille watershed. Seven of the centers are on federal lands in LSR and Research Natural Areas. Spotted owl populations were undoubtedly higher in the past before extensive logging reduced the amount of available habitat (Figure T-2). The present population within the LSR should remain stable and perhaps increase in the future. Annual monitoring will continue.

Reptiles and Amphibians

Native reptiles and amphibians:

Reptile and amphibian species remain the same (approximately 28 species) with the addition of the pond turtle which has been observed as far up as Buck Creek. (Webb and Shea, 1990)

Non-native reptiles and amphibians:

The eastern bullfrog (*Rana catesbiana*) is present in large numbers in the ponds around the town of Powers, and also in Cedar Swamp. Bullfrogs are prolific breeders and provide a lot of food for predators such as kingfishers, mergansers, ospreys, raccoons, mink, river otters, etc. However, they are a large aggressive species and will feed on native frogs. They also severely limit the rare western pond turtle populations where they occur together because they eat the young ones.

Threatened, Endangered, and Sensitive reptiles and amphibians:

The Northwestern pond turtle (*Clemmys marmorata*) occurs in small numbers in ponds and slow moving portions of the South Fork drainage. They require basking sites such as rocks, banks, or partially submerged logs, and sandy banks in which to lay their eggs. There are several adult pond turtles present in the Powers County Park Pond, and they have been observed in the upper river nearly as far as Buck Creek (Shea, personal observation). Few young ones have been found, indicating high juvenile mortality. Formal surveys will be conducted during 1995 in conjunction with the ODFW and will be continued in the future.

Del Norte's (*Plethodon elongatus*) and Siskiyou Mountain (*Plethodon stormi*) salamanders live in rocky habitats such as talus slopes and outcrops. Neither species has been observed on the District but both probably occur.

Red-legged frogs (*Rana aurora*) prefer lower elevation riparian habitats in slow or standing water. Fifteen years ago these frogs were commonly seen in the watershed (Shea, personal observation) but are not so often observed now. Formal amphibian surveys in conjunction with the ODFW are being conducted this spring (1995) on 13 different sites within the watershed area, and will be continued in future years. This will provide critical basic information on species presence and population trends.

California Mountain Kingsnake (*Lampropeltis zonata*) inhabits forest edges, especially where fence and sagebrush lizards are found; the Siskiyou National Forest is believed to be marginal habitat for the California mountain kingsnake (Steve Cross, personal communication, October 1989). Nussbaum and others (1983) documented that this kingsnake occurs in oak and pine forests up to 9,000' elevation, and may be found under and inside rotting logs, or sometimes under rocks. These authors list records for Josephine and Curry counties. This species has not been observed on the District but likely occurs.

Habitats

Special and unique habitats do not exist in abundance within the watershed boundaries. The following habitats exist on Forest Service lands within the analysis area:

100 acres of cliffs and scabrock slopes
191 acres of ponds and small lakes
552 acres of meadows and small openings (an additional 25 acres are privately owned)
1500 acres of hardwood-dominated stands (Figure T-7)

These habitats are distributed throughout the entire watershed and are typically great distances from each other, averaging 5 miles apart. Corridors to link the sites are generally coniferous forest and/or riparian zones.

Important microsite habitat features include snags, downed wood, and individual hardwood trees interspersed in coniferous forest stands. These conditions historically were more abundant primarily due to the landscape having more old growth ecosystem. Currently, for many species, lack of snags, downed wood, and hardwoods has become a critical limiting factor as substantial acreage has been converted to early seral stage (Figure T-1). In late successional stands which have not been managed however, such as the Research Natural Areas, distribution is likely adequate to meet the needs of a number of birds and mammals.

Future Trends

The watershed is still relatively free of non-native animal species, though numbers and kinds will increase in the future.

The nutria (*Myocastor coypus*) is not yet present in the drainage. They are a native of South America and were introduced into northwestern Oregon in the 1930's on commercial fur farms. They have since steadily spread south into every major waterway, and are currently found in large numbers in the Umpqua River drainage 40 miles to the north. It is only a matter of time until they spread south and are also present in the Coos and Coquille River systems, where they may directly compete with native beavers and muskrats.

An important habitat concern will continue to be "fragmentation". Fragmentation is is the process of reducing size and connectivity of stands that compose a forest. At present, approximately half the analysis area is LSR which "will maintain a functional, interactive, late-successional and old growth forest ecosystem" (ROD, p.6). Future fragmentation of intact pieces of old growth should not be occurring on Forest Service Late Successional Reserves acres. Acreage in the LSR (approximately 44,000) will become the most important areas for those species dependent on that ecosystem type. The remaining federal land designated as Matrix (17,000 acres) will sustain "most timber harvest and other silvicultural activities" (pg C-39, ROD). These sites, while meeting standards and guidelines for large wood, snags, and green tree retention, will favor more early seral and mid seral species. Specific guidelines for coarse, woody debris and green tree and snag retention should ensure population maintenance of wildlife species across the landscape.

An assumption is that private land within the watershed (approximately 25,700 acres) will be managed on a 50 year rotation and will thus meet the needs of those species requiring early seral habitat for one or more life history requirements. A concern with these very large blocks of land is that some wildlife species (e.g. elk) will not use the interior portions of habitat that lie great distances from cover (Wisdom et.al. 1986). Areas with high road densities tend to be used less or avoided by many wildlife species such as mountain lions (Van Dyke et. al., 1986). Many amphibians also will not cross roads thereby reducing the amount of their available habitat.

Therefore, the overall effectiveness of the large clearcuts within the South Fork watershed is debatable but certainly the edge portions closer to cover will be highly used by big game species and others. Maintaining adequate cover, i.e., late successional habitat close to large open areas will be particularly important for this reason.

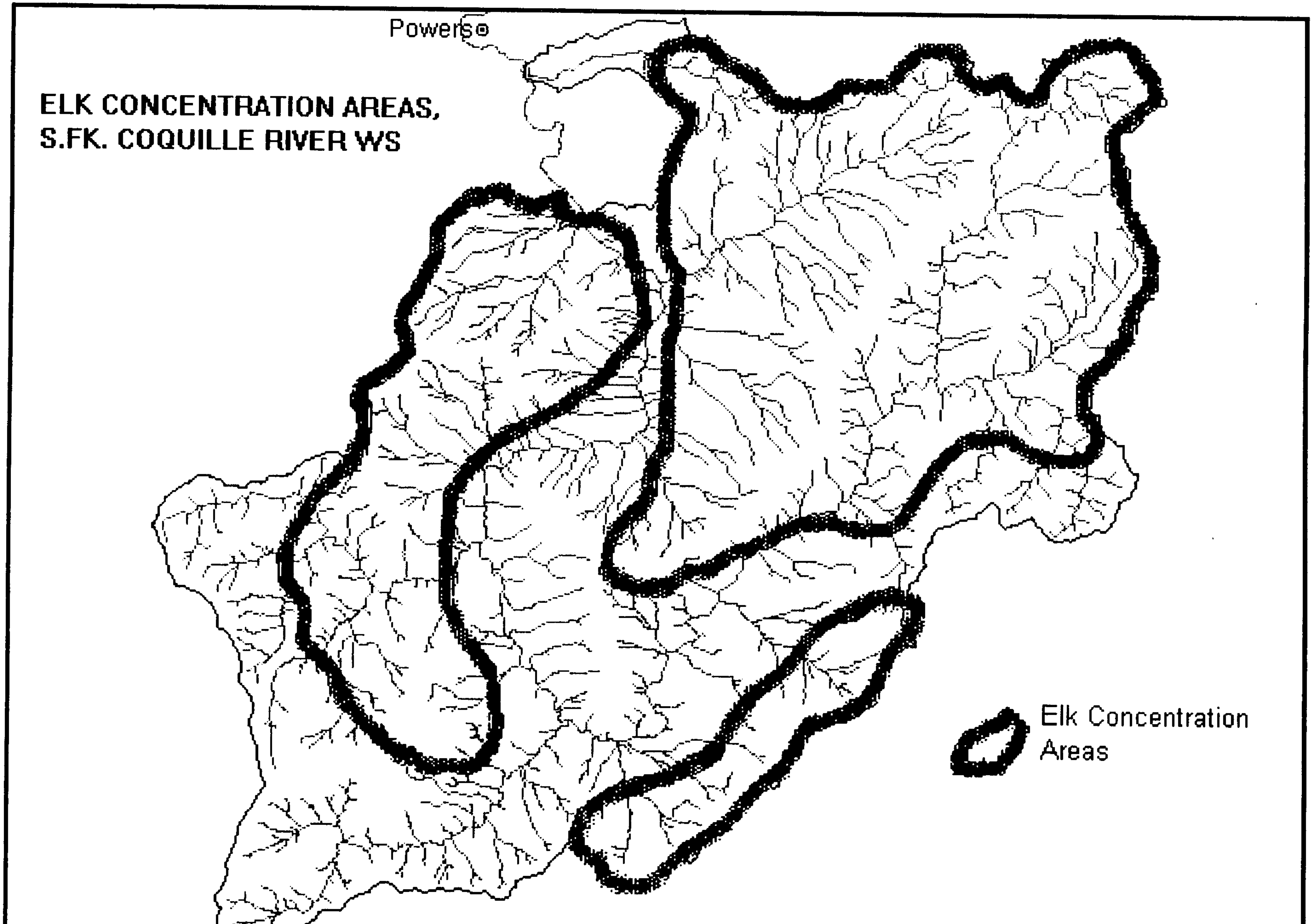
ELK CONCENTRATION AREAS,
S.FK. COQUILLE RIVER WS
Powers
Elk Concentration
Areas

Figure T-5

FINDINGS OF FACT

Watershed Vegetation

1. A wide variety of indigenous vegetation exists in the watershed due to the moderate climate, abundant rainfall, different soil types, wide range of elevation and diversity of habitats.

2. Vegetative composition and seral stages have changed dramatically in the past 100 years, almost entirely due to human activities such as overgrazing of livestock, road construction and logging.

3. There are six sensitive plant species present in the watershed, all of which currently have healthy populations and adequate safeguards for survival.

4. There are approximately 70 species of exotic plants present in the watershed which tend to establish in areas of extensive ground disturbance such as road building, logging, intense prescribed burning of logging slash, and overgrazing.

Port-Orford-cedar

1. The watershed contains the most important POC concentrations within its natural range.

2. Port-Orford-cedar root disease *Phytophthora lateralis* exists in the watershed.

3. Any reduction of an individual component (human activity, elk/cattle activity, POC-infected soil/water) will reduce the probability of infection.

4. *Phytophthora lateralis* moves in water via aquatic spores, as spores in mud transported by people, machinery, or animals, or by growing through root grafts between adjacent trees.

5. Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores.

6. Soil moisture is by far the greatest environmental influence on the spread of *Phytophthora lateralis*.

Wildlife

1. There has been a measurable decrease in late-successional seral stages in the last century. Consequently, there has also been an increase in early successional stages.

2. Species associated with late successional forest have declined in numbers and distribution while early successional ones have increased.

3. Surveys have documented spotted owls in good numbers and stable populations.

4. Occupied behavior has been documented for marbled murrelets.

5. Roosevelt elk now occur in the watershed at much higher numbers than a century ago.

6. The manner in which the timber has been extracted from the watershed has resulted in a significant amount of fragmentation and a resulting increase in species which thrive on edges.

7. A decline in population numbers has been observed over the last 15 years for the red-legged frog.

8. Exotic species have been observed in the watershed, mainly the wild turkey and the bullfrog, and likely there will be others in the future (nutria).

DATA GAPS

Watershed Vegetation

1. More information on fire history is needed.

2. More *general* surveys are needed to make a complete inventory of plants on the District and to add to the District Herbarium collection and plant slide files.

3. More *intensive* surveys are needed on Sensitive plants present on the District, and on plants specifically listed in the 1994 ROD.

Wildlife

Lack of basic inventory data (presence/absence and habitat use) on many wildlife species such as:

Furbearers	Small Mammals	Frogs/Toads
Salamanders	Turtles	Lizards
Songbirds	Raptors	

OPPORTUNITIES

Watershed Vegetation

1. Many of the special plant habitats may be maintained or enhanced by such methods as periodic prescribed burns in meadows or by ensuring sustained water flows by leaving adequate riparian zones.

2. Gorse may be killed by pulling the entire plant from the ground when the soil is moist. This program should be aggressively pursued while the population is still small.

3. Trucks and other machinery which work in gorse-infected areas may be treated by washing and disinfecting before entering on Forest land for other projects.

4. Tansy may be controlled by the use of biological controls such as the tansy flea beetle. These may be gathered locally and applied directly on the plants.

5. The use of the ODFW exotic seed mix will eventually be discontinued as local farmers and nurseries grow native grass seed for use on future projects.

Port-Orford-cedar

1. Sanitize roads that exhibit moderate to high occurrences of POC. Remove all POC within 50 feet downhill and 25 feet uphill. Listed below are roads that are in need of sanitization.

Road Numbers	*Area Identifier*
3347.070	Dry Hoss
5502.295,316	Toastberry
3353.014	Slick John
3358.155	Homestead
3363.223	Fat Hickey
3358.220	Bike Loop
3347.190	LSR
3348.084	Panther Grab
3347	Iron Sucker Gate
3347	N. Top Rock Gate

3347	Up & Down Unit#1
3363.070	Slick Thin
5560.050,055	Alnus (behind gate)

2. Consider removal of POC in areas immediately adjacent (50 feet both sides) to streams and drainages (surface or shallow subsurface flow). Thereafter, in those areas, continue removal of POC based on site-specific spacing requirements.

3. Permanently close roads that do not provide access for further management activities and gate those roads that may provide access for future management activities.

4. Continue seed collection for planting POC in low risk plantations, as well as the search for genetically resistant stock (in cooperation with Institute of Forest Genetics of Placerville, California).

5. Consider using Global Positioning System (GPS) to locate plots throughout the district, which in turn can be set up to allow monitoring of the spread and/or introduction into new areas.

Wildlife

1. Some "wet sites" that were impacted under previous clearcutting management may benefit from wetland enhancement activities such as excavation, sealing to hold water, and wildlife shrub planting.

2. Create new and maintain existing meadows and small openings. Enhance existing areas within the watershed under Forest Service ownership.

3. Salvage operations will have the greatest potential to impact dead and dying trees. Following the Guidelines for Salvage (page C-13 through C-16 of the R.O.D.) will be critical.

MANAGEMENT RECOMMENDATIONS

Watershed Vegetation

1. Continue the present aggressive gorse eradication program in the watershed.

2. Continue use of biological controls where applicable.

3. Continue the native grass seed collection and cultivation programs for use on district projects.

4. Monitor road obliterations for native grass seeding and do any necessary reseeding:

5520-051 Clay Hill	5520-040 Baleout	5520-150 Panther Ridge
5520-180 Buck Gravy	5520-160 Panther Ridge	5521-080 Buckberry
5521-073 Buckberry	5325 south end of Iron Mtn.	3358-250 Cedar Swamp
3358-210 Cedar Swamp	3363-150 Johnson Mt.	3363-181 Flannigan Prairie
3363-142 Johnson Mt. near summit		

5. Continue to carefully monitor and eradicate known populations of exotics and to aggressively control any new ones.

6. Continue to survey for sensitive and rare species.

7. Manage and protect known populations of sensitive and rare species.

8. Maintain special plant habitats and species diversity by such methods as prescribed burns in meadows; selective thinning in older growth stands; and maintain adequate and clean water flows to wetlands and riparian zones.

9. Conduct plant surveys in special areas not previously addressed in project documents:

Squaw Lake	Darlingtonia Bog, Iron Mountain
Azalea Lake	Iron Mountain in general
Dry Lake	Coquille River Falls Research Natural Area
Cedar Swamp	Port Orford Cedar Research Natural Area
Mud Lake	Daphne Grove Campground
Panther Ridge	Vernally moist areas (specifically for *Bensoniella oregana*)
Eden Ridge Meadows	

Port-Orford-cedar

1. Continue POC disease control strategies.

2. Continue annual POC monitoring on site-specific projects.

3. Continue monitoring and mapping spread of *Phytophthora lateralis* within the analysis area.

4. Identify and map "safe" water sources for fire suppression purposes.

Wildlife

1. Intensive herptile surveys in cooperation with the ODFW were begun during 1995 and should be continued. This is especially important for species of concern such as the red-legged frog and western pond turtle.

2. Neotropical Breeding Bird Surveys and Winter Bird Surveys have been conducted annually on two established routes within the watershed since 1992. These give excellent basic data on species presence and population trends and should be continued. Other bird census methods such as Point Counts and mist-netting should also be continued. Osprey productivity is also monitored annually.

3. Elk surveys have been conducted annually in the watershed since 1990 (Shea, District files) and for many years by the ODFW. These should be continued to monitor any changes in sex and age ratios, numbers and distribution. .

4. Proposed, Endangered, Threatened and Sensitive animal species, such as spotted owls and marbled murrelets, should continue to be surveyed and monitored.

5. Habitat diversity on federal lands will be maintained as stated in the Siskiyou National Forest Plan and amendments.

6. Begin an inventory program using remote camera stations to document presence of furbearers of the area such as pine marten, fisher, bobcat, black bear, and gray fox.

7. Begin a second inventory program using pitfall traps to document species distribution of small mammals and amphibians.

8. Comprehensive management plans should be completed for special wildlife sites (per the Siskiyou National Forest Plan, S & G MA9-6). The only site with a completed plan presently is Cedar Swamp. This will ensure continued maintenance and enhancement of these unique habitats for wildlife species.

9. Continue to monitor and document activity of non-native wildlife species.

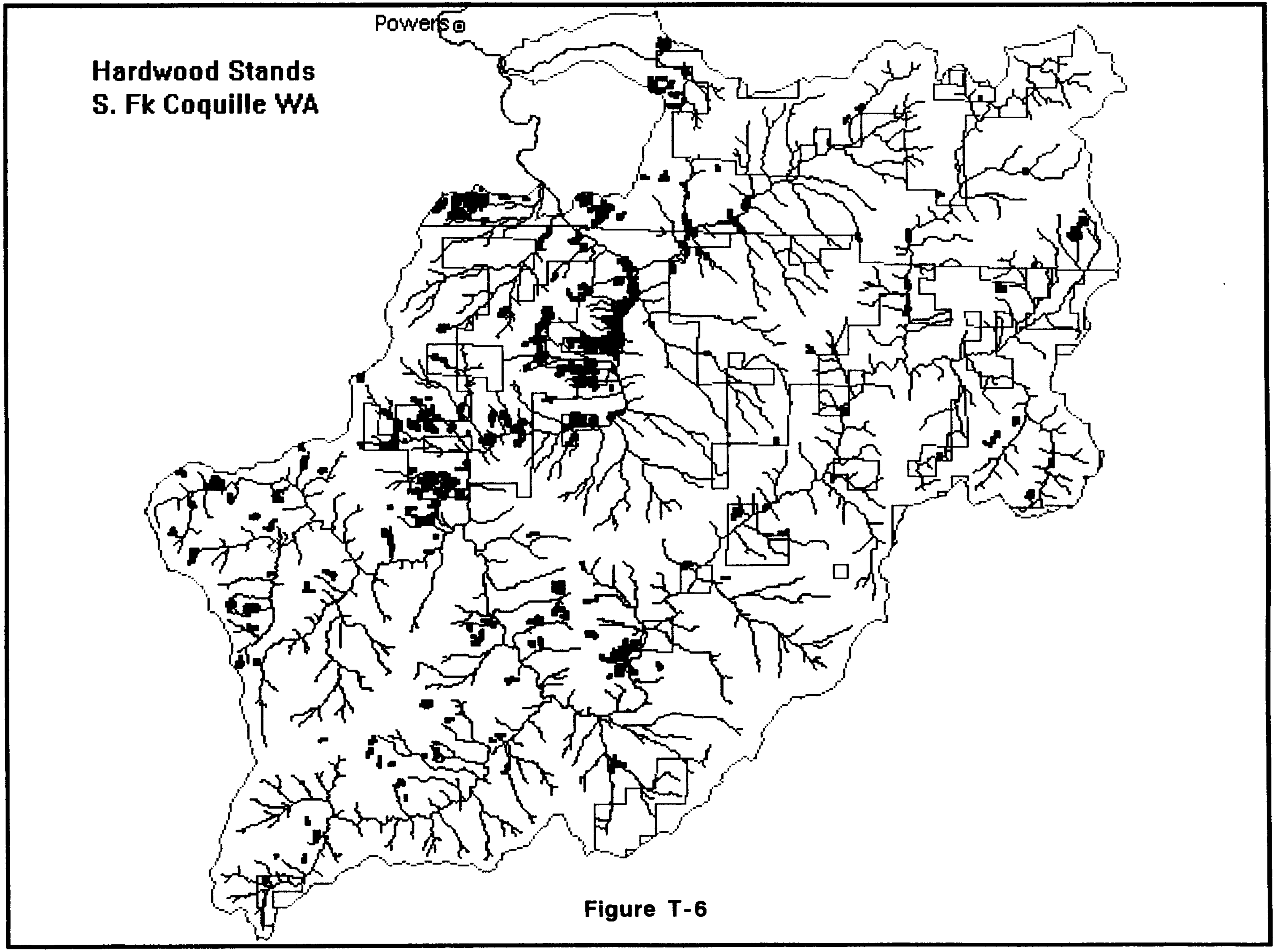

Figure T-6

TABLE 1: List of Special Habitats and Acres

Habitat Type	*Location*	*Acres*
Cliffs, Scabrock slopes	Road 33 along South Fork Coquille	20.0
	Hanging Rock	10.0
	Rock Bluffs #190	21.3
	Rock Bluffs #189	19.6
	Rock Bluffs #186	30.7
		101.6
Ponds, Small lakes	Azalea Lake	67.3
	Squaw Lake	25.0
	Mud Lake	14.5
	Dry Lake	31.5
	Ex-Nickel Pond	14.8
	Cedar Swamp	32.2
	Flannigan Wet Area	5.8
		191.1
Meadows, Small Openings	Eden Valley Meadows	78.3
	Johnson Mt. Meadows	31.9
	Flannigan Prairie	54.3
	Ferris Ford Meadows	13.8
	Fuzzy Gulch Meadow	14.8
	Wooden Meadow	13.4
	Foggy Meadow	126.4
	Camp Meadows	16.4
	Pioneer Camp Meadow	32.7
	Coal Meadow	37.0
	Salmon Mt. Opening	2.8
	Sweeney Meadows	121.1
	Shiv Scabrock Meadow	9.6
		552.5
(outside FS land)	Ash Swamp	10.0
	Doe Swamp	10.0
	China Flat	5.0
		25.0

TABLE 1: List of Special Habitats and Acres (continued)

Hardwood Stands	3358 Alder Stand	30.0
Riparian zones	All streams	396.0
Late Successional Forest	South Fork Coquille Pine Marten Habitat Area	160.0
	Johnson Pine Marten Habitat Area	191.0
	Rock Creek Pine Marten Habitat Area	187.0
	Buck Creek Pileated Habitat Area	373.0
	Spotted owl Nest Sites (Acres used by pair unknown)	2
	Panther Creek Elk Area	167.0
	Buck Creek Elk Travel Corridor	98.0
	Foggy Creek Elk Travel Corridor	128.0
	Clear Creek Elk Travel Corridor	54.0
		1,358.0

GLOSSARY OF ACRONYMS:

BLM	Bureau of Land Management, United States Department of the Interior
CCC	Civilian Conservation Corps
DEQ	Oregon Department of Environmental Quality
FEMAT	Forest Ecosystem Management Assessment Team Report
LRMP	Land and Resource Management Plan
LSR	Late Successional Reserves
NFMP	National Forest Management Plan
ODFW	Oregon Department of Fish and Wildlife
POC	Port-Orford-cedar
ROD	Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.
USFS	United States Forest Service
WAA	Watershed Analysis Area (Smaller drainages delineated in the Siskiyou Forest Plan used for ecosystem analysis. Usually 500-2500 acres.)

REFERENCES

American Fisheries Society, 1982, The Best Management Practices for the management and protection of western riparian stream ecosystems. Western Division of AFS, Riparian Habitat Committee. "whitepaper". 45 p.

Atzet, T. and R.E. Martin. 1991. Natural Disturbance Regimes in the Klamath Province. Proceedings of the Symposium on Biodiversity of Northwestern California, Santa Rose, California.

Bakke, P., 1993, 1993 Water Temperature Monitoring Report. USDA Forest Service. Powers Ranger District, Powers, OR. 32p.

Baldwin, E.M., Beaulieu, J.D., Ramp, L., Gray, J., Newton, V.C., Jr. and Mason, R.S., 1973, Geology and mineral resources of Coos County, Oregon: Bulletin 80, Oregon State Dept of Geology and Mineral Industries, 82 p.

Barr, N. and S.C. Suitt, 1980, Geologic observations and preliminary recommendations: Rock Creek Landslide, Powers Ranger District, Powers, OR. 3 p.

Behnke, R.J., 1992, Native Trout of Western North America: American Fisheries Society Monograph 6. American Fisheries Society. Bethesda, MD.

Bisson, P. A. [and others], 1987, Large woody debris in forested streams in the Pacific Northwest: Past, Present and Future. Pp. 143-190 *In*: Salo and Cundy (eds.), Streamside Management: Forestry and Fishery Interactions. Contr. no. 57, Inst. Forest Resources, University of Washington, Seattle, WA.

Chen, G.K., 1991, South Fork Coquille Basin: Fisheries Summary: USDA Forest Service. Siskiyou National Forest, Powers Ranger District, Powers, OR. 17 p.

Columbia River Basin Report (Draft), 1992, Region 6 Columbia River Basin Forest's Anadromous Fish Habitat Desired Future Conditions. USDA Forest Service, Region 6. 24 p.

Cooper, Loran J. 1939. A history of the Siskiyou National Forest.

Cross, S. 1989. Personal Communication.

DEQ, Coos Bay, 1993, Unpublished Turbidity measurements

Dott, R.H. 1971. Geology of the Southwestern Oregon Coast, West of the 124th Meridian: State of Oregon, Department of Geology and Mineral Industries Bulletin 69.

Goebl, A., 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Grandmontagne, Leo, 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Hallett, Joe, 1995, Oral communication. Powers Ranger District, Siskiyou National Forest.

Hamilton, J.R.and J.D. Remington. 1962. Salmon and Trout of the South Fork Coquille River in Relation to the Eden Ridge Hydroelectric Project. Pacific Power and Light Company. Portland, OR.

Harbert, Steve. 1995. Personal oral communication. Powers Ranger District, Powers, OR.

Hicks, B.J., R.L. Beschta, and R.D. Harr. 1991. Long-term Changes in Streamflow Following Logging in Western Oregon and Associated Fisheries Implications. Water Resources Bulletin, American Water Resources Association, Vol.27, No.2.

Hoffman, T., 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Hyland, C.J., 1992, 1992 Water Temperature Monitoring Report. U.S.D.A. Forest Service. Powers Ranger District, Powers, OR. 21 p.

Interagency Scientific Committee. 1990. A conservation Strategy for the Northern Spotted Owl: Report of the Interagency Scientific Committee To Address the Conservation of the Northern Spotted Owl. Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. USDA Forest Service, USDI Bureau of Land Management, USDI Fish & Wildlife Service, USDI National Park Service. Portland, OR 427 p.

Johnson, S.R. 1995. Factors Supporting Road Removal and/or Obliteration. USDA. Forest Service, Kootenai NF. 5 p.

Lisle, T.E. 1986. Stabilization of a gravel channel by large streamside obstructions and bedrock bens, Jocoby Creek, northwestern California. Geological Society of America Bulletin. 87:999-1011.

Magill, J. 1976. Eden Valley History. A written historical account of the Eden Valley Area. 6 p.

Magill, Joe, 1995, Oral communication with Dave Shea, Siskiyou National Forest, Powers Ranger District, Powers, OR.

Maser, C. [and others] 1981. Natural History of Oregon Coast Mammals. Pacific NW Forest and Range Experiment Station. General Technical Report PNW-133.

Meehan, W.R. editor, 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. Bethesda, MD. 751 p.

Middlebrook, G.D. 1993. Draft Deer and Elk Management Plan, Siskiyou National Forest.

Nehlsen, W., J.E. Willaims, Itchatowich, J.A. 1991. Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho and Washington. Fisheries. 16 (2):4-21.

Nickelson, T. E. [and others]. 1992. Status of Anadromous Salmonids in Oregon Coastal Basins. Oregon Department of Fish and Wildlife. Portland, OR. 83 p.

Nussbaum, R.A., E.D. Brodie, Jr., and R.M. Storm. 1983. Amphibians and Reptiles of the Pacific Northwest. A Northwest Naturalist Book. University of Idaho Press...., ID. 332 p.

ODFW, 1969, Records on transplanting coho salmon in Foggy and Wooden Rock Creeks: Oregon Department of Fish and Wildlife. Portland, OR.

ODFW, 1992, Wild Fish Management Policy: Oregon Department of Fish and Wildlife. Portland, OR. 21 p.

ODFW, 1992, Coquille Basin Fish Management Plan: Oregon Department of Fish and Wildlife. Portland, OR. 125 p.

ODFW, 1993, An evaluation of winter steelhead hatchery-to-wild ratios on the South Fork Coquille River in the run year 1992-93: Oregon Department of Fish and Wildlife. Charleston, OR. 20 p.

Oregon Forest Practices Act Amendment, 1994. New water classification and protection rules under the Oregon Forest Practices Act. Oregon Department of Forestry.

Reeves, G.H. [and others], 1991, Rehabilitating and modifying stream habitats. American Fisheries Society Special Publications. 19:519-558.

Roth, L.F., R.D. Harvey, and J.T. Kliejunas. 1987. Port-Orford cedar Root Disease. For. Pest Leafleat R6-FPM-PR-010-91. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Portland, OR.

Rumreich, 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Ryman, N. and F. Utter, 1987, Population Genetics and Fishery Management: University of Washington Press, Seattle, WA.

Sedell, J.R., Maser, C. 1994. From the Forest to the Sea: the ecology of wood in streams, rivers, estuaries, and oceans. St. Lucie Press, Del Ray Beach, Florida. 200 p.

Shea, D.S. 1981. Beavers on the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR.

Shea, D.S. 1990. A Short History of Elk on the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR.

Shea, D.S. 1992. Checklist of Common Plants on the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR 97466.

Shea, D.S. 1993. Exotic Plants on the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR 97466.

Shorb, Lowell, 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Shorb, Willy, 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Stinson, Rennay, 1995, Oral communication with Max Yager, Powers Ranger District, Siskiyou National Forest.

Sullivan, K., Lisle, T.E., Dolloff, C.A., Grant, G.E., Reid L.M., 1987, Stream channels: the link between forests and fishes: in Salo, E. O., and Cundy T. W., eds., Streamside Management: Forestry and Fisheries Interactions, Contr. No. 57, Inst. Forest Resources, University of Washington, Seattle, WA.

Townsend, Curt, 1995, Oral communication with Joe Hallett and Cindy Ricks (written documentation): Powers Ranger District, Siskiyou National Forest.

Trotter, P.C., 1989, Coastal cutthroat trout: A life history compendium: Transactions of the American Fisheries Society 118:463-473.

USDA Forest Service, 1986 unpublished, Shooting Star Report: Siskiyou National Forest

USDA Forest Service, 1989, Final Environmental Impact Statement, Land and Resource Management Plan: Siskiyou National Forest. Grants Pass, OR.

USDA Forest Service, March 1993, unpublished, Eligibility Study, South Fork Coquille River and Two of its Tributaries: Johnson Creek and Wooden Rock Creek.

USDA Forest Service and USDI Bureau of Land Management, 1994a, 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. Two volumes and appendices. Portland, OR.

USDA Forest Service and USDI Bureau of Land Management, 1994b, Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.

Van Dyke, F.G. [and others]. 1986. Reactions of mountain lions to logging and human acitivity. J. Wildl. Manage. 50(1):95-102.

Verts, B.J. and L.N. Carraway. 1984. Key to the Mammals of Oregon. Oregon State University Book Stores, Inc. Corvallis, OR.

Webb, L. and D. Shea. 1990. Amphibians, Reptiles, and Mammals of the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR.

Webb, L. and D. Shea. 1991. Birds of the Powers Ranger District. Siskiyou National Forest, Powers Ranger District, Powers, OR.

Wesche, T.A., 1974, Relationship of discharge reductions to available trout habitat for recommending suitable streamflows: University of Wyoming, Water Resources Research Institute, Water Resources Series 53, Laramie, WY.

Wisdom, M.J. [and others]. 1986. A model to evaluate elk habitat in western Oregon. Publication No. R6-F&WL-216-1986. USDA Forest Service, Pacific Northwest Region, Portland, OR. 36 p.

Yager, Max, 1995, Oral communication regarding visual observations of turbidity: Powers Ranger District.

Zobel, D.B.; L.F. Roth, and G.M. Hawk. 1985. Ecology, Pathology, and Management of Port-Orford-cedar (Chamaecyparis lawsoniana). Gen. Tech. Rep. PNW-184. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station.

Appendix A: Methods

Sediment Delivery:

Areas of high, moderate, and low watershed sensitivity were delineated by Linda Hayden, Powers District Geologist, on 1986 1:12,000 true color aerial photographs in 1990. The criteria listed below were used for delineation. This mapping was not transferred to a map base and is not available as a GIS layer.

Watershed Sensitivity Criteria
* Slope angle: probability of mass failure, movement of detached soil, risk of delivery
* Landform and slope shape: soil depth and potential for groundwater concentration
* Proximity to stream channnels: risk of delivery
* Lithology and structure: texture of parent material and soil (friction angle, cohesion), soil depth, contrasting permeabilities, orientation of materials underlying slopes
* Location of existing landslides (natural, road- and harvest-related): combinations of other factors which result in failure
* Type of existing landslides or other erosion process: debris flows (torrents) from headwalls, debris slides from scarp and toe of slump-earthflows, gullies from toe of slump-earthflows
* Location of facilities which could increase the watershed sensitivity: sidecast or stacked roads with previous failures

Observations of sediment sources, delivery mechanisms, and changes in frequency are based on:
* Interpretation of 1982 high altitude (1:58,000) color infrared aerial photographs
* Observations of types and magnitudes of landslides and erosion experienced during the February 1986 storm, winter 92-93, and winter 94-95.
* Mapping of landslides in the Coquille River visual corridor from 1979 1:24,000 true color aerial photographs.
* Interview with Curt Townsend (1995).

Road Construction and Harvest history Maps

Maps of road construction and harvest history were constructed using the District Total Resource Inventory (TRI), and by consulting with long-time residents and engineering records. These land use maps were compared with the watershed sensitivity mapping on photos to create a list of road segments in high, moderate, and low watershed sensitivity, and a list of timber harvest areas in high watershed sensitivity (currently stored as Lotus 1-2-3 files with the Forest Resource Geologist in Gold Beach).

Seral Information:

The riparian buffer/seral stage map was constructed in ARC/INFO GIS at the Siskiyou National Forest headquarters. It was based on a 200' tree-height for the Powers Ranger District and using these buffer-width parameters:

* 400' buffer radius around Class I and II streams
* 200' buffer radius around Class III and IV streams (Class IV's were only included within the matrix lands.)

This layer was imported into the UTOOLS program, where it was used as a template to cut out a portion of the vegetation datat contained there. This vegetation data was originally derived from the Pacific Meridian Resources (PMR) satellite scan data. The resulting riparian buffer/seral stage map and database (paradox) was used to produce maps and reports.

It was assumed that private lands will be managed for timber on a 50 year rotation and riparian buffer strips will be determined as outlined in the amendment to the Oregon Forest Practices Act (1994).

Assumptions for Terrestrial Analyses

Important processes are succession, reproductive needs, migration needs, and patch size disturbances for looking at the key questions for terrestrial (vegetation and wildlife).

1. Age groupings of PMR seral stages

Pioneer	< 50 years old.
Early Seral	Average 100 years old (50%< and 50%>) (ranges from 50 to 150 years).
Mid Seral	Average 150 years old (50%< and 50%>) (ranges from 100 to 200 years).
Late Seral	>200 years old.
Climax	>300 years old.

2. Estimate of Historical Vegetation in 1890 and Future Vegetation in 2040.

Existing	*Past (1890)*	*Future (2040)*
Pioneer	Late Seral or Climax	Early Seral
Early Seral	Late Seral or Climax	Mid Seral
Mid Seral	Pioneer	Late Seral
Late Seral	Mid Seral	Climax or Late Seral
Climax	Climax	Climax
Nonforested	Nonforested	Nonforested

Appendix B: Road Segments with Past or High Potential for Initiating Debris Flows

Road Segments with past or high potential for intiating Debris Flows (based on interpretation of 1982 high altitude color infrareds, and knowledge of recent debris flows in the watershed). Need to note which sites have been treated already by road obliteration/decommissioning programs over the last decade.

Watershed - Road Number - Evidence

Johnson Creek

Upper Johnson, roads 3353160 and 3353200x (Bray Mountain) have crossings in headwall positions.

Granite Creek, road 3353 at very upstreammost headwall, a debris flow would scour out large wood from a riparian zone that is still somewhat intact. Landing above failed from road 3353220.

Granite Creek, road 3353 just past 180 road that had a past pullback site, past debris slides, headwall locations.

Rock Creek

Sand Creek and Shale Creek, road 3343, debris flows

Rock Creek, Road 33 fill failures directly into channel

Lower Mainstem

"Section 8" creeks, road 3358, direct delivery by debris flows to mainstem

Kelly Creek, end road 3358160, each crossing has produced a debris flow.

Anderson and Daphne Creeks, road xxxx510.

Elk Creek, "George Road" 3358050.

Elk Creek, extension of road 3358150 into the headwall area of Elk Creek not shown on district map

Upper Land Creek and the watershed to the east, private roads on bluff line, have had debris flows

Coal Creek

Lower Coal Creek, road 3358 (winter 94-95 with failures)

Woodby Creek area, road 5000110, large debris flow, didn't deliver to stream?

Upper Mainstem

Upper South Fork, near Elk Horn campground, end road 3358180.

Wood Table area, road 3348270 (and 275?), winter 92-93 failure

South Fork Lockhart Creek, road 3358 with poor location following channel with steep grade, and 250 road.

Appendix C: South Fork Coquille River Historical Summary

Compiled by Joseph Hallett
Cultural Resource Technician
Powers Ranger District

The South Fork Coquille River flows northerly into the Coquille River just east of Myrtle Point in southwestern Oregon. The South Fork is approximately 50 miles long and drains a watershed of about 150 thousand acres between the Rogue River and the Umpqua River drainages. The lower 22 miles wind through broad flat grassy valleys on private land outside the Siskiyou National Forest boundary. The upper 28 miles and 83,500 acres are within the Siskiyou National Forest. Much of this land is steep with narrow canyons. Vegetative cover is mostly Douglas-fir trees, both old growth and second growth. The understory is abundant heavy brush. The area within the National Forest is covered by the Powers, Agness, Bone Mountain, and Marial quadrangle maps of the U.S. Geological Survey.

Before the coming of the white man, this area was inhabited by the Upper Coquille band of the Athabascan Indians. The Cow Creek band of the Umpqua Tribe, as well as several bands of Rogue River Indians, may have used the river headwater valley, later named Eden Valley after an early settler. There were Indian settlements in the Broadbent, Gaylord, and Powers areas of the South Fork Coquille River. Seasonal hunting camps existed higher in the river valley.

A main trail ran north-south through what is now the Siskiyou National Forest. It followed the South Fork Coquille River up to Rock Creek then climbed to the divide at Agness Pass and down to Illahe and Agness on the Rogue River.

The first whites in the region were fur trappers and traders in the 1820's.
In 1826-27, Alexander R. McLeod, of the Hudson's Bay Company, traveled south from Fort Vancouver, through the Willamette Valley, into and down the Umpqua River drainage, to the Coos Bay and Coquille River systems, and then south along the coast to the mouth of the Rogue River. In 1828 Jedidiah Smith's American, trapping party crossed the Elk and Sixes Rivers, on a journey north, along the coast, from California. The party was later massacred and robbed at the mouth of Smith River. Much of the early fur trade was conducted over the inland California Trail by the Hudson Bay Company, which maintained a near monopoly over the region's fur trade for 40 years. In the 1820's, the company established its most southern post, Fort Umpqua, near present day Elkton.

White settlers & miners started moving into the area in the early 1850's. Many placer mines operated in the South Fork Coquille River area and its tributaries. Johnson Creek and Rock Creek were actively mined. The miners used the early Indian trails and built some of their own.

The first white settlement on the southwestern Oregon coast was at Port Orford, founded by Capt. William Tichenor in 1851. The Coos Bay and Umpqua River areas also began attracting settlers in the early 1850's.

In August of 1851 a party led by W.G. T'Vault left Port Orford to find a route to the mines of Jackson County. They proceeded over to the Rogue River, then up to Big Bend where most of the party turned back. A small group continued but were forced by the topography northward to the South Fork Coquille River which they followed to the ocean where they were attacked and scattered by the Lower Coquille Indians.

The U.S. Army established a post, Fort Orford, this same year as a result of the hostilities. The army attempted to open a trail to Fort Lane in the upper Rogue River Valley. In October 1855, Lt. August V. Kautz took a detachment of soldiers through the Coast Range. The expeditions map, drafted the following year by Thomas Cram shows they travelled up the Elk River watershed to Iron Mtn. then to the Rogue River and up the Mule

Creek drainage then down the Rogue/Cow Creek divide to the interior Rogue Valley at Grave Creek. This and another 1856 map of the Port Orford vicinity are the areas' first detailed maps.

Charles Foster came to the west coast in 1849. Before settling on the Big Bend of the Rogue River in 1853, he ran a pack train from Crescent City, California to the Randolph mines north of the Coquille River near the coast. He was employed to guide Captain Smith and a company of soldiers over the trail from Port Orford to the Big Bend during the Indian war of 1856.

With the discovery of gold in the black sands along the beaches in 1853, near both Randolph and Gold Beach, many prospectors poured into the region from California. In July of 1854, Thomas "Coarse Gold" Johnson found placer gold near the headwaters of the South Fork Coquille River, on the creek now bearing his name. His discovery created a minor gold rush . The success of Jake Summers' mining on the Sixes River also led to a small gold rush in 1856. In the mid 1870's a second mining boom occurred at the mouth of the South Fork Sixes River, and was developed by the Hydro Sixes Mining Company in 1914.

The Indian war of 1855-56 was a result of increasing hostility between the Indians and the white miners and settlers who moved into the region, in great numbers, following several gold strikes in the early 1850's. After the war almost all the Indians were removed from southwestern Oregon to reservations at Siletz and Grand Ronde.

Johnson Creek, Johnson Mountain, Barklow Mountain, China Flat, China Creek, McCurdy Creek, Delta Creek, and Hall Creek were named by the early miners dating from the 1850's. The Chinese, perhaps a thousand strong, had a settlement at China Flat in the late 1800's and worked the diggings on Johnson Creek until they were chased off by the homesteaders of the North Carolina Settlement (Powers area) in the 1890's. In 1891 heavy rains caused the Sucker Creek slide and two others on Johnson Creek which buried much of the miners diggings.

In 1858, Binger Hermann founded the Baltimore Colony on the South Fork near Broadbent.

In 1868 there was a large fire on the southern Oregon coast. The fire spread from Yachats to the Klamath River in California and burned inland up to 30 miles. Much of the Elk and Sixes drainages were burned. The skipper of a small sailing vessel said the fire was in view for seven days.

After the fire of 1868 the hide hunters, or pelters as they were called, came into the area and established camps all through the Coquille and Cow Creek drainages. Some of the known camps were; Cedar Swamp, Hide Camp, Cold Springs, Elk Valley, Cow Creek, and Dutchman Butte. These men hunted deer and elk for their hides and elk eye teeth only. They exterminated the elk from Eden Valley.

The area that is now Powers was settled by a few early pioneers in the late 1850's to 1860's. Henry Woodward, Issac Bingham, O.C. Holcomb, and William McDonald were four of the earliest. Around 1872, four families moved into the valley to form what was known as the North Carolina Settlement. These families were the Hayes, the Gants, the Lands, and the Wagners. The Wagner homestead remains in downtown Powers as the Pioneer House, a museum. The community later became known as Rural when a Post Office was established. Around 1900 settlers from Rural began taking up settlements within what was to become the Siskiyou National Forest. After the Homestead Entry Act of 1906, many of them received deeds to land after proving they met requirements of the act. In 1915, Albert Powers built a logging railroad into the area from Myrtle Point. The community rapidly expanded in boom town fashion, becoming a logging center.

With the building of the Southern Pacific Railroad through the interior Umpqua and Rogue valleys into California in 1883, agriculture began to get into production basis. Westfork, (the post office known as Dothan), was a railway station at the junction of Cow Creek and West Fork Cow Creek. The railroad had reached this far by 1879-80. This was the gateway to Eden's valley, 25 miles west, a 2 or 3 day trip with pack stock. Settlers moved into Eden Valley living by subsistance farming, and cattle ranching. Just east of the valley was the Bolivar (Thompson) Mine with an adit 700 feet long. During the early 1900's it only produced about 300 tons of ore, yeilding only 5% copper. In 1902 when a fire started in Eden Valley the old timers who remembered the disasterous fire of 1868 decided they should do all they could to extinguish it. Many volunteers were recruited from miles around and stopped the fire before it did much damage. Loren Cooper in his History of the Siskiyou National Forest mentions 5 more fires from 1914 to 1930 around the Eden Valley, Foggy Creek, West Fork Cow Creek areas.

At its height Eden Valley and environs had 7-10 families, a post office, a school, two sawmills, and an emergency airplane landing field. It wasn't until about 1947-48 that Eden Valley was accessable by road from Powers. Settlers lived in Eden Valley, the headwaters of the South Fork Coquille, from the 1880's until 1956 when the last family sold & moved out.

The Siskiyou National Forest was established around 1906.

Almost all of the land in the watershed was surveyed between 1901 and 1925. The surveyors recorded in their notes: settler's & miner's names, cabins, trails, and ranger's cabins.

About 1914 many applications for coal land acquistion were made on Eden Ridge and in Squaw Basin. Lands verified as coal bearing were deeded to the claimants for a price. All later sold out the land to timber companies. Very little commercial coal was produced from these mines.

Also in 1914 a shake shelter was built on Bald Knob by the lookout fireman. In 1918 a new cabin, shake exterior-sealed inside, was built on Bald Knob. Over the next 3 years work progressed on the Price Trail (Coquille River to Illahe). Around 1953 the road into Bald Knob lookout was built. In 1963 the present 20' flat cabin tower was built on Bald Knob.

In 1915, John R. and Owen W. Smith with others located 4 placer claims in the upper Rock Creek drainage totaling 640 acres. In 1918, Owen W. Smith, W.M. Dietriech, and another located the Anaconda Lode #1 claim just east of Iron Mountain. These claims were then worked. In 1935 a quit claim deed was made to John and Martha Nielson for the 4 placer claims. In 1939 patent was granted for 200 acres on 3 of these claims as well as the Anaconda claim (15 acres). Nielson later aquired the Anaconda claim. Dietriech died on the claim in 1936 and his grave is still there. A 1935 letter mentions 3 buildings on the claim and the 1925 GLO notes also show a blacksmith shop. Bonanza Basin to the south was mined by Tom Wallace and his wife about this same time.

A lookout station was built on Iron Mountain in 1925 and used until about 1943 when the smokejumper project started.

From 1915 - 23 the Smith/Powers Company and later the Coos Bay Lumber Company conducted railroad logging in the Salmon Creek and Land Creek areas.
From 1929-36 railroad operations were extended east of Powers onto Eden Ridge.

In 1922 nearly all the land around Powers burned destroying reproduction, this happened again in 1935. By 1927 the experiment of running 500 sheep on Johnson Mountain was a success. A shake cabin was built on Johnson Mountain in 1928-9 and a 40' pole tower was built for it in 1936. The lookout tower was replaced in 1949 with a 65' treated timber structure and was used until the early 1960's. It was destroyed about 1968.

In 1928 a lookout was built on Mt. Bolivar. In 1934 the C.C.C. completed a road from Glendale to the Eden Valley Ranger Station, the Mount Reuben Road. The ranger station was purchased about 1910, and used until about 1950.

1929 was the worst fire year in the history of the Port Orford/Powers Ranger District. There was a bad fire on Salmon Creek and a smaller one on Johnson Mountain. Later the same year, several hundred incendiary fires were set on the North Fork of the Elk River which burned Barklow and Salmon Mountains, destroying fine stands of reproduction. This fire was finally extinguished by December rains. The Barklow Fire burned 9000 acres with a perimeter of 26 mi.

In 1931, the Pepper brothers, miners at the mouth of Johnson Creek, constructed a road to their mine by way of Land Creek and Sand Rock Mountain. This road came down the west side of China Creek, above China Flat and Dry Creek falls, and then south to Johnson Creek. The road along the South Fork Coquille River was extended to China Flat by the C.C.C. during 1933-34.

A Civilian Conservation Corps camp existed at China Flat fom 1933 to 1940. Building the road connecting Powers with Agness was one of the major projects of the camp. Men from the China Flat camp built the road southward. In 1937, they joined the road segment built by the Agness crew. This connected Agness to the outside world by road. In 1938, C.C.C. crews from the China Flat camp began snag falling on Johnson Mountain for fire protection. In 1940 the crew conducted the first thinning operation on the Siskiyou N.F. in the Upper Land Creek area. Douglas-fir was taken out and Port Orford cedar saved.

In 1935 The Northwest Forest & Range Experiment Station started developing the Experimental Forest, on the Siskiyou National Forest, under the depression era Emergency Relief Act (E.R.A.). The Experimental Forest was to study the management of Port Orford cedar. In 1936, the "Husposka Place" (formerly the Lawson Thomas homestead), on the South Fork Coquille was aquired. The White Cedar House was then built as a headquarters. A log stringer bridge was also built across the river. The Experimental Forest extended from Johnson Creek, south, and from the Coquille River, west, to the Rock Creek divides with Elk River and the Rogue River. This land was mapped and cruised between 1935-38.

In 1938 a CCC spike camp was built at soldiers camp for the road work on the Iron Mountain Road. The Nielson claim was logged in 1940. In 1953 a Canadian plane crashed on Iron Mountain ridge. A salvage road was constructed to it 3 miles north from soldiers camp. There is a 1 acre, cat excavated, copper mining pit; 1/4 mile west of soldiers camp that was worked in the early 1950's by the late Jack Hannon and a partner. There are similar chrome mining pits northeast of Iron Mountain. In 1981 many lode mining claims were staked on and around Iron Mountain. There is no evidence that any of them has ever been worked.

In 1939 a bad fire in slashings near the mouth of Wooden Rock Creek was caused by a logging steam "donkey" blowing up, this is known as the Bryant fire named after the logger. In the late 1940's the roads up Foggy and Clear Creeks were built and the private timber logged out.

The Forest Service maintained some of the old trails, did some selective logging in the early years, and started building some roads. After World War II, the Forest Service started intensively managing timber and building logging roads.

Since 1948, development in the watershed has been rapid and today most of the drainages have been roaded and logged. The Forest Service required the dismantling or burning of cabins on abandoned mining claims in the late 1960's and early 1970's. There are now no permanent residents within the forest.

Both private and National Forest lands today are managed timber stands that also provide recreational use. There is no longer any stock grazing or cultivation.

APPENDIX D: EXOTIC PLANT SPECIES PRESENT IN THE SOUTH FORK COQUILLE RIVER WATERSHED

TREES

Apple	PYMA
Redwood	SESE

SHRUBS

French Broom	CYMO3
Scotch Broom	CYSC
Sweetbriar Rose	ROEG
Himalayan Blackberry	RUDI
Evergreen Blackberry	RULA2
Gorse	ULEU

GRASSES, SEDGES, RUSHES

Silver Hairgrass	AICA
Meadow Foxtail	ALPR
Sweet Vernalgrass	ANOD
Slender Oat	AVBA
Quaking Grass	BRMI
Soft Brome	BRMO
Ripgut Brome	BRRI
Cheatgrass	BRTE
Crested Dogtail	CYCR
Dogtail Grass	CYEC
Orchardgrass	DAGL
Crabgrass	DISA
Alta Tall Fescue	FEAR3
Foxtail Fescue	FEME
Nitgrass	GAVE2
Velvetgrass	HOLA
Toadrush	JUBU
Annual Rye	LOMU
Perennial Rye	LOPE2
Timothy	PHPR
Annual Beardgrass	POMO
Kentucky Bluegrass	POPR

FORBS

Scarlet Pimpernel	ANAR3
Chamomile	ANCO
English Daisy	BEPE
Oxeye Daisy	CHLE2
Canada Thistle	CICA
Chicory	CIIN
Poison Hemlock	COMA2
Queen Anne's Lace	DACA4
Foxglove	DIPU
Teasel	DISY
Crane's Bill	ERCI
Coast Fireweed	ERPR
Dovefoot Geranium	GEMO
English Ivy	HEHE
Klamathweed	HYPE
Cat's Ear	HYRA
Everlasting Pea	LALA3
Bird's Foot Trefoil	LOCO3
White Sweet Clover	MEAL
Yellow Sweet Clover	MEOF
Pennyroyal	MEPU
Parentucellia	PAVI
English Plantain	PLLA
Common Plantain	PLMA
Curled Pondweed	POCR
Creeping Buttercup	RARE
Sheep Sorrel	RUAC
Curley Dock	RUCR
Burnet	SAMI2
Soapwart	SAOF2
Tansy	SEJA
Common Groundsel	SEV
Sowthistle	SOAR
Chickweed	STME
Red Clover	TRPR
Hop Clover	TRPR2
Salsify	TRPR4
White Clover	TRRE
Moth Mullein	VEBL
Common Mullein	VETH

Appendix E: Amphibians, Reptiles and Mammals of the South Fork Coquille Watershed and Their Associated Habitat

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
AMPHIBIANS:									
Red-legged frog	Uncommon		X	X					
Foothill yellow-legged frog	Common			X					
Bullfrog	Occasional		X	X					
Pacific treefrog	Abundant		X	X					
Tailed frog	Occasional			X				X	
Western toad	Occasional	X	X	X				X	
Pacific giant salamander	Common		X	X				X	
Northwestern salamandar	Common	X	X	X				X	
Long-toed salamandar	Hypothetical	X	X	X				X	
Olympic salamandar	Status Unknown		X	X				X	
Oregon salamandar	Common							X	X
Dunn's salamandar	Status Unknown		X	X	X				
Del Norte salamandar	Status Unknown				X				
Western red-backed salamander	Hypothetical							X	
Clouded salamander	Occasional						X	X	X

1 = to 100 years old
2 = 100 to 200 years old
3 = 200 [illegible] ars old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
California slender salamander	Occasional	X						X	X
Rough-skinned newt	Abundant	X	X				X	X	X
REPTILES:									
Western pond turtle	Rare		X	X					
Western skink	Common	X						X	X
Northern alligator lizard	Common	X					X	X	X
Southern alligator lizard	Occasional	X					X	X	X
Western fence lizard	Abundant	X			X		X	X	X
Sagebrush lizard	Status Unknown	X						X	
Rubber boa	Uncommon	X						X	X
Ringneck snake	Occasional	X						X	X
Sharp-tailed snake	Status Unknown	X						X	X
Gopher snake	Common	X				X	X		X
Western yellow-bellied racer	Common	X				X	X		
Northwestern garter snake	Status Unknown	X				X			
Common garter snake	Common		X	X				X	
Western terrestrial garter snake	Status Unknown	X						X	X

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Aquatic garter snake	Common		X	X					
Mountain kingsnake	Hypothetical	X						X	X
Common kingsnake	Hypothetical	X			X			X	X
Western rattlesnake	Hypothetical	X			X			X	X
MAMMALS:									
Opossum	Occasional	X		X		X	X	X	X
Vagrant shrew	Status Unknown	X		X				X	
Pacific shrew	Status Unknown		X					X	
Trowbridge shrew	Common						X	X	X
Dusky shrew	Status Unknown		X			X		X	
Shrew mole	Common			X				X	X
Townsend mole	Common	X							
Coast mole	Common	X							
Little brown myotis	Status Unknown		X	X				X	X
Yuma myotis	Status Unknown					X			
Long-eared myotis	Status Unknown	X				X			
Long-legged myotis	Status Unknown	X				X			

1 = to 100 years old
2 = 100 to 200 years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
California myotis	Common	X						X	X
Fringed myotis	Status Unknown	X							X
Silver-haired bat	Common							X	X
Big brown bat	Status Unknown	X				X		X	
Hoary bat	Status Unknown	X				X		X	
Townsend's big-eared bat	Status Unknown	X				X			X
Pallid bat	Status Unknown	X						X	
Bobcat	Common	X			X	X		X	X
Mountain lion	Occassional	X			X	X		X	X
Coyote	Common	X						X	
Grey fox	Rare	X							X
Raccoon	Common	X	X	X				X	X
Ringtail	Occassional	X		X	X			X	
Black bear	Common	X		X		X	X	X	X
Short-tailed weasel	Common	X					X	X	
Long-tailed weasel	Occassional	X						X	

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Mink	Common		X	X				X	
Marten	Occassional							X	
Fisher	Rare							X	X
Spotted skunk	Abundant	X						X	X
Striped skunk	Common	X				X		X	
River otter	Common		X	X					
Brush rabbit	Common	X				X			
Mountain beaver	Common	X	X	X			X	X	
Porcupine	Common						X	X	X
Beaver	Common		X	X					
Townsend chipmunk	Abundant	X						X	X
California ground squirrel	Common	X			X	X			
Western gray squirrel	Common							X	X
Douglas squirrel	Abundant						X	X	X
Northern flying squirrel	Common							X	X
Dusky-footed woodrat	Common	X				X	X		

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Red-necked Phalarope	Rare		X	X					
California Gull	Uncommon		X	X					
Western Gull	Uncommon		X	X					
Marbled Murrelet *	Uncommon			X				X	
Band-tailed Pigeon *	Uncommon					X		X	X
Mourning Dove *	Uncommon	X				X			X
Western Screech Owl *	Uncommon						X	X	X
Great Horned Owl *	Common					X	X	X	X
Northern Pygmy Owl *	Uncommon						X	X	X
Spotted Owl *	Uncommon						X	X	X
Barred Owl	Rare						X	X	X
Great Gray Owl	Rare							X	
Northern Saw-whet Owl *	Uncommon							X	X
Common Nighthawk	Rare	X						X	X
Vaux's Swift *	Common							X	X
Rufous Hummingbird *	Common	X				X			X
Calliope Hummingbird *	Uncommon	X				X			X
Allen's Hummingbird *	Uncommon	X				X			X
Anna's Hummingbird *	Rare					X			X
Belted Kingfisher *	Common		X	X					

***Known or believed to nest on district.**

1 = to 100 years old
2 = 100 to 200 years old
3 = 200[illegible]ars old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Cooper's Hawk *	Uncommon					X		X	X
Sharp-shinned Hawk *	Uncommon					X		X	X
Red-tailed Hawk *	Common	X				X		X	X
Golden Eagle *	Rare	X			X	X			
Bald Eagle	Rare			X					
Northern Harrier	Rare	X	X	X					
Osprey *	Uncommon		X	X					
Black-shouldered Kite	Rare	X				X			
American Kestrel	Uncommon	X				X			
Merlin	Rare					X			X
Peregrine Falcon	Rare				X				
Blue Grouse *	Common							X	X
Ruffled Grouse *	Common					X		X	X
Wild Turkey	Uncommon	X				X			X
California Quail *	Common	X				X			
Mountain Quail *	Common					X			X
Killdeer *	Uncommon	X	X	X					
Greater Yellowlegs	Rare		X	X					
Spotted Sandpiper *	Common		X	X					
Common Snipe *	Uncommon	X	X						

*Known or believed to nest on district.

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

Appendix F: Birds of the South Fork Coquille Watershed and Their Associated Habitat

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Common Loon	Rare		X	X					
Horned Grebe	Rare		X	X					
Western Grebe	Rare		X	X					
Double-crested Cormorant	Rare		X	X					
Great Blue Heron	Common		X	X					
Green-backed Heron	Uncommon		X	X					
Great Egret	Uncommon		X	X					
Tundra Swan	Rare		X	X					
Canada Goose	Rare		X	X					
Mallard *	Common		X	X					
Green-winged Teal	Uncommon		X	X					
Cinnamon Teal	Rare		X	X					
Wood Duck *	Uncommon		X	X					
Ring-necked Duck	Uncommon		X	X					
Bufflehead	Rare		X	X					
Common Merganser *	Common		X	X					
Hooded Merganser	Uncommon		X	X					
Turkey Vulture	Common	X			X	X	X	X	X
Goshawk	Rare					X		X	X

***Known or believed to nest on district.**

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Bushy-tailed woodrat	Common	X			X			X	X
Muskrat	Occassional		X	X					
Deer mouse	Abundant	X				X	X	X	X
Western red-backed vole	Status Unknown							X	
White-footed vole	Status Unknown			X				X	X
Red tree vole	Status Unknown							X	
Townsend vole	Status Unknown	X							
Long-tailed vole	Status Unknown	X						X	
Oregon vole	Status Unknown	X						X	
California vole	Status Unknown	X						X	
Pacific jumping mouse	Occassional	X				X			X
Black-tailed deer	Abundant	X				X	X	X	X
Roosevelt elk	Common	X				X	X	X	X

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Northern Flicker *	Common	X				X	X	X	X
Pileated Woodpecker *	Uncommon					X	X	X	X
Hairy Woodpecker *	Uncommon					X	X	X	X
Downy Woodpecker *	Uncommon					X	X	X	X
Red-breasted Sapsucker *	Uncommon					X	X	X	X
Western Kingbird	Uncommon	X				X			
Olive-sided Flycatcher *	Common	X				X		X	
Western Wood Pewee *	Common	X				X		X	X
Willow Flycatcher *	Uncommon	X	X	X		X			X
Hammond's Flycatcher *	Uncommon	X				X		X	X
Dusky Flycatcher *	Uncommon						X	X	
Western Flycatcher *	Common						X	X	X
Black Phoebe	Rare	X				X			
Violet-green Swallow *	Common			X					X
Tree Swallow *	Common			X					X
Barn Swallow *	Common	X				X			
No. Rough-winged Swallow *	Uncommon	X	X	X		X			
Cliff Swallow *	Uncommon				X	X			
Purple Martin	Rare	X				X			
Gray Jay*	Rare							X	X

*Known or believed to nest on district.

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Steller's Jay *	Common							X	X
Scrub Jay *	Uncommon	X				X			X
American Crow *	Uncommon	X							X
Common Raven *	Common							X	X
Black-capped Chickadee *	Common	X				X		X	X
Mountain Chickadee *	Rare						X		
Chestnut-backed Chickadee *	Common						X	X	X
Bushtit *	Common					X	X	X	X
Red-breasted Nuthatch *	Uncommon						X		X
White-breasted Nuthatch	Rare					X	X		X
Brown Creeper *	Uncommon								X
House Wren *	Uncommon	X				X			X
Winter Wren *	Common	X				X			X
Rock Wren *	Rare				X				
Bewick's Wren *	Uncommon	X				X			X
Marsh Wren *	Uncommon		X	X					
Wrentit *	Common	X				X			
Dipper *	Common			X					
Golden-crowned Kinglet *	Common						X	X	X
Ruby-crowned Kinglet *	Common						X	X	X

***Known or believed to nest on district.**

1 = to 100 years old
2 = 100 to 200 years old
3 = 200-[illegible]rs old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
American Robin *	Common	X				X	X	X	X
Varied Thrush *	Common						X	X	X
Hermit Thrush *	Common	X				X	X	X	X
Swainson's Thrush *	Common						X	X	
Western Bluebird *	Uncommon	X				X			X
Townsend's Solitaire *	Uncommon					X	X	X	X
Water Pipit	Rare	X				X			X
Cedar Waxwing *	Common								
Northern Shrike	Rare	X				X			
European Starling *	Uncommon					X			X
Solitary Vireo *	Common					X	X		X
Hutton's Vireo *	Common					X	X		X
Warbling Vireo *	Common					X	X		X
Orange-crowned Warbler *	Common					X			X
Nashville Warbler *	Uncommon					X	X		X
Yellow Warbler *	Uncommon		X	X		X			
Black-throated Gray Warbler *	Common						X	X	X
Townsend's Warbler	Uncommon						X	X	X
Hermit Warbler *	Common						X	X	

*Known or believed to nest on district.

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Yellow-rumped Warbler *	Common					X	X		X
MacGillivray's Warbler *	Common		X	X		X			
Common Yellowthroat *	Uncommon		X	X		X			
Wilson's Warbler *	Common					X			X
Yellow-breasted Chat *	Rare		X	X		X			
Western Tanager *	Common						X	X	X
Black-headed Grosbeak *	Common					X	X		X
Evening Grosbeak *	Common						X		X
Red-winged Blackbird *	Uncommon		X	X					
Brewer's Blackbird *	Uncommon	X				X			
Brown-headed Cowbird *	Uncommon	X				X			X
Western Meadowlark	Uncommon	X							
Northern Oriole	Uncommon								X
Lazuli Bunting *	Uncommon		X	X		X			
Rufous-sided Towhee *	Common					X			X
Chipping Sparrow *	Common					X	X		X
Savannah Sparrow *	Uncommon	X				X			
Fox Sparrow *	Uncommon					X			X
Song Sparrow *	Common					X			X

***Known or believed to nest on district.**

1 = to 100 years old
2 = 100 to 200 years old
3 = 200 [illegible] years old

		SPECIAL AND UNIQUE HABITATS				TEMPERATE CONIFEROUS FOREST			
Species	Frequency of Occurrence	Meadows/Small Openings	Marshes Ponds/Small Lakes	Riparian Zones	Rocky Areas Cliffs/Scabrock Slopes	Early Seral [1]	Mid Seral [2]	Late Seral [3]	Hardwoods
Lincoln's Sparrow	Uncommon					X			X
White-throated Sparrow	Rare					X	X		X
White-crowned Sparrow *	Common					X			X
Golden-crowned Sparrow	Uncommon					X	X		X
Dark-eyed Junco *	Common	X				X			X
Purple Finch *	Uncommon					X			X
Cassin's Finch	Rare						X	X	
House Finch	Uncommon	X				X			
Pine Siskin	Common	X				X	X		X
Red Crossbill	Uncommon						X	X	
Lesser Goldfinch	Rare					X			X
American Goldfinch	Common	X				X			

*Known or believed to nest on district.

1 = to 100 years old
2 = 100 to 200 years old
3 = 200+ years old

BDDD

Watershed Analysis
Information Sharing Meeting
Siskiyou National Forest
8/95

BDBDB

Watershed SOUTH FORK COQUILLE District POWERS

Iteration Number 1.0 Analysis Steps Completed All

WATERSHED CHARACTERIZATION

Southwest Oregon Province

The South Fork Coquille River is located in the SW Oregon Province, an area that includes the Umpqua River, Rogue River watersheds and various sub-basins along the coast of southwest Oregon. These coastal sub-basins are lumped together as the South Coast drainage basins and can be again divided into four sub-basins: Sixes, Coquille, Coos and Chetco. The Coquille River is the largest of the south coast basins.

COQUILLE BASIN

The South Fork Coquille River is one of four major tributaries that enter the Coquille River, located in the South Coast Basin of Oregon. The Coquille basin covers 677,800 acres, with 32% of the basin located on Bureau of Land Management and Forest Service lands. The South Fork Coquille, 156,800 acres, in the only portion of the Coquille located on National Forest, with 47% of the area located entirely on the Powers Ranger District, Siskiyou National Forest.

The 4% of the basin in flood plains and terraces historically provided highly productive areas ciritical to samonid fish species. These riparian and stream habitats were the focal point of early European human settlement and disturbance. Flood plains and stream terraces located on the South Fork Coquille tend to be on private land. That portion located on the National Forest is mostly mountainous.

WATERSHED ANALYSIS AREA CHARACTERIZATION

The South Fork Coquille Watershed Analysis summarizes key information for the Upper South Fork Coquille beginning at the headwaters in Eden Valley and ending one mile south of the town of Powers. In this analysis, the Upper South Fork Coquille is the analysis area or the 'key watershed'.

For analysis purposes, the key watershed was divided into eight subwatersheds (Foggy/Eden, Wooden Rock, Upper Mainstem, Johnson/Sucker, Rock, Lower Mainstem, Coal Creek and Hayes Creek), ranging from approximately 6,800 to 24,100 acres each. There are private land holding in the Hayes, Coal and Wooden subwatersheds with a significant portion of the Lower Mainstem, Rock Creek, and Wooden Rock subwatersheds owne by Georgia Pacific Corporation.

Concurrently, the Bureau of Land Management (Coos Bay District) is conducting an analysis of the Lower South Fork Coquille beginning one mile south of Powers and continuing to the confluence with the Middle Fork of the Coquille River. Although part of Salmon Creek is within the Forest Service's key watershed analysis area, the BLM will include all of it in their analysis.

Values

Among the important values of the South Fork Coquille drainage are its fish, wildlife, aesthetics, timber, and recreation. The watershed is representative of forested ecosystems along the southern regon coast, and includes habitat for old-growth associated species such as the northern spotted owl and marbled murrelet.

These allocations define the type of management activities in Federal Lands. Current land designations within the key watershed are 11,030 acres of martix, 43,816 acres of late successional reserves (LSR) and 22,277 acres of riparian reserves.

Social Setting (History)

There were Indian settlements in the Broadbent, Gaylord, and Powers areas. Seasonal hunting camps existed higher in the river valley.

Settlers and miners started moving into the area in the early 1850's. The miners used the early Indian trails and built some of their own. Many placer miners operated in the South Fork Coquille River and its tributaries. The miners were mostly looking for gold although some later mines produced nickel.

The area that is now Powers was settled by a few pioneers in the late 1850's to 1860's. The biggest changes to the watershed began to occur with the appearance of the railroad in 1915 and the establishment of the Smith/Powers Logging Company. Early activity concentrated largely in the Salmon and Land Creek areas and later extended east of Powers onto Eden Ridge.

Mining and logging continue today at less than historic levels. Most mining operations do not produce enough income to be significant. Although mining is mostly recreational, several social, environmental, and political issues surround mining operations.

Timber harvest activities were the main industry in the area after World War II. Like many other areas, several social issues regarding timber harvest continue to affect the watershed. These include effects on scenery, wildlife habitat, and water quality and local employment. Timber harvest effects on wildlife and water quality are discussed in the Terrestrial and Aquatic sections.

Camping, fishing and hunting are still popular recreational activities with local residents. There are two developed campgrounds. Daphne Grove is located 7 miles south of the Forest boundary and Rock Creek is 5 miles beyond Daphne

Grove. There is other dispersed camping within the key watershed. Use is not heavy as the area is not near a major population center.

Physical Setting

Climate

The watershed is dominated by a wet, warm, marine climate, with temperature variations corresponding to changes in elevation. The area recieves 70-100 inches of rain annually. It is often inundated by fog which extends inland along the river and up to 2,500 feet depending on the height of marine inversion layers. Frequent moist fog and cloud cover buffers vegetation by reducing fluctuations in temperature and seasonal water stress. There is little snowpack.

East wind episodes are most severe in late summer and fall. These episodes are characterized by strong easterly winds, low humidities, and relatively high day and night temperatures.

Elevations range from 190 feet in the Powers area, to 4,026 feet at Iron Mountain on the southwestern divide of the watershed.

Geology

The Upper South Fork Coquille Watershed straddles two district geologic provinces, seperated by the Coquille River Fault Zone (Dott 1971). The Coast Range province occurs east of the fault. he geologic and geomorphic setting of each tributary is described in Aquatic Ecosystems.

Biological Setting

The landscape is dominated by conifer forests on steep slopes and productive soils. The watershed is a patchwork of many age classes and species, due mainly to timber harvest and past disturbances. Vegetation types vary from oak savannahs and Douglas-fir forests in the lowlands to knobcone-lodgepole-sugar pines in the highest mountains, with a great diversity of habitats between these two extremes. The fire occurence rate in the South Fork Coquille drainage is low for both lighting and human-caused fires when compared to other drainages on the Siskiyou N.F..

Wildlife

There are a broad array of species with a variety of needs within the analysis area. There are many documented occurrences of old-growth dependent species, most notably, the spotted owl and marbled murrelet. Both these are listed as Threatened by the U.S. Fish and Wildlife Service. Habitat exists for additionally listed species including the peregrine falcon (endangered) and the bald eagle (threatened).

Historically the area has had much higher amounts of late successional habitat but many species, such as elk, actually thrived due to increase in early successional habitat. There are a small amount of special and unique wildlife habitat areas such as ponds/lakes, meadows, and cliffs.

Fisheries

Key watersheds are critical refugia for maintaining and recovering habitat for at risk stocks of anadromous salmonids. At-risk species in the South Fork Coquille are the spring chinook, coho, and sea-run cutthroat.

KEY QUESTIONS

Key Questions for the "Aquatic Ecosystem".

Sediment Delivery:

-- What processes deliver coarse and fine-grained sediment to the watershed?
-- Where are they delivered
-- In what magnitude are they delivered?
-- How much sediment is delivered naturally and how much is derived from human activity?

Large Wood:

-- What processes deliver large wood?
-- Where have management activities reduced the large wood supply below natural levels?
---How can the supply of large wood be restored?

Water Quality:

-- What are the factors and processes affecting water quality in the South Fork of the Coquille Watershed?

Stream Channel Morphology

-- Where are channels sensitive to increased sediment and decreased large wood?
-- Is there evidence that channel morphology and sediment storage have changed from historic conditions?
-- What are the expected channel morphology and storage condition trends?
-- How can channel conditions be improved?

Fish Species:

-- What fish species are present in the South Fork Coquille Watershed and what is their known distribution? What population trends have these species exhibited?
-- Where are the key spawning and rearing areas?

Subwatersheds:

-- What are the current habitat conditions in the South Fork Coquille Watershed?
-- What and where are the factors limiting salmonid abundance?
-- How can fisheries habitat on the South Fork Coquille River be maintained and or restored?

Social:

How does the South Fork Coquille River Watershed contribute to the meeting the social and commodity values desired by the public?

-- Timber Commodity (and its effect on employment)
-- Non-timber Commodities (products sold via permits or permitted activities that could generate a product for sale)
-- Non-commodity amenities such as recreation and access.

Wildlife:

How does the South Fork Coquille Watershed contribute to wildlife species diversity and viability? This very broad and complicated question can at least be partially answered by analyzing the following characteristics of the watershed:

-- What wildlife species exist in the watershed?
-- What is the predicted future use of the area by wildlife?
-- What important habitats exist in the watershed?
-- How are these habitats arranged across the landscape?
-- How can these habitats be maintained and/or enhanced?

Plants:

How does the South Fork Coquille Watershed contribute to plant species diversity and viability? This question can at least be partially answered by analyzing the following characteristics of the watershed:

-- What plant species exist in the watershed?
-- What is the predicted future occurrence of plants?
-- What important habitats for plants exist in the watershed?
-- How are these habitats arranged across the landscape?
-- How can these habitats be maintained and/or enhanced?
-- What has the influence of human activities (primarily grazing) been?

Port-Orford-cedar:

-- How is Port-Orford-cedar root rot (Phytophthora lateralis) affecting the vegetative makeup and management throughout the watershed?

FINDINGS

Fish Habitat and Water Quality

1. Roads have increased sediment and decreased large wood delivery, and may have altered the normal hydrologic flow.

2. Reduced maintenance on existing roads would result in drainage diversions, and continued road-related debris flows.

3. Large wood is lacking in all streams in the analysis area as a result of timber harvest, debris flows, and direct removal especially from streams in the Foggy/Eden and Wooden Rock watersheds.

4. Riparian and upland seral stages have shifted from late to early seral over the last 100 years, primarily due to timber harvest activities.

5. There is limited historic temperature data.

6. Summer temperatures are near lethal limits (i.e., 70 F.) in Foggy/Eden and Upper Mainstem, and at the lowest point of the Lower Mainstem (i.e., Forest Boundary).

7. Johnson and Coal Creeks each reduce the mainstem temperature by slightly more than a degree.

8. Below the National Forest Boundary, clearing of riparian forest for agriculture and water withdrawals appear to have contributed to elevated stream temperatures.

9. The South Fork Coquille key watershed provides high quality, low turbidity water, particularly from tributaries draining the Klamath/Siskiyou province. Water clarity has improved since the period of intensive harvest practices from 1940-early 1970's.

10. Channel form and function have changed in response to increased sediment delivery and large wood loss

11. From anecdotal accounts deep historic pools have filled with sediments.

12. Other major changes include aggradation in Rock Creek below the large natural slide, increased storage behind large wood jams in Johnson Creek, and bedrock exposure from debris flow scour in Coal Creek.

Hatchery Operations

1. Hatchery introductions appear to have had an influence on wild stocks of salmonids within the analysis area.

2. The hatchery and diversion fence at Lower Land Creek had a significant negative effect on anadromous salmonids within the analysis area.

Spring Chinook

1. The amount of available habitat within the mainstem South Fork Coquille River appears to be reduced from historical levels due to temperature limitations and sedimentation.

2. Spring chinook populations are depressed from historic levels.

3. Poaching has been a factor to declining runs of spring chinook.

4. Summer temperatures have reduced the range of adult spring chinook habitat.

5. Historic spring chinook summer maturing pools have filled from aggradation and/or loss of large wood.

Fall Chinook

1. Fall chinook populations are healthy and have increased over the last 10 years.

Coho Salmon

1. Coho salmon populations within the key watershed are depressed from historic levels.

Winter Steelhead

1. Wild winter steelhead populations have decreased from historic accounts.

2. The winter steelhead broodstock conversion program appears to be working.

3. Recent changes in fishing regulations on the South Fork Coquille are benefitting wild steelhead.

4. Johnson and Sucker Creeks are very important wild winter steelhead spawning and rearing areas.

Sea-run Cutthroat

1. Sea-run cutthroat populations are depressed from historic levels.

2. Culverts could be limiting access to first and second order spawning and rearing areas for sea-run cutthroat.

Trout

1. Available cover in the form of large wood appears to be directly correlated with resident trout abundance in the Foggy/Eden and Wooden Rock subwatersheds.

2. Brook trout are reproducing naturally in Azalea Lake.

Other Species

1. Pacific Lamprey populations are depressed from historic levels.

SOCIAL

Timber

1. Managed stands under Federal jurisdiction make up 23% of the watershed.

2. Managed stands under private jurisdiction make up 29% of the watershed.

3. Managed stands make up 52% of the total watershed (Federal and non-federal).

4. Annual estimated timber harvest over the next 50 years is 1.9 MMBF.

5. Current harvest levels are one-fifth of harvest levels during the 1980's.

6. Manageable matrix makes up 8% of the South Fork Coquille Watershed.

Non-timber Commodities

1. The total market value of non-convertible products in the $30,000 to $50,000 range per year. They do make a minor contribution to local employment.

Other Forest Products

1. No commercial firewood sales have been offered by the Powers Ranger district in the last 10 years; therefore firewood has not contributed to local employment.

2. Demand for personal use firewood will remain steady.

3. Supply of personal use firewood is only one-third of past levels. The public has a desire for plentiful easy-to-get firewood that will go unmet.

4. Little firewood will be available from private lands.

Mining

1. Commercial mining within the analysis area is unlikely.

2. Recreational scale gold mining with suction dredges will continue. Small scale short term affects to the aquatic system (such as increases in turbidity) during summer low flows will be likely.

3. There are 40 valid operating plans on National Forest in the analysis area.

Non-Commodity

1. The watershed has seen a change in human use from a subsistence nature to a recreational pastime focus

2. Recreation activities are evolving from consumptive (hunting, fishing, trapping) to non-consumptive (hiking, birdwatching, photography) pastimes.

3. Overall recreational use may increase in the watershed.

Terrestrial

Vegetation

1. A wide variety of indigenous vegetation exists in the watershed due to the moderate climate, abundant rainfall, different soil types, wide range of elevation and diversity of habitats.

2. Vegetative composition and seral stages have changed dramatically in the past 100 years, almost entirely due to human activities such as overgrazing of livestock, road construction and logging.

3. There are six sensitive plant species present in the watershed, all of which currently have healthy populations and adequate safeguards for survival.

4. There are approximately 70 species of exotic plants present in the watershed which tend to establish in areas of extensive ground disturbance such as road building, logging, intense prescribed burning of logging slash, and overgrazing.

Port-Orford-cedar

1. The watershed contains the most important POC concentrations within its natural range.

2. Port-Orford-cedar root disease *Phytophthora lateralis* exists in the watershed (see Figure T-5).

3. Any reduction of an individual component (human activity, elk/cattle activity, POC-infected soil/water) will reduce the probability of infection.

4. The root rot moves in water via aquatic spores, as spores in mud transported by people, machinery, or animals, or by growing through root grafts between adjacent trees.

5. Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores.

6. Soil moisture is by far the greatest environmental influence on root rot.

Wildlife

1. There has been a dramatic decrease in late-successional seral stages in the last century. Consequently, there has also been an increase in early successional stages.

2. Species associated with late successional forest have declined in numbers and distribution while early successional ones have increased.

3. Surveys have documented substantial numbers of spotted owls and marbled murrelets in the analysis area.

4. Roosevelt elk now occur in the watershed at much higher numbers than a century ago.

5. The manner in which the timber has been extracted from the watershed has resulted in a significant amount of fragmentation and a resulting increase in species which thrive on edges.

6. A decline in population numbers has been observed over the last 15 years for the red-legged frog.

7. Exotic species have been observed in the watershed, mainly the wild turkey and the bullfrog, and likely there will be others in the future (nutria).

CONCLUSIONS