# Indian / Deadwood Watershed Analysis



**June 1996**

**Siuslaw National Forest**

This analysis was conducted by the staff of the
Siuslaw National Forest
4077 Research Way
Corvallis, OR 97333
(541) 750-7000

## Indian/Deadwood Watershed Analysis Team

### Core Team

| | |
|---|---|
| Harriet Plumley | Team Leader |
| Paul Burns | Fish Biologist |
| Barbara E. Ellis | Geographic Information Specialist |
| Carl Frounfelker | Wildlife Biologist |
| Johan Hogervorst | Hydrologist |
| Callie McConnell | Hydrologist |
| Pamela Wright | Ecologist |

### Support (Siuslaw NF)

| | |
|---|---|
| Karen Austin | Wildlife Biologist |
| Courtney Cloyd | Geologist |
| Julie Cox | Public Affairs Specialist |
| Barbara Daniels | Economist/Analyst |
| John Dillingham | Transportation Engineer |
| Stu Johnston | Silviculturist |
| Dan Karnes | RDMA |
| Jane Kertis | Ecologist |
| Don Large | Resource Planner |
| Dan Mummey | Transportation Engineer |

### Additional Support

| | |
|---|---|
| Kathy Barry | US Fish & Wildlife Service, Portland, OR |
| Jerry Beatty | Forest Pest Management, USFS Regional Office |
| Sam Chan | Research Scientist, PNW Forest Exper. Station, Corvallis |
| Gary Hoppe | Eugene District-BLM, Eugene, OR |
| Art McCoy | Oregon Department of Forestry, Veneta, OR |
| Tom Spies | Research Scientist, PNW Forest Exper. Station, Corvallis |

Cover illustration was donated by Mary Lou Goertzen, a resident of Deadwood. No part of the illustration may be reproduced without written permission of the artist.

## TABLE OF CONTENTS


| | Page |
|---|---|
| **CHAPTER 1 - INTRODUCTION** | 1 |
| **CHAPTER 2 - CHARACTERIZATION OF THE INDIAN/DEADWOOD WATERSHED** | |
| Climate | 4 |
| Geology | 4 |
| Vegetation | 4 |
| Wildlife | 5 |
| Fish | 5 |
| Landownership | 6 |
| Human uses | 6 |
| Plan Land Allocations | 7 |
| **CHAPTER 3 - ISSUES AND KEY QUESTIONS** | |
| Issue 1: Protection and Restoration of Streams | 9 |
| Issue 2: Management of Late-Successional Reserve lands | 11 |
| Issue 3: Management of Matrix | 13 |
| **CHAPTER 4 - NATURAL RESOURCES: CHARACTERISTICS AND PROCESSES** | |
| Climate | 15 |
| Geology | 15 |
| Soil/Climate Zones and Landtype Associations | 16 |
| Natural Disturbance Processes | 17 |
| Fire | 17 |
| Floods and Landslides | 18 |
| Insects and Disease | 19 |
| Wind | 20 |
| Role of Distubance in Vegetative and Aquatic Population Dynamics | 20 |
| Ecological Units in Indian/Deadwood | 21 |
| Vegetation | 22 |
| Effects of Fire on Vegetation Pattern | 23 |
| Effects of *Phellinus weirii* on Vegetation Patterns | 24 |
| Plant Association Groups (PAGs) | 25 |
| Historic Wildlife Resources | 34 |
| Aquatic Environment | 35 |
| Channel Classification and Dominant Inputs | 35 |
| Stream Function Segments | 37 |
| Riparian Vegetation | 39 |
| Fish Habitat | 39 |

History of Human Settlement 43
American Indian Uses 43
Euroamerican Settlement 43

**CHAPTER 5 -CURRENT CONDITIONS**

Vegetation 49
Seral Stage Distribution 49
Species Composition and Structure 51
Wildlife Species and Habitats 52
Big Game Habitat 52
Species Guilds 53
Mature Conifer Habitat 54
Centers of Biodiversity 55
Special Habitats 55
Botanical Resources 56
Range 56
Riparian Reserves 56
Summary 57
Aquatic Environment 57
Human Disturbances 57
Current Conditions 60
Summary 72
Human Uses 72
Overview of Siuslaw River Basin 72
Indian/Deadwood Watershed 73
Demographic Characteristics 75
Trends 78

**CHAPTER 6 - LANDSCAPE OBJECTIVES AND MANAGEMENT RECOMMENDATIONS**

Landscape Objectives 79
Management Opportunities 82
Management for Streams and Riparian Areas 82
Management for Late-Succession Forests 84
Management of Matrix Lands 87

**CHAPTER 7 - MONITORING AND ADAPTIVE MANAGEMENT**

1. Public Participation 101
2. Thinning Plantations to Develop Old-growth Structure 103
3. Riparian Thinning for Improved Ecological Riparian Function 105

**REFERENCES**
**ACRONYMS**

**APPENDICES**


| | |
|---|---|
| A | Public Involvement |
| B | Soil Moisture Levels and Patterns |
| C | Analysis Methods |
| D | Seral Stages for 1990 Vegetation Layer |
| E | Characteristics of Ecological Units |
| F | Early Sawmills of Indian/Deadwood |
| G | Wildlife Resource Data |
| H | Regional Forester's Sensitive Species List |
| I | Road Inventory |
| J | Subwatershed Summaries |
| K | Stream Habitat Condition Ratings |
| L | Landscape Block Data |
| M | Priority Management Recommendations by Landscape Block |
| N | Subwatershed Priorities for Restoration |

## List of Tables


| | | |
|---|---|---|
| 2.1 | Landownership in Indian/Deadwood | 6 |
| 2.2 | Northwest Forest Plan Allocations | 7 |
| 4.1 | Characteristics of Soil/Climate Zones | 17 |
| 4.2 | Characteristics of Ecological Units | 22 |
| 4.3 | Distribution of Seral Stages by Fire Regime Block | 24 |
| 4.4 | Plant Associations Included in the Plant Association Groups | 26 |
| 4.5 | Plant Associations and Soil Conditions | 27 |
| 4.6 | CWD Volume by Ecological Unit through Succession | 33 |
| 4.7 | Characteristics of Subwatersheds in Indian/Deadwood | 36 |
| 4.8 | Stream Function Segment Summary | 40 |
| 4.9 | Acres Harvested on National Forest Land | 47 |
| 5.1 | Changes in Seral Stage Distribution from the 1940's to Current | 50 |
| 5.2 | Acres of Plantations by Age Class | 52 |
| 5.3 | Summary of Land Use by Subwatershed | 61 |
| 5.4 | Confinement and Gradient Summary | 62 |
| 5.5 | Water Temperatures for Subwatersheds | 70 |
| 5.6 | Fish Habitat Objectives and Rating Criteria | 71 |
| 5.7 | Acres of Private Land Use | 73 |
| 5.8 | Demographic Characteristics of the Siuslaw River Basin and Indian/Deadwood Watershed | 76 |
| 5.9 | Location of Employment and Commuting Data | 77 |
| 6.1 | Guidelines for Silvicultural Treatments | 85 |
| 6.2 | Acres of Current Seral Stages by NFP Allocations | 88 |
| 6.3 | Landscape Objectives and Management Strategies | 90 |

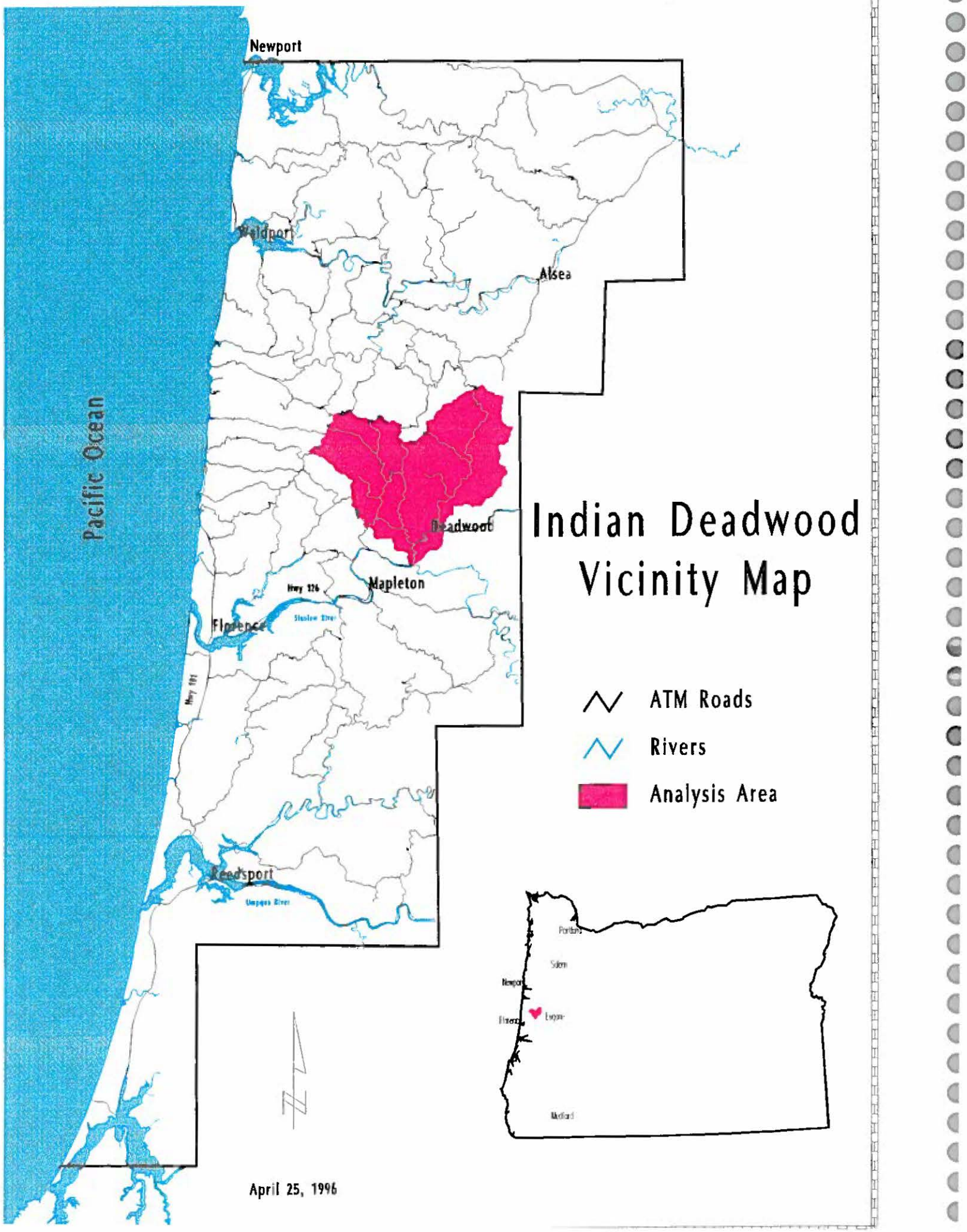

## List of Figures


| | | |
|---|---|---|
| | Vicinity Map | |
| 2.1 | Siuslaw River Basin | 4a |
| 2.2 | Late-Successional Reserves | 4b |
| 4.1 | Two principal sources of coarse woody debris through succession | 30 |
| 4.2 | Pattern of coarse woody debris accumulation through succession | 32 |
| 4.3 | Coarse woody debris in West and Middle Ecological Units | 32 |
| 4.4 | Coarse woody debris in East Ecological Unit | 33 |
| 5.1 | Percent seral stage acres in 1945 and 1990 | 50 |
| 5.2 | Mean patch sizes of seral stages for 1945 and 1990 | 51 |
| 5.3 | Ownership by stream function segment | 66 |

## List of Maps


2.1 Landownership
2.2 Northwest Forest Plan Allocations
4.1 Fire Regime Blocks and Landtype Associations
4.2 Slide Prone Areas
4.3 Topography and Ecological Units
4.4 Prelogging Seral Stage Vegetation
4.5 Plant Association Groups
4.6 Watersheds
4.7 Stream Function Segments
4.8 Historic Distribution of Fish
4.9 Historic Land Uses
4.10 Historic Roads
5.1 Current Seral Stage Vegetation
5.2 Natural and Managed Stands
5.3 HABSCAPES - 4 guilds
5.4 Hotspots of Mature Conifer Forest Biodiversity
5.5 Current Condition of LWD Supply
5.6 Current Condition of Shade Adequacy
5.7 Anadromous Fish Rearing Condition
5.8 Current Land Uses
5.9 Current Road System
6.1 Landscape Block Priorities
6.2 Aquatic Priorities

Appendix Maps
Appendix G - 1 Mature and Interior Conifer Habitat


Newport
Waldport
Alsea
Pacific Ocean
Deadwood
Mapleton
Hwy 126
Florence
Siuslaw River
Reedsport
Umpqua River
Indian Deadwood
Vicinity Map
ATM Roads
Rivers
Analysis Area
April 25, 1996

# Chapter 1 - Introduction

The Indian/Deadwood watershed analysis was conducted as part of implementing the Northwest Forest Plan (USDA/USDI 1994). The purpose of the analysis was to assess current conditions of the Forest resources compared to past conditions, and to develop an understanding of the processes, both natural and human-caused, that led to the current conditions. Analysis of the interactions of the physical and biological resources in the watershed can lead to a scientifically based understanding of the ecology of the area.

The watershed analysis is intended to provide guidance on how best to implement direction of the Northwest Forest Plan (NFP) at the watershed scale, and in particular, within Indian/Deadwood watershed. Direction from the NFP provides broad general objectives for management of federal lands. Analysis of resource conditions and human uses in the watershed led to selection of landscape objectives and management opportunities that can provide an effective strategy for changing the current conditions that are inconsistent with NFP objectives.

The watershed analysis was conducted by an interdisciplinary team of six with assistance from several specialists on the Forest and from other agencies. Interested publics, primarily residents and landowners in Indian/Deadwood, also provided information throughout the process.

This report is written for federal land managers. It, therefore, contains abbreviated discussions of general forest ecosystem processes and aquatic resources. Emphasis in the report is given to management implications and the rationale that led to them. The report format generally follows the organization suggested in the Federal Guide for Watershed Analysis (REO 1995), except that descriptions of "reference conditions" precede the discussion of current conditions.

Chapter 2 of this report provides a characterization of the watershed, with a summary of important resources and processes in context of the Coast Range and Siuslaw River Basin. Chapter 3 lists the issues selected for analysis and the associated key questions. Chapters 4 and 5 establish the basis for subsequent management recommendations. Chapter 4 presents a description of the physical environment, potential vegetation, and major disturbance processes, both natural and from human uses. Chapter 5 discusses current conditions of the terrestrial and aquatic resources, and explains how the conditions have changed as a result of disturbance processes.

Landscape patterns and objectives are developed in Chapter 6 to show how the watershed might best be managed to address the issues. Resource specific management opportunities, including silvicultural treatments, riparian area projects and road stabilization projects, are identified and prioritized for all areas of the watershed. The management opportunities are intended to provide district managers with a watershed-scale landscape pattern for identifying site-specific projects that are appropriate for implementing the NFP direction in the Indian/Deadwood watershed. Finally, Chapter 7 provides a few adaptive management and monitoring opportunities that could meet some province and/or Forestwide goals, or be adopted by the Mapleton Ranger District to showcase some new ways of managing forest ecosystems on a large scale.

With the completion of this watershed analysis, 65% of the Siuslaw River Basin will have been analyzed. The remaining three watersheds are scheduled for completion in the next year, so that the entire river basin can be assessed for opportunities to meet NFP objectives on a larger scale.

# Chapter 2 - Characterization of the Indian/Deadwood Watershed

The Indian and Deadwood watersheds lie in the southern half of the Oregon Coast Province, about 27 miles up the Siuslaw River from the Coast and about 12 miles from Mapleton. (See vicinity map.) In this report, the two watersheds are referred to as the Indian/Deadwood watershed. All of the 74,000-acre watershed is within Lane County and occupies a small (15%) northern portion of the Siuslaw River Basin.

The watershed consists of two major tributaries to Lake Creek (Indian and Deadwood Creeks); Green Creek--a small tributary watershed to Lake Creek; and the lower portion of Lake Creek just before it empties into the Siuslaw River. Deadwood Creek, in the eastern portion of the watershed, drains 8 major tributaries, and Indian Creek in the western portion drains 7 major tributaries. Lake Creek is a 6th order (large) tributary to the middle of the Siuslaw River and drains land in the northern portion of the basin.

The watershed is bounded by Windy Peak (elevation 2052') on the east, Taylor Butte and Klickitat Mountain (elevation 2307') on the north and Saddle Mountain (elevation 2297') on the west. The lowest elevation is on the southern boundary where Lake Creek flows into the Siuslaw River (elevation 119').

Typical of the central interior Coast Range, this watershed has rugged topography with short, very steep slopes and V-shaped ridge crests and stream channel bottoms. The mountains are densely dissected by streams (about 8 miles of stream/square mile). Most ridgelines in the far eastern portion of the watershed run east-west, while in the western portion the ridges run in all directions with no apparent pattern.

Distinguishing features of the watershed are:

- The watershed contains one of only two Key Watersheds (W. Fork Indian Creek) identified in the Northwest Forest Plan (NFP) for the Siuslaw River Basin (Figure 2.1.). The other Key Watershed is N. Fork Siuslaw River, located to the west of Indian Creek watershed. The W. Fork Indian Creek Key Watershed is, therefore, an important area for protection of fish stocks at risk in the short term until restoration can occur on other watersheds in the river basin.

- The watershed offers some of the best opportunity to actively manage for late-successional conditions within the Oregon Coast Province. The majority (81%) of the lands in the watershed are in federal management, and of those, a large portion (85%) is allocated to Late-Successional Reserve (LSR). The watershed occupies a southern portion of a large (330,000 acre) LSR that dominates the middle of the Coast Range (Figure 2.2). Many of the lands within the LSR have limited opportunities for management, because they are allocated to Wilderness and other "withdrawn" designations, such as Special Interest Areas and Research Natural Area, that preclude vegetation management.

- Some residents of the eastern portion of the watershed are engaged in watershed restoration activities along lower stream reaches crossing private lands. The opportunity to improve strategic

areas throughout the entire watershed is high due to this interest in cooperative activities spanning federal and private lands.

## CLIMATE

The Indian/Deadwood watershed has a temperate climate that is moderated by its proximity to the Pacific Ocean. Summer and winter temperatures are moderate, and snow storms are rare. Most rainfall occurs between October and March. The average annual rainfall varies from 85 inches near Lake Creek to 115 inches in the upper elevations. Severe winter storms with heavy precipitation result in high flashy streamflows and are often accompanied by downslope movement of wood and sediments into stream channels. High winds with windspeeds up to 100 mph occur occasionally during major storm events and result in small 1-10 acre patches of tree blowdown.

## GEOLOGY

The watershed is underlain by the Eocene Tyee sandstone with a few scattered basaltic intrusions. The Tyee Formation is a thick deposit of interbedded, gently folded sandstone and siltstone. Lying near a plate tectonic boundary, the Coast Range continues to be very slowly uplifted and tilted to the east.

The dominant erosional processes that have helped shape the landscape are landslides, in the form of debris slides and torrents, and some slump earthflows. Debris slides tend to occur in steep stream channels on slopes that are perpendicular to rock bedding, while slumps tend to occur parallel to bedding planes or where streams have down cut dormant earth flows.

There is a soil moisture and topographic relief gradation from east to west across the watershed. The eastern third of the watershed is relatively dry with longer and steeper slopes, while the westernmost portion is wetter with shorter and more gentle slopes. These differences influence the vegetation patterns.

## VEGETATION

The Indian/Deadwood watershed lies completely within the Western Hemlock zone. Douglas-fir, western hemlock and western redcedar are the most common overstory tree species (Franklin and Dryness 1988). Wet environments are more widely distributed in the western part of the watershed and support salmonberry plant associations. Drier environments, characterized by more salal and rhododendron, are more prevalent in the eastern portion of the watershed.

The watershed appears to lie within two different fire regimes that influenced natural vegetation patterns from west to east. Episodic, climatically-driven, large fires burned through the western portion of the watershed infrequently, but with high severity, and created large (>10,000 acre) patches of single seral stage vegetation (USDA 1995b). The eastern portion of the watershed has more patchy vegetation, and fire may have burned more frequently. Very large patches of mature conifer forest probably existed at various times in the western portion, but have become severely fragmented after 30 years of intensive logging.

The current dominant tree species is Douglas-fir because of stand-replacing fires in the 1850's and intensive forest management during the latter half of the 1900's. Red alder occupies areas recently

# Late Successional Reserves

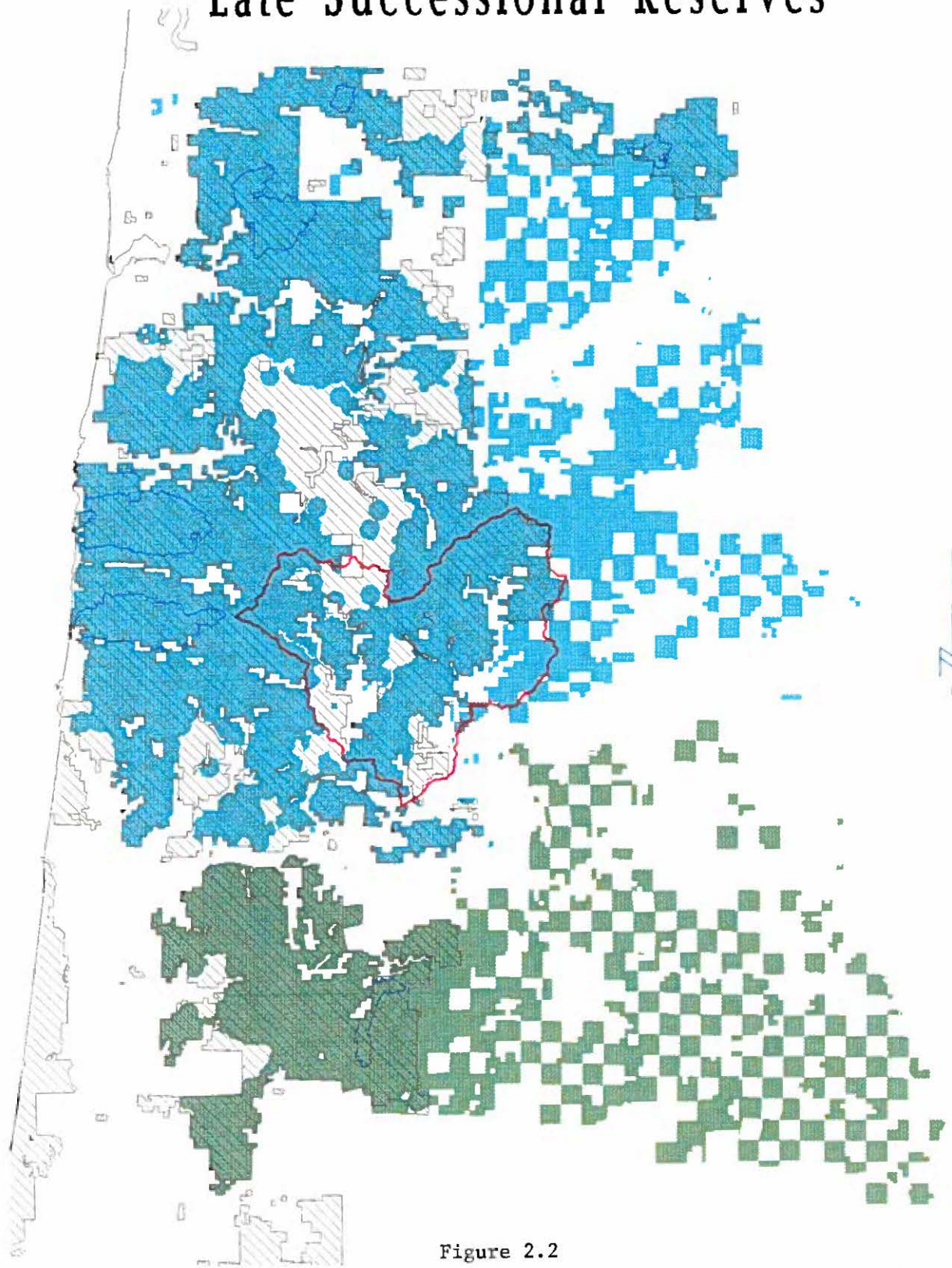


Figure 2.2

LSR RO267

LSR RO268

Siuslaw National Forest

Indian/Deadwood Watershed

Withdrawn Areas

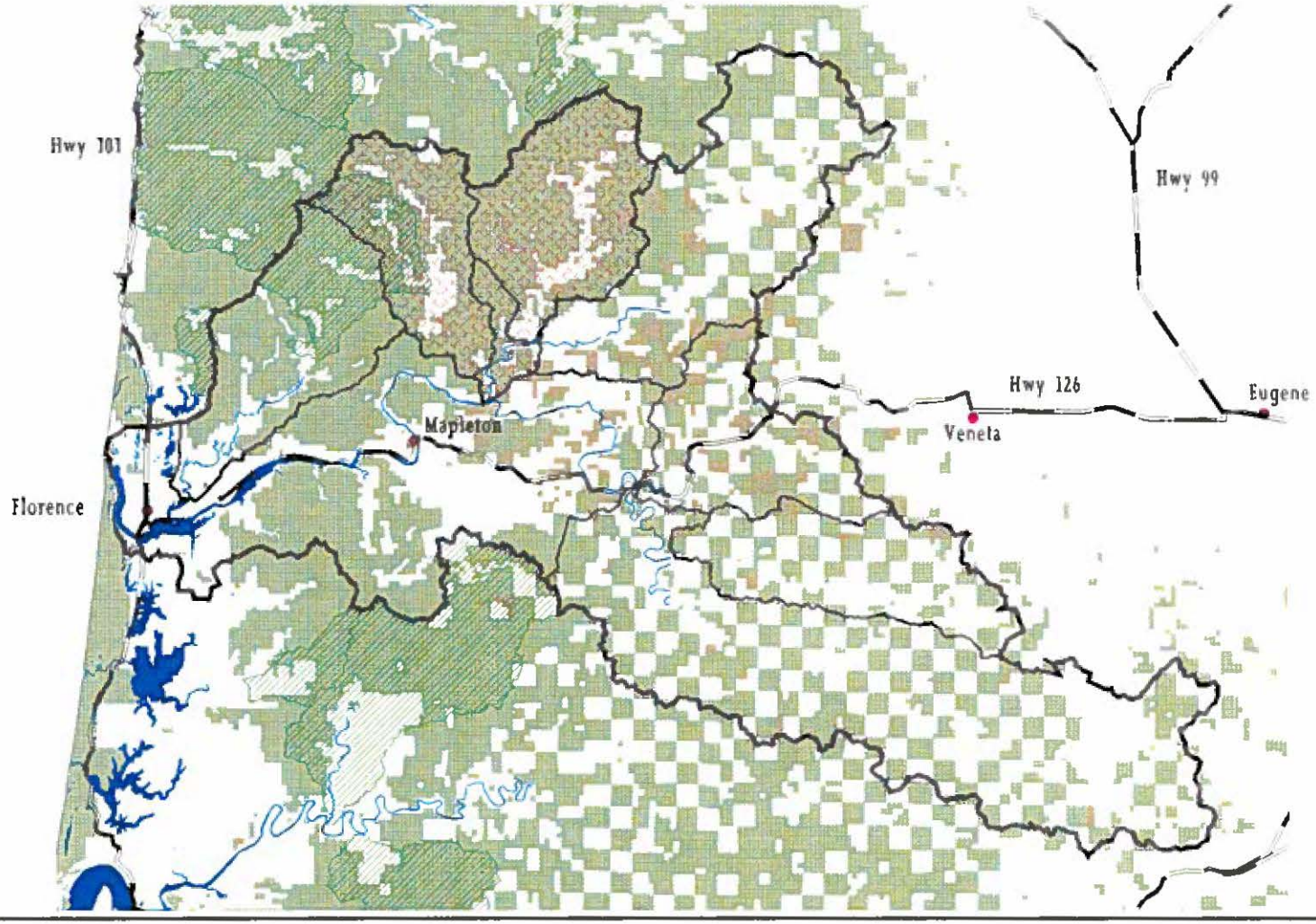
Withdrawn Areas include Wilderness, Special Interest Areas, and Research Natural Areas

0 1 2 3 4 5 6

MILES

RF 1:439737

# Siuslaw River Basin




Federal Lands
State Lands
Other Ownerships
Rivers and Lakes

Key Watersheds
Indian/Deadwood Watershed

Siuslaw River Basin
Fifth Field Watersheds
Major Highways

0 1 2 3 4 5 6
MILES

RF 1:472416

Figure 2.1

disturbed either by fires, landslides or logging. Currently, it is most commonly found in disturbed sites and in riparian zones, including valley floodplains and stream adjacent slopes.

The north and east portions of the watershed have a relatively high level of laminated root rot, *Phellinus weirii*, compared to other parts of the Coast Range. The root rot affects primarily Douglas-fir. Snag levels are high in the Deadwood watershed, perhaps due to the root rot and Douglas-fir bark beetle. The root rot condition appears to be endemic to this area and may be due to the more frequent fire occurrences, the combination of which resulted in the drainage being named "Deadwood".

## WILDLIFE

Over the last century, a number of species have been extirpated from the area, including the grizzly bear, gray wolf, fisher and lynx, as human occupation and development increased. Currently, only about 44% of the watershed contains late-successional conifer forests which are habitat to species such as northern spotted owl, pileated woodpecker, marbled murrelet and flying squirrel. Recent loss of these habitats is due to timber harvest. Over the long term, these forests experienced periodic large natural fires and windstorms.

A variety of other wildlife habitats can be found in the watershed associated with combinations of forest cover types and successional stages. Big game species, such as Roosevelt elk and blacktail deer, that prefer habitats with a variety of openings and cover types, have been increasing in the watershed during the last several decades due to timber harvest of forested areas. Two bald eagle nest sites are located at the southern portion of the watershed, in proximity to Lake Creek. Only one site currently supports an active nesting pair.

## FISH

The Indian/Deadwood watershed contains over 360 miles of perennial fish-bearing streams, of which 150 miles are anadromous fish habitat. The area historically supported a substantial portion of the anadromous fish population of the Siuslaw River Basin. Fish species included chinook, coho and steelhead salmon, and sea-run cutthroat trout. Today, stream habitat for these fish is far below its potential throughout the watershed.

Most of the wild anadromous fish populations have declined significantly over the past century and drastically over the last few years. Recently, in July 1995, the coho salmon was proposed for listing as a threatened species throughout the Oregon and northern California coasts by the National Marine Fisheries Service. Petitions have also been filed to list steelhead as endangered coastwide. Chinook salmon is the only species showing increases to numbers that approach levels seen in the early 1900's. Of the many factors contributing to the decline of these fish, harvest of large wood and loss of complex pools associated with large wood are the main habitat components missing on Coast Range streams.

The West Fork Indian Creek area, including Rogers and Maria Creeks, in the western portion of the watershed has been designated a Key Watershed to serve as a refugia for anadromous fish since it is one of the few most intact areas left in the Siuslaw River Basin. This area still has relatively healthy runs of anadromous fish, compared to adjacent areas, with habitat conditions that could respond quickly to management improvements. Although the runs are relatively healthy, the habitat for anadromous species is still judged to be far below its natural potential level, possibly only 30-40% of potential.

## LANDOWNERSHIP

Landownership in the Siuslaw River Basin is divided almost evenly between federal lands--national forest and Bureau of Land Management (BLM)--and private lands. There is a small percentage of state forest land. The western half of the river basin is comprised of large blocks of national forest surrounding smaller tracts of private land, while the eastern half has a "checkerboard" pattern of private landownership interspersed with national forest, BLM and State lands (Figure 2.1).

In the Indian/Deadwood watershed, the majority (81%) of the lands are in federal ownership, with most of those acres under Siuslaw National Forest management. State lands occupy about 2% of the watershed and private lands are 17% (Table 2.1 and Map 2.1).

Table 2.1 Landownership in Indian/Deadwood (in acres)

| Watershed | FS | BLM | Total Federal | State | Private | TOTAL |
|---|---|---|---|---|---|---|
| Indian Cr. | 25,407 | - | 25,407 | - | 5,386 | 30,793 |
| Deadwood Cr. [1/] | 28,918 | 5,558 | 34,476 | 1,358 | 7,428 | 43,262 |
| TOTAL | 54,325 | 5,558 | 59,883 | 1,358 | 12,814 | 74,055 |
| Percent | 73% | 8% | 81% | 2% | 17% | |

[1/] Includes Lower Lake.

## HUMAN USES

The Siuslaw River Basin, which extends from the ridge of the Coast Range in the east (just west of Cottage Grove), to the Pacific Ocean near Florence in the west, is comprised primarily of forest land with a small amount of agricultural land. A few industrial sites are located within the basin, with many more located to the east in Veneta, Eugene/Springfield and Cottage Grove.

About 30% of the Siuslaw River Basin is managed as industrial forest. A small percent (<4%) of those lands are located in the Indian/Deadwood watershed and comprise about 7% of the watershed. Davidson Industries owns the largest parcels of industrial forest land in the watershed and most of those are in the Indian Creek watershed. The remaining private land is owned by small woodlot owners, residential dwellers, and a few local ranchers and farmers.

Residential dwellings are concentrated near the mouth of Lake Creek and along the bottomlands of Indian Creek and Deadwood Creek, where the topography offers gentle slopes suitable for homesites and farming. About 35 residences are in Indian Creek and about 95 in Deadwood. An additional 60 residences are in Swisshome. A few residents have permits for pasture land on the Forest. Several have permits for water transmission lines. About 13% of the residents derive some of their income from resources within the watershed, but most are employed outside the watershed. A small percentage has chosen the area for retirement.

A few undeveloped recreational sites are located in Indian Creek drainage, including primitive campsites along Indian Creek about 4 miles upstream from Lake Creek, and an old growth trail above Gibson Creek currently used by local residents and occasional Elderhostel groups.

Big game (elk, deer, bear and cougar) are hunted during various regulated fall hunts. Activities associated with hunting (e.g., increased traffic, shooting, and camping) are a disturbance to some residents and recreation visitors.

Recreational fishing for resident and sea-run cutthroat trout and for steelhead occurs in the watershed. Numerous reports indicate that poaching of chinook, coho and steelhead may be a problem in the upper portions of the watershed, especially in years when escapements are at very low numbers.

## PLAN LAND ALLOCATIONS

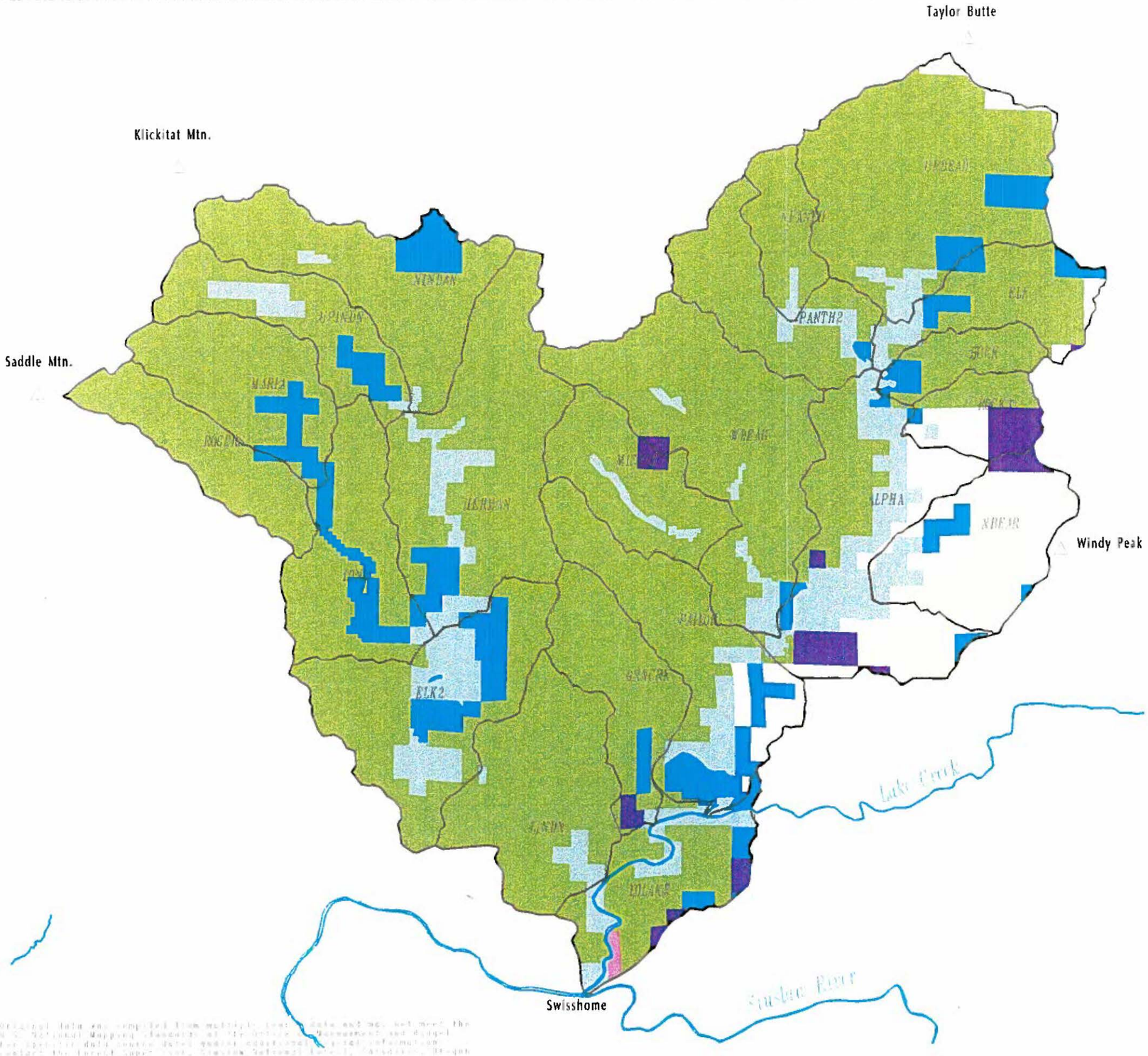
The Northwest Forest Plan established land allocations for all federal land, as shown on Map 2.2. Approximately 85% of the federal land is designated as Late-Successional Reserve (LSR), including occupied marbled murrelet sites, and 15% is Matrix. Two bald eagle management areas are located in the southern portion of the watershed and occupy about 120 acres each. The West Fork Indian Key Watershed occupies approximately 8,837 acres (15%) of the watershed, overlaying LSR and Matrix lands. About 77% of the Key Watershed is in LSR and the remainder in Matrix. (Table 2.2).

Table 2.2 Northwest Forest Plan Allocations (in acres)

| NFP Allocation | FS | BLM | TOTAL | Percent |
|---|---|---|---|---|
| Late-Successional Reserve | 45,521 | 5,567 | 51,088 | 85% |
| Matrix | 8,770 | - | 8,770 | 15% |
| Bald Eagle Mgmt Areas | 234 | - | 234 | <1% |
| TOTAL | 54,525 | 5,567 | 60,092 | |
| | | | | |
| Included in above acres: | | | | |
| Key Watershed | 8,837 | - | 8,837 | 15% |
| in LSR | 6,793 | | 6,793 | |
| in Matrix | 2,044 | | 2,044 | |

Note: Total acres of federal lands do not match total acres in Table 2.1 due to variations in GIS mapping.

Riparian Reserves, adjacent to all streams, overlay all the land allocations and occupy about 85-90% of the land. These are intended to provide protection for streams and other water bodies, as well as provide dispersal corridors for certain terrestrial species and greater connectivity between late-successional forest habitat.




# Indian/Deadwood Ownership Pattern

- Subwatershed Boundaries
- Siuslaw National Forest
- BLM
- State
- OSFW
- Industrial Forestry
- Private

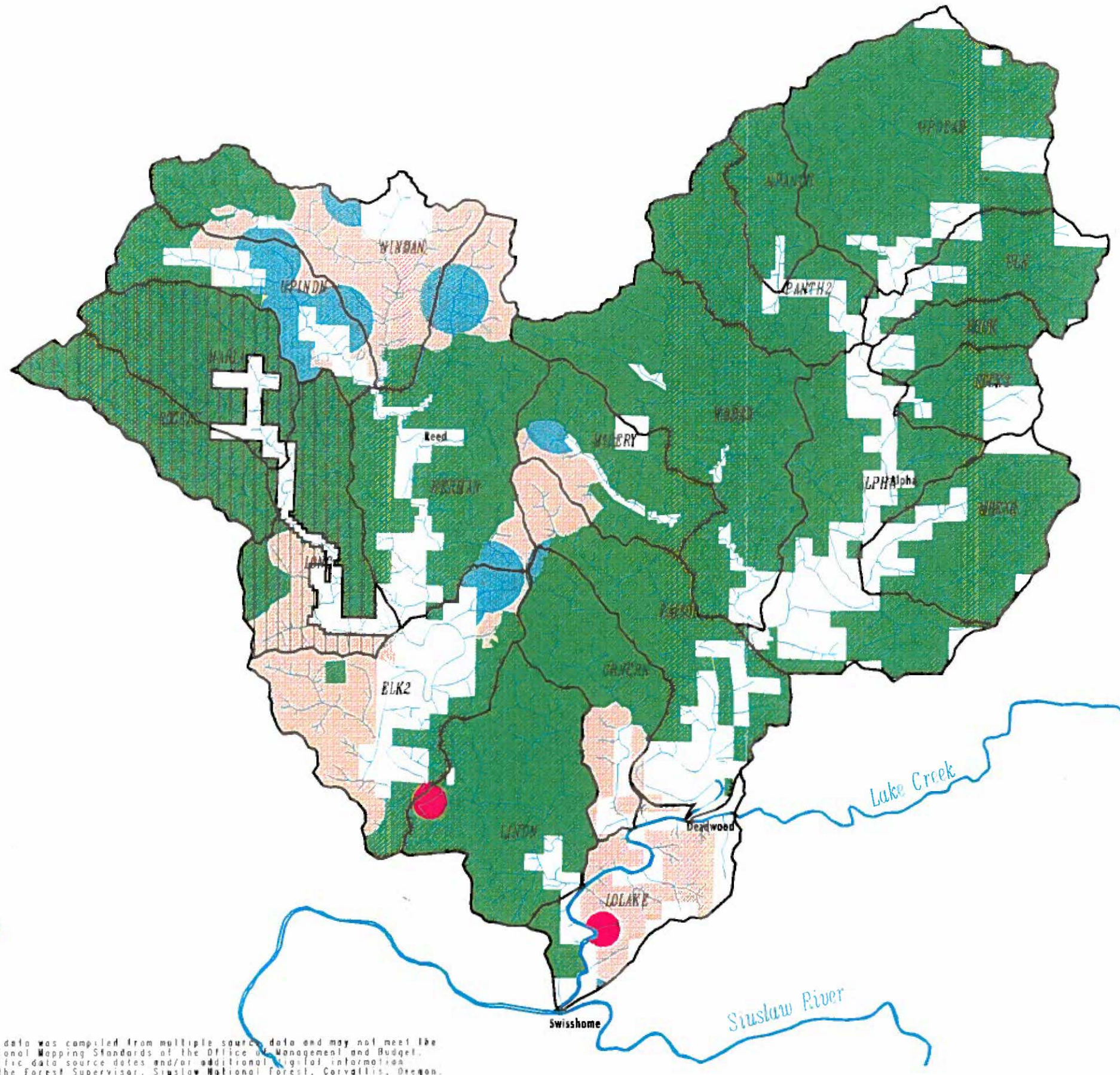
0 1 2 3 4

MILES

RF 1:103605

June 17, 1996

Map 2.1




Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy

# Indian/Deadwood Analysis Area NW Forest Plan

- Matrix
- LSR
- Murrelet Circles
- Eagle Sites
- non Federal
- Key Watersheds

0 1 2 3 4

MILES

RF 1:103605

June 13, 1996

Map 2.2

# Chapter 3 - Issues and Key Questions

The Northwest Forest Plan (USDA 1994) provides management direction for 81% of the land in Indian/Deadwood, and therefore focused identification of issues to the few most immediate concerns surrounding implementation of the new plan. The watershed analysis team also met with Mapleton district specialists and interested publics, primarily residents and landowners, to learn what additional concerns or opportunities they thought should be addressed. The information gathered at those meetings and field trips was used to strengthen the set of key questions that were selected for each issue. A few of the public's concerns were beyond the scope of this watershed analysis, but are documented for future use in Appendix A.

The highest priority issues are listed below with the key questions that were used to address the issues. These questions were used to focus the analysis presented in Chapters 4 and 5. The three issues are identified again in Chapter 6 in the discussion of management opportunities for the watershed.

## ISSUE 1

What opportunities exist for protecting, maintaining and restoring the streams and riparian areas in the watershed?

### Background

The anadromous salmonid runs on the Oregon coast have declined precipitously since 1990. On the Siuslaw National Forest, 28 anadromous salmonid stocks at risk were documented by the American Fisheries Society in 1991. In July 1995, the National Marine Fisheries Service proposed listing the coho salmon as a threatened species throughout the Oregon coast. Fish populations in Indian and Deadwood Creek watersheds have reportedly declined significantly since the 1970's.

A large segment of the public, including environmental interest groups, local Indian tribes, and commercial fishermen, have expressed concerns for many years about declines in anadromous salmonid populations in the Pacific Northwest. The Northwest Forest Plan was released in 1994 in response to overwhelming public and scientific concern about loss of late-successional forests and associated fish habitat. The Aquatic Conservation Strategy is a primary component of the Plan, calling for restoration and maintenance of ecological health of watersheds and aquatic ecosystems on public land. Many interest groups hold high expectations that the federal land management agencies will implement the Plan and restore health to the streams.

Results of research and stream surveys, summarized in reports such as Watershed Protection and Restoration in the Mid-Oregon Coast Range (USDA 1993) and Assessment of Federal Lands in and Adjacent to the Oregon Coast Province (USDA 1995b), indicate that most streams on the Forest, including those in in this watershed, are deficient in large woody debris and that riparian areas lack large conifer trees. Few stream systems have structure needed to dissipate stream energy, store water flows, trap nutrients and provide high quality fish habitat. Monitoring of stream temperatures on the Forest indicate many of the streams exceed state water quality standards suitable for fish habitat. In addition, road construction for access to timber harvest areas increased rapidly on the Siuslaw and in

Indian/Deadwood watershed since 1960. Roads built prior to the mid-1970's are known to greatly increase the potential for landslides and be a major source of sedimentation to streams.

Residents of both Deadwood Creek and Indian Creek would like to see fish populations return to past levels. At the same time, most residents of Indian/Deadwood have become dependent on the road network to access their properties and travel to local towns. Many would like to see most of the roads maintained at least for high clearance vehicles, because they are concerned about fire dangers and do not want to see the Forest investment in roads wasted. On the other hand, some residents would like to see the road network reduced if that would decrease traffic, especially from hunters.

One resident of Indian Creek has a permit to graze cattle on a Forest Service allotment (Indian Creek allotment). Currently, no grazing is allowed on the allotment until an analysis of allotment condition and effects of grazing on the riparian meadow environments can be completed. The permittee and forest managers need to determine how to meet the Aquatic Conservation Strategy objectives of the NFP when assessing future grazing opportunities in the watershed.

Forest managers want to know what the most appropriate and important management activities might be for restoring stream conditions. Opportunities are limited by funding and accessibility to streams, so it is critical to identify the most beneficial actions.

## Key Questions

The following key questions were identified as important information needed to address the issue:

**Streams** -

1. What is the current water quality condition, particularly temperature? How does water quality in the watershed compare to state water quality standards?
2. 
3. How has the amount, timing and delivery of water, sediment and wood in the watershed changed?

4. What is the anadromous fish distribution, spatially and temporally, in this watershed? (Past and Present). What is the current trend in distribution?

5. What natural and human activities have affected fish distribution, riparian vegetation, stream condition, water quality and flows? Examples of human activities: recreation, domestic water use, farming, grazing, logging, road building.

6. Are there any good to excellent anadromous fish production areas remaining in the watershed? If so, where are they and what makes them high quality?

7. Are there any known historic hotspots that are currently degraded, but which have a high potential for successful restoration?

8. What is the importance (or role) of the streams in Indian/Deadwood to the water quality and anadromous fish habitat of the Siuslaw River Basin?

**Riparian Areas** -

1. What is the vegetation structure and composition of the natural stands in riparian areas?

2. What were the major natural disturbances prior to human settlement; what are the major disturbances today? what are the relationships between upland and riparian disturbances?

3. What is the likely riparian succession?

4. Are there vegetation or physical features in the riparian areas that will limit certain aspects of restoration?

5. Are there factors that are presently affecting the production of other aquatic species? How?

6. How will restoration activities affect human uses of the watershed, i.e., grazing, access, recreation, hunting?

## ISSUE 2

What is the condition of the Late-Successional Reserve lands and how can they be managed to function as a late-successional ecosystem?

## Background

About half of the Oregon Coast Province is in private landownership and little, if any, of this provides late-successional forest habitat. The federal lands make up about 27% of the area and less than half of those lands currently provide older forest conditions. In addition, the remaining older forest is found in numerous small patches surrounded by young plantations. The Federal Lands Assessment (USDA 1995b) found that most mid to late-seral stage vegetation on the Siuslaw National Forest is very fragmented from past timber harvest activity. This condition is not conducive to sustaining populations of several species associated with mature forests, including the northern spotted owl, a federally listed threatened species.

Regional and national environmental interest groups would like the remaining late-successional forests in the Pacific Northwest protected to sustain viable populations of species associated with those habitats. The NFP calls for protection and enhancement of conditions for late-succession and old-growth forest ecosystems on a system of Late-Successional Reserves on federal land.

About 85% of the federal lands in the Indian/Deadwood watershed are allocated to Late-Successional Reserve (LSR) under the Plan. Forest managers want to know how to promote late-successional forest structure in the even-aged, young plantations present in the managed stands today. Results of fire history research, summarized in the Federal Lands Assessment, indicate that Coast Range vegetation patterns have been affected by large, but infrequent, natural fire disturbance that probably varied by geographic location across the Forest. To understand how to manage forest stands for late-successional conditions, managers should understand how natural processes operate in the watershed.

## Key Questions

The following key questions were identified as important information needed to address the issue:

**Forest Vegetation** -

1. What were the historic seral conditions (vegetation stages) in the watershed? What were the natural disturbances that led to those conditions?

2. What are the current seral conditions? What disturbances led to those conditions?

3. Given natural disturbance, what is the range of variability for seral conditions? What is the range of variability of within-stand structure?

4. What are the differences in landscape structural features, e.g., landscape fabric, patch sizes, fragmentation, etc., between current and natural (premanagement) conditions?

5. What are the differences in "within-stand" structural features, e.g., species composition, canopy layers, and levels of snags and coarse woody debris, between current and historic conditions?

6. How extensive are noxious weeds? Are they inhibiting native flora and fauna?

**Late-Successional Habitat** -

1. How much of the current forest is considered to be mature conifer? What is the spatial distribution of the mature conifer? How could the current condition be improved to meet needs of late-successional forest species guilds?

2. How much of the current mature conifer is considered "interior mature habitat" (habitat > 500 feet from edges)? What is the spatial distribution of the interior habitat? How could the current condition be improved to meet needs of late-successional forest species guilds?

3. How much suitable habitat is available for spotted owls and marbled murrelets and what is their distribution?

4. Are there specific areas outside federal lands in the watershed which serve an important function for connectivity?

5. What is the importance (or role) of the LSR lands in this watershed compared to the entire LSR? e.g., contribution to habitat, contribution to resident owl population?

6. Concerning riparian areas as habitat for terrestrial species, how fragmented or continuous is the vegetation along the stream courses and between upslope and riparian areas?

7. What other species habitats exist in the watershed? What conditions are they in?

8. Are there any sensitive plant species in the watershed?

9. What unique habitats occur in the watershed?

10. How are people currently using the LSR lands, e.g., hunting, collecting special forest products, using trails or special sites? Will these uses prevent attainment of LSR conditions?

## ISSUE 3

How should the remaining forest areas (Matrix) be managed?

### Background

The Northwest Forest Plan allocated about 8,800 acres to Matrix lands. Matrix offers an opportunity for wood fiber production. About 85 percent of all Siuslaw Forest lands fall within Riparian Reserves because of the high density of streams found on the short, steep slopes. On the Siuslaw National Forest, Matrix lands falling outside Riparian Reserves are in very small patches along ridgelines. Riparian Reserves were selected in the Plan to protect aquatic resources and, as such, constrain traditional timber harvest management practices.

Some publics, at both local and regional areas, have high expectations that the Forest will produce wood fiber on lands not needed for late-successional species. In addition, some local residents would like to have timber receipts return to higher levels in order to generate revenues for local roads and schools.

Findings from the Federal Lands Assessment (USDA 1995) indicated that timber sales from Matrix lands on the Siuslaw would not be able to provide large timber volumes by themselves, but would need to be combined with adjacent thinning sales from LSR lands in order to create a feasible sale. Forest managers would like to know how best to manage the small, scattered Matrix and intermingled Riparian Reserve lands to meet some timber production objectives and Aquatic Conservation Strategy objectives of the Northwest Forest Plan.

### Key Questions

The following key questions were identified as important information needed to address the issue:

1. How will Matrix lands be managed to fit the objectives of the watershed?

2. How is the role of Riparian Reserves in Matrix lands different than that in Riparian Reserves in LSR?

3. What are the vegetation conditions, e.g., age and species, in Matrix lands?

# Chapter 4 - Natural Resources: Characteristics and Processes

This chapter describes the physical and biological resources of the watershed and explains some of the interactions between them. The range of forest stand types and stream conditions expected to occur naturally across the watershed is presented and explained to be a function of the soils, climate and natural disturbance processes. This is the story of how the watershed functioned prior to Euroamerican settlement. The goal of this watershed analysis is to provide an understanding of the natural processes so they will be used as a basis for selection of appropriate management activities to ensure long-term sustainability of resources in the watershed.

The watershed analysis is tiered to a larger-scale analysis conducted for the Federal Lands Assessment (USDA 1995b). The Assessment identified some province-wide ecological strata that were helpful in placing the watershed in context of larger phenomena, including soil-climate zones, fire regime blocks, landtype associations (LTAs) and plant association groups (PAGs).

## CLIMATE

The climate of the Coast Range is influenced by the position and intensity of high and low pressure systems over the North Pacific Ocean, and by variation in topography. The Indian/Deadwood watershed is located on the west slope and crest of the Coast Range and experiences moderate summer and winter temperatures. Generally the mean temperature of the coldest month (January) is 15 - 20°F lower than that of July. Most of the precipitation falls as rain from November to March with some intense winter storms. Precipitation is lower in the major valley bottoms and increases as elevation increases. The normal annual precipitation in the watershed for the last 35 years ranges from 85" at the mouth of Lake Creek to 115" at Prairie Mtn. Strong winds (70-100 mph), often associated with rainstorms, may occur during the fall and winter. Heavy rain for several days saturates soils and, in addition to strong winds, may trigger landslides and cause patches of blown down trees.

In general, between 40-50% of the annual precipitation falls during December to February, 20-25% in the fall, 20-25% in spring and only 6% in summer. Stream flow reflects this with an annual cycle of high flashy flows during the winter and low baseflows during the dry summer months, when most of the flow in channels is derived from emerging groundwater. Flooding due to heavy rains occurs about once in two years, usually in the late fall and winter. This level of high water maintains the channel condition. Large floods occur less frequently and result in more significant channel and riparian vegetation changes. In coastal drainages notable flood years have been 1861, 1890, 1909, 1927, 1953, 1955, 1964, 1974, 1982, 1983 and 1996.

## GEOLOGY

The Indian/Deadwood watershed is underlain by the Tyee Formation. This formation is a thick deposit of rhythmically bedded, micaceous sandstone grading upward into siltstone that was deposited in shallow seas over basalts about 40-60 million years ago (Eocene). There are some basaltic intrusions that are not extensive in Indian/Deadwood, but exert a controlling influence on some of the landforms. The Coast Range has experienced tectonic uplift for the last 10 million years as the Juan de Fuca plate of the Pacific Ocean floor subducts beneath the North American plate. Major

earthquakes occur just off the coast about every 300 years as subduction continues, and these events are reflected in estuarine deposits along the coast.

The uplift is not uniform in a north-south direction but is rising and tilting eastward. This combination of lithology and tectonic uplift controls landforms and drives channel development and morphology in the Coast Range. Stream gradients on sedimentary rocks are highly variable. Relative to the other major drainages dominated by the Tyee formation ( e.g., the Yaquina and Alsea) the Siuslaw River has the steepest gradient. Variable river and valley gradients in the western Coast Range to have been attributed to differences in uplift. The western Coast Range is an exception to the typical widening in a downstream direction of river valleys and this is attributed to the eastward tilting. Differential rates of uplift and eastward tilting may have resulted in the lower reaches of Indian, Deadwood and Lake Creeks being moderately confined. (Stream confinement is shown on Map 4.7, Stream Function Segments.)

Products of erosion of the Tyee Formation include sand with some pebbles and cobbles. The pebbles and cobbles form a less durable substrate in streams than those produced from basaltic formations to the west. The Tyee streams also have more variable and less steep stream gradients.

The soils of Indian/Deadwood are predominantly gravely clay loams that have high infiltration rates. High biologic activity accompanied by high decomposition rates results in moderately high accumulations of soil organic matter. Soil moisture fluctuations from winter to summer are moderate to great depending on specific soil characteristics and slope position. Soil depth ranges from 20 to greater than 60 inches.

## SOIL/CLIMATE ZONES AND LAND TYPE ASSOCIATIONS

Six Landtype Associations (LTAs), having distinct physical characteristics, are found in the watershed (Map 4.1). LTAs stratify the landscape into areas of similar shape, geology and soils, which influence vegetation characteristics and stream channel form and process (USDA 1995b). All the LTA's in Indian/Deadwood are in the physiographic category of steep, highly-dissected bedrock dominated ridge systems. Shallow rapid landslides are the predominant erosion process with scattered areas of deep seated rotational failures. This is in contrast to the hummocky, moderate to high relief, deeply incised hills and valleys to the west or the gentle to steep bedrock dominated ridges and valleys to the north of the watershed.

The LTAs in Indian/Deadwood fall into two soil/climate zones-- central interior zone to the west and southern interior zone to the east. Basic differences are shown in Table 4.1.

Differences in available soil moisture in the central Coast Range vary only during short periods of low rainfall in mid to late summer. Soils are not limited in their potential for plant growth by soil moisture during the rest of the year. Coarse-scale available soil-moisture classes, ranging from 1 to 3, (wet to dry, respectively), were developed for the Federal Lands Assessment. These are relative ratings that compare seasonal available soil moisture within an eco zone that generally has much higher available soil moisture levels during all seasons than virtually any place in the west.

Table 4.1. Characteristics of Soil/Climate Zones

| Soil/Climate Zone | LTA's | Climate Characteristics | Soil Moisture |
|---|---|---|---|
| **Central Interior (West side)** | 3B, 3C, 3C1, 3C2, 3T | Wet winters, moist summers; significant differences (>5 ° C) in soil temperatures from summer to winter. | Soil moisture fluctuations from winter to summer are moderate: summer levels vary from very high on lower slopes to moderately dry on upper sideslopes. |
| **Southern Interior (East side)** | 3F | Very wet winters, moist summers; significant differences (>5 ° C) in soil temperatures from summer to winter. | Soil moisture fluctuations from winter to summer are moderate to very great; summer levels vary from moderate to low. |

The Indian/Deadwood watershed has predominantly (87%) class 3, dry soils. Exceptions occur in the alluvial deposits of the valley bottoms and on steep slopes (56% of the area has 30-60 % slopes; 14% has 60+% slopes). Significant differences in available soil moisture were not evident at this coarse scale but a closer look at soil characteristics and slope classes revealed an important gradation of conditions across the watershed, with higher proportions of dry environments in the east transitioning to wetter environments in the west. (See Appendix B for details of this analysis.)

## NATURAL DISTURBANCE PROCESSES

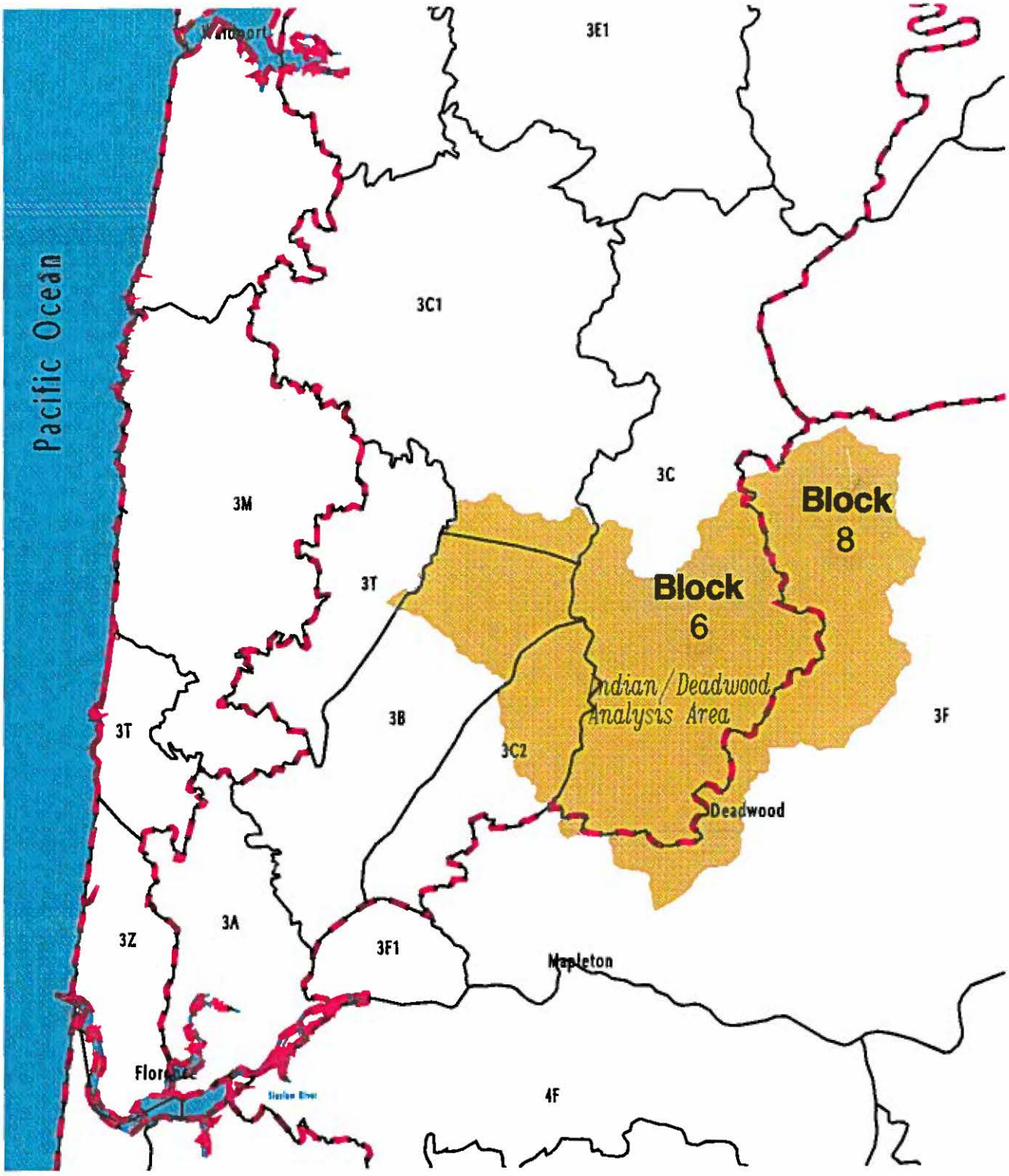
Four natural disturbances that are important in the watershed are fire, floods and landslides, laminated root rot and high winds. The scale at which they occur is important for understanding how they affect the resources spatially and temporally. **Fire** occurs infrequently, but across the landscape at a very large scale. **Floods and landslides** occur primarily in riparian areas affecting smaller portions of the watershed, but significantly affecting aquatic resources throughout the stream system. **Laminated root rot** (*Phellinus weirii*) is pervasive in the Deadwood drainage, but is a slow moving disturbance agent which operates at a small-scale. **High winds** occur occasionally and affect small (1-10 acre) patches of forest vegetation.

### Fire

In general, natural fire disturbances in the Coast Range are described as low frequency (> 200 years apart) and high severity, though probably not occurring on a regular cycle (Agee 1993, Teensma et al. 1991). Climatic changes are most likely responsible for these large fires. Although the fire record is not long enough to infer a cyclic pattern of fires, ignition increases from north to south due to increased lightning frequency and reduced summer precipitation. The last large fire to burn through much of the Indian/Deadwood watershed was in 1849. That fire affected about 800,000 acres between the Siuslaw and Siletz Rivers. Smaller fires are known to have burned parts of the watershed since then, including a fire east of Deadwood Creek in the 1930's. Some of the later fires may have been the result of settlers clearing land.

A recent study of Coast Range fire history indicates there appear to be relative differences in fire frequency and intensity from the coastal and interior zones to the southern valley margin (Impara 1995). Eight fire regime blocks were delineated in the Federal Lands Assessment based on different fire return intervals and/or severity and size. The fire regime blocks correspond closely to the

# Fire Regime Blocks & Land Type Association




Map 4.1

soil/climate zones since the gradation of fire effects appear strongly related to climate and landform characteristics (USDA 1995b).

Indian/Deadwood was identified as lying within two different fire regime blocks (Map 4.1). An ongoing fire history study by Peter Impara, an OSU student, includes a field transect through the Indian/Deadwood watershed. Preliminary results confirm the spatial gradation of fire pattern and were used to verify the boundaries and descriptors of severity and frequency of the two regime blocks covering the watershed (Impara, pers. communication). The western portion of the watershed has fire and vegetation patterns that typify the moist western hemlock forests, and the eastern portion is in an ecotonal zone that reflects some characteristics of the fire regime of the Willamette Valley.

**Central Interior - Alsea (Fire Regime Block 6)**

This block appears to cover the area west of Deadwood Creek. Fire in this block has been infrequent and severe, occurring with strong east winds in drought years. Large to jumbo patches of a single seral stage (1,000 to >10,000 acres) dominated the landscape. These patches were expected to have changed over time from early seral to mid and then to late seral stage because of the low frequency of subsequent disturbance. Douglas-fir, western hemlock and western redcedar are primary components of mid and late seral conditions.

**Southern Interior (Fire Regime Block 8)**

The area east of Deadwood Creek shows different historic vegetation patterns, which may be a reflection of different fire behavior. Fire pattern in this block appears to have been of low to moderate (<100 - 300 years) frequency and moderate to high severity (30 - >70% mortality). Vegetation patches were of variable size. Block 8 has a more complex topographic relief pattern which could account for a more patchy burn and patchy vegetation patterns. Although east winds may occur in this block, deeply dissected ridges create barriers to wind movement and fire spread and could be responsible for variable fire effects. This would result in variable patch size and more diverse tree species composition and remnant live trees than in Regime Block 6.

Analysis of topography in the watershed reveals that lands within Regime Block 6 are of lower topographic relief than the lands within Block 8. This seems to confirm the assumptions used to develop the fire regime blocks, i.e., Block 6 would have less variation in burning intensity than Block 8 and provide little protection for small patches of trees to survive as remnants after a fire.

## Floods and Landslides

Floods are not just high water, rather they include multiple processes: debris slides and flows, sediment-laden streamflows, movement of woody debris and disturbance to riparian vegetation. These processes are tightly linked in a flood disturbance system. Large floods are responsible for the most extensive and persistent changes in river, valley and riparian vegetation. The few hours when a flood is peaking can modify the landscape more than in all the intervening decades combined, however, the changes are not uniformly distributed across the landscape. Therefore, the effects of floods are both temporally and spatially variable.

Two important upslope erosional processes in the Indian/Deadwood area are debris slides and torrents and slumps. Often described as shallow-rapid failures, debris slides and torrents are the predominant erosional process in this area. They usually start in intermittent headwater stream channels and flow

rapidly downstream with tremendous force. They most commonly occur during heavy rainstorms following high antecedent soil moisture. Landslides occur when downslope shear stress exerted by the weight of the saturated slope exceeds soil shear strength and the force of gravity moves material downhill (NCASI 1985). The resulting debris slides and torrents are a mixture of mud, rock and organic debris that tend to scour the upper 1st and 2nd order stream reaches and eventually deposit sediment and wood in lower reaches (>3rd order). Dam break floods may also be associated with debris torrent deposits that temporarily impound water and sediment, but then break through to create a large flood wave down the stream channel (Montgomery and Buffington, 1993).

The recurrence interval for debris slides or torrents from a single location in the central Coast Range is on the order of hundreds to thousands of years. Periodically, lower reaches impacted by large torrents will be aggraded by the influx of sediment, then gradually degraded as the stream downcuts through the deposit. This cycle of aggrading and downcutting occurs in a timeframe of hundreds to thousands of years, depending on the size of the deposits and the flow regime of the channel. Valley width, channel gradient and tributary angle influence how far a debris torrent travels and where it will deposit its load, but it is not uncommon for debris torrents to scour headwalls and channels to bedrock for hundreds of feet. Debris torrents on Tyee generally produce deposits ranging from 500 to 5000 cubic yards in size, averaging approximately 2000 cubic yards.

Slumps are present in Indian/Deadwood but are not as common as debris slides. They are large, deep-seated slides that move downhill on a curved plane of weakness. They can cover areas as large as entire hillsides and can move either slowly and continuously or rapidly during large storm events.

Map 4.2 shows an estimate of the most slide-prone areas in Indian/Deadwood. It is based on a debris slide hazard rating of the area (see Appendix C for analysis methods). The model used to develop this map was based on relationships between slope form and slope gradient. With the knowledge that debris slides and torrents often occur in areas where thin soils overlay bedrock, a final variable factoring in soil thickness was layed over areas given a "high probability" rating by the original model. As a result, designated areas shown on Map 4.2 include soils less than 3.5 feet thick in areas containing concave slopes greater than 35% or planar slopes greater than 65%. It should not be assumed that shallow-rapid landslides will occur only in marked areas of this map. However, this information, coupled with data from past landslide and stream surveys, may provide insight into locations of high probability for sediment and wood influxes to the aquatic environment. In addition, this map will alert land managers to areas where more site specific analyses should occur at the project level. The map does not identify areas of possible slumps.

### Insects and Disease

Laminated root rot, caused by the fungus *Phellinus weirii*, is the most commonly encountered forest disease disturbance agent in the watershed. The Deadwood watershed has a high incidence of laminated root rot relative to the rest of the Coast Range. From surveys conducted in the mid-1980's, the northeast portion of Deadwood was found to contain openings caused by this disease in 32 percent of the areas surveyed (Goheen et al 1983, 1984 and 1986).

Root rot fungus is a parasite that kills host trees of all sizes and ages. The fungus extensively decays roots of highly susceptible host trees and either causes windthrow or kills them by destroying their ability to take up water and nutrients. Infected saplings and small poles usually die standing; larger trees are more likely to be windthrown (Hadfield 1986). Douglas-fir and grand fir are the most

susceptible host trees. Deciduous trees are immune, cedars and redwood are resistant, and western hemlock is moderately resistant.

*Phellinus weirii*, like other root pathogens, has coevolved with its host through time and thus is a natural part of many forest ecosystems. Spreading through forest stands by means of root contacts, it kills susceptible host trees resulting in scattered groups of dead trees, openings in the canopy, increased volume of down woody debris and increased species diversity in the plant community (Thies and Sturrock 1995). In the absence of host trees, the fungus can survive on decaying conifer roots for up to 75 years. It clearly has the potential to produce landscape level diversity in the central coastal area.

The Douglas-fir bark beetle also occurs in the watershed, usually increasing in numbers following a blowdown. Trees infected by root rot become more susceptible to windthrow, but the trees may also be host to bark beetle before they blow over.

### Wind

Strong winds with gusts up to 100 mph occur with major storm events. The effect of such strong winds in the Coast Range is the creation of 1-10 acre forest openings due to tree blowdown. Most of the blowdowns in Indian/Deadwood occur along ridgetops. The blowdowns provide places for successional development by opening the canopy and releasing suppressed understory climax species.

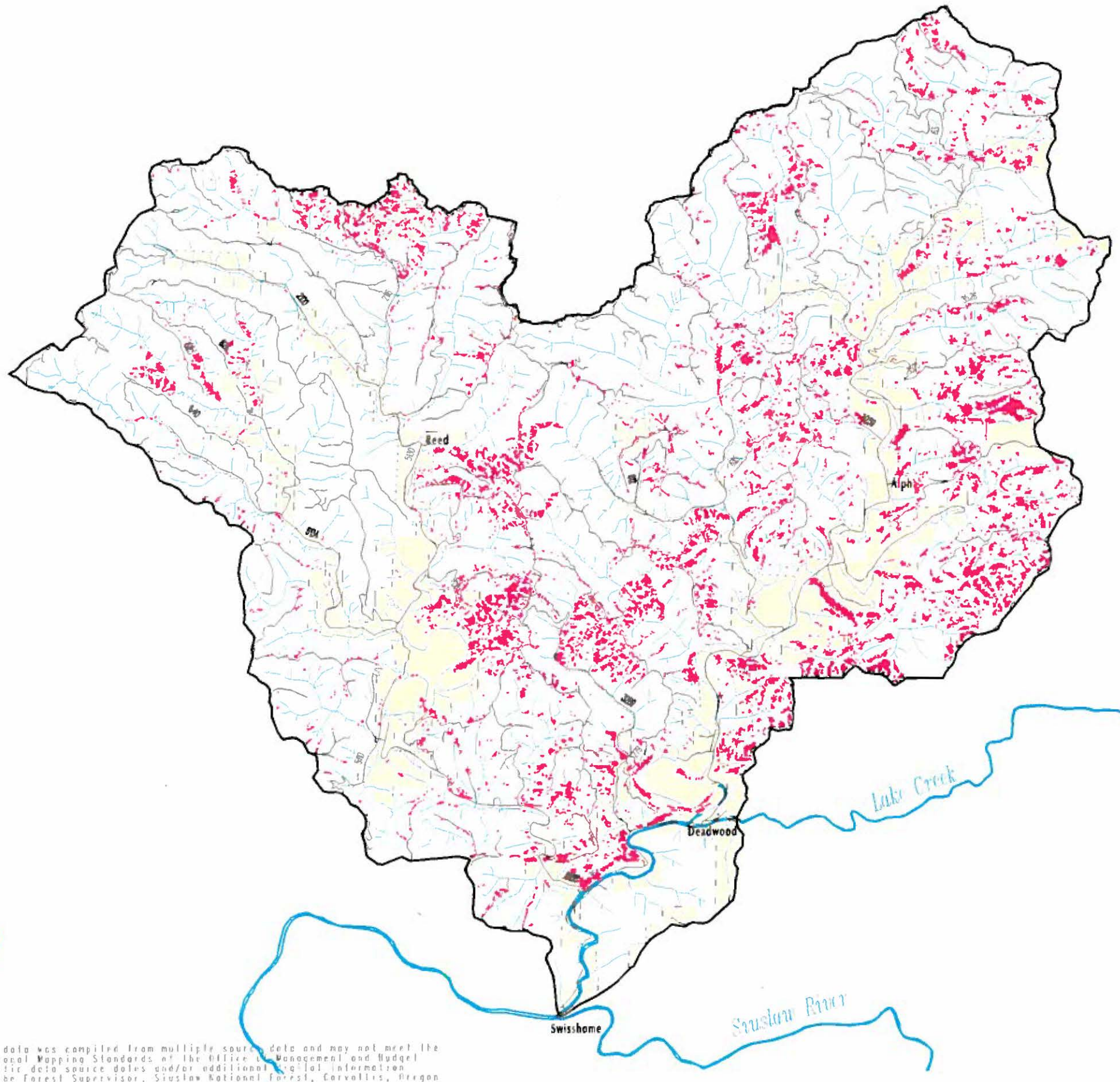
Major wind storms in recent history include the following:

- October 1962 (Columbus Day Storm)
- March 27, 1963 -- gusts over 100 mph occurred along the Oregon coast
- December 27-29, 1965 -- 75-120 mph winds unofficially recorded on the coast
- October 2, 1967 -- 100-115 mph winds recorded along the coast
- March 26, 1971 -- scattered damage along the coast
- December 18 - 22, 1971 -- coastal area, Willamette Valley wind and rain caused a lot of damage-
- January 7, 1975 – gusts reaching 70mph
- March 24, 1976
- February 12-13, 1979
- November 14-15, 1981 -- most intense storm since the Columbus day storm of 1962
- December 19-26, 1983 and November 1-2, 1984 -- 90 mph winds on the coast
- December 12, 1995 -- 120 mph winds on the coast

These wind speeds were recorded on the coast. There is a loss of intensity inland with a corresponding reduction in amount and frequency of blow down.

### Role of Disturbance in Vegetative and Aquatic Population Dynamics

Natural wildfires usually reset a stand or landscape back to an earlier seral stage, while wind and root rot tend to move a stand or landscape forward to more advanced seral stages. (See "Generalized Forest Succession" later in this chapter for a discussion of species composition changes with seral stage development.) Fire, especially stand-replacing events, kills most of the trees and produces an early seral forest which then moves through succession as one large block, finally remaining in later




# Indian Deadwood Slide Prone Areas

System Roads

Class 1,2,3 streams

Non Federal Lands

High Risk Thin Soils

0 1 2 3 4

MILES

RF 1:103605

June 11, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget for specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon This map has no warranties to its content or accuracy

Map 4.2

seral stages for a few hundred years. On the other hand, laminated root rot, so prevalent in the Deadwood drainage, maintains deciduous patches of early seral forest present over much of the area.

Landslides increase following large fires, leaving channels heavily loaded with sediment and wood. Between large fires, sediment and wood are redistributed downstream over time in waves. Additional inputs come from large floods and windstorms. Large floods in mature forests leave stream channels filled with large wood from debris torrent deposits and riparian snags killed by fire. Thus debris (particularly large-diameter conifers) maintains structure in stream channels for about the first 100 years until wood is recruited from the new forest or upstream. Wood from deciduous stands enters the stream about 50 years following disturbance, while wood from conifers may take 100+ years. Unburned patches, which typically occur in larger riparian areas, may continue to supply more wood. Floods and landslides maintain a greater mixture of seral stages and species composition throughout the riparian areas than found upslope. They also serve as agents that bring wood and sediment to the stream system.

## ECOLOGICAL UNITS IN INDIAN/DEADWOOD

Indian/Deadwood watershed exhibits gradations from west to east in several resource characteristics, including soil moisture, forest patch size, tree density, and species composition. The watershed was stratified into three ecological units based on these differences and an examination of aerial photos and field excursions. The stratification was useful for further analysis of the vegetation, hydrology, fisheries and wildlife habitats. Furthermore, the differences are significant enough to suggest varying management strategies.

The LTAs were grouped into the three ecological units: West Unit (LTA 3B, 3C1, 3C2, and 3T), Middle Unit (LTA 3C) and East Unit (LTA 3F). The three ecological units are shown on Map 4.3. The West unit falls west of LTA 3C, the East Unit falls east of LTA 3C, and the Middle Unit is in LTA 3C. As shown on the map, the LTAs are just portions of larger LTA areas. The LTA descriptions, therefore, are relative to conditions in the central Coast Range.

The **western** section of the watershed has low relief and broad valleys creating a wet to moist environment, and an infrequent, stand-replacing fire regime. This type of fire regime implies that the area is dominated by a single seral stage. The **eastern** portion of the watershed has high backbone ridges and high topographic relief, a moist to dry environment, and a moderately frequent, moderate to severe fire regime. This type of fire regime implies variability in terms of stand condition and distribution of seral stages. The **middle** portion of the watershed is a transition area and has landforms characteristic of both the east and west portions of the watershed, but primarily has short, steep slopes with a moist environment and an infrequent, stand-replacing fire regime. Table 4.2 briefly summarizes the characteristics of the three ecological units within the Indian/Deadwood watershed.

Table 4.2. Characteristics of Ecological Units

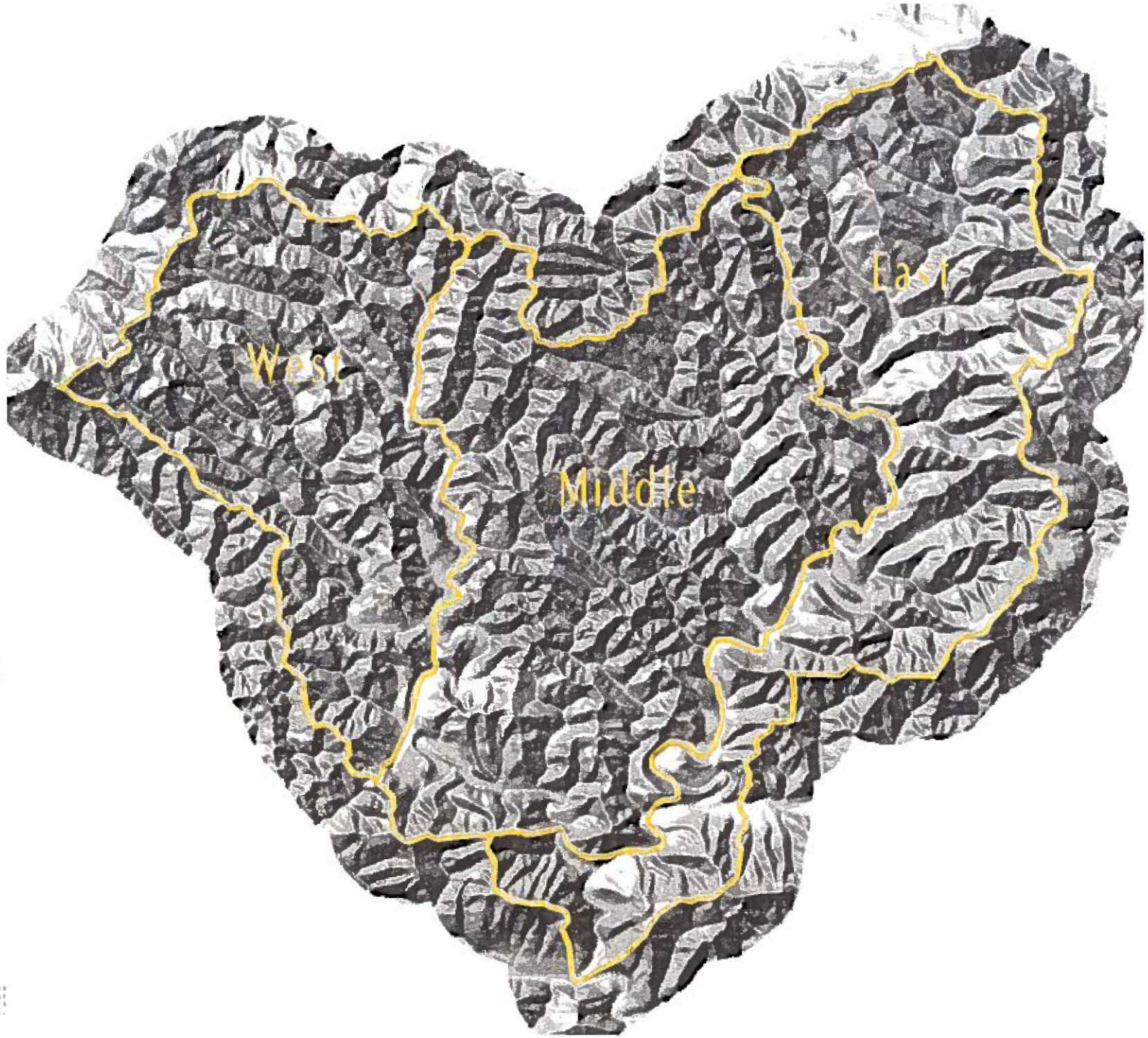
| Ecological Unit | Acres | Fire Regime Block | Soil Moisture | Topography and relief | % area occupied by PAGs[1/] |
|---|---|---|---|---|---|
| West Unit: West of Indian Cr. | 18,520 acres (25%) | Block 6 - Stand replacing, infrequent fires with jumbo patch sizes, >1000 acres). | Wetter soils (LTAs 3B, 3C1, 3C2, 3T) | Low relief. Highly dissected slopes. Broad valleys. Slope lengths short. | Salmonberry 41% Salal 23% Swordfern 34% Rhododendron 2% |
| Middle Unit: between Indian and Deadwood Creeks | 30,478 acres (41%) | Same as West Unit | Moist soils (LTA 3C) | Variable relief. Generally short, steep slopes. | Salmonberry 30% Salal 29% Swordfern 38% Rhododendron 3% |
| East Unit: East of Deadwood Creek | 25,051 acres (34%) | Block 8 - Moderately frequent, mixed severity fires with moderate to large patch size, 100-1000 acres) | Drier soils (LTA 3F) | High relief. Highly dissected slopes. Slope lengths long. | Salmonberry 25% Salal 36% Swordfern 36% Rhododendron 3% |

[1/] From PAG model for Western Hemlock series, USDA (1996)

In general, the soils of the western and central parts of the watershed (West and Middle Units) can be described as very deep moderately fine-textured soils that overlie moderately to highly permeable bedrock, summer soil moisture levels vary from very high on lower slopes to moderately dry on upper sideslopes. The East Unit soils are shallow to deep, fine to medium textured soils that overlie impermeable bedrock, generally moderate to low summer soil moisture levels. A detailed discussion of soil moisture levels and patterns in Indian/Deadwood is provided in Appendix B.

## VEGETATION

Forest stand structure, density and species composition are a function of topographic conditions, reburn frequency, seed source availability, brush competition and biological pests. This section describes some of these factors that influence natural vegetation patterns in the watershed.




Indian/Deadwood

Topography

N Ecological Units

Map 4.3

## Effects of Fire on Vegetation Patterns

This section describes coarse scale vegetation patterns in the watershed associated with fire regime blocks and soil/climate zones. Knowledge of fire history can be used to manage the landscape vegetation within the natural range of seral stages and patch sizes. Historic vegetation patterns were reconstructed by examining fire history studies, a digitized vegetation map constructed from 1940's aerial photos and 1939 oblique aerial photos available at the University of Oregon map library. The fire history studies and oblique photos provided general vegetation patterns of patch size and seral stages, while the vegetation map provided seral stage distributions from one point in history (1940's). This period is assumed to reflect vegetation patterns typical of those prior to extensive logging. Distribution of historic seral stages is shown on Map 4.4 and Table 4.3.

### Fire Regime Block 6

The 1940's vegetation data indicates that before intensive logging, Fire Regime Block 6 was, for the most part, one contiguous patch of mature conifer forest. Mature conifer stands dominated this block, occupying about 32,000 acres or 65% of the block and occurred in a small number (23) of patches. The other significant seral stage was very early seral which occupied 13% of the disturbance block, but occurred in 78 patches with a mean patch size of 84 acres (Table 4.3).

A mature conifer-deciduous mix occupied the headwall areas and 2nd and 3rd order stream valleys of the most western portion of the watershed (Upper Indian, Maria, Rogers, Long and Elk Creek drainages). Deciduous species were a lesser component of the riparian vegetation in the central portion of the watershed.

### Fire Regime Block 8

The 1940's vegetation data indicates that Block 8 was a mosaic of small to medium patches with patch size ranging from 30 to 1500 acres. This patch size distribution was notably different than the large patches of Block 6. Mature conifer stands occupied most of the acreage but were less predominant (49%) and were in much smaller patches than in Block 6 (Table 4.3). Douglas-fir dominated mid seral stages, with western redcedar and western hemlock major components in late seral conditions.

The percent of the block occupied by very early seral stage (12%) was similar to Block 6, but occurred in only 2 patches. The riparian areas did not show a strong association with any seral condition across the block, except West Fork of Deadwood Creek which was mapped as mature conifer-deciduous mix. Alder is found in frequently disturbed upland zones and most drainage bottoms.

The "prelogging" 1940's seral stage map is assumed to provide some indication of the vegetation patterns that would naturally occur following large fire events. However, this historic vegetation pattern is from one point in time (1940's) and with fire effects being extremely variable, this point may be atypical.

Table 4.3. Distribution of Seral Stages by Fire Regime Block (from 1940s "pre-logging" map)

| | Fire Regime Block 6 | | | | Fire Regime Block 8 | | | |
|---|---|---|---|---|---|---|---|---|
| Seral Stage | Acres | % of Disturb. Block | Number of Patches | Mean Patch Size | Acres | % of Disturb Block | Number of Patches | Mean Patch Size |
| Grass/ Forb | 1149 | 2 | 20 | 57 | 661 | 3 | 16 | 41 |
| Very early seral | 6,522 | 13 | 78 | 84 | 2,905 | 12 | 2 | 1,453 |
| | | | | | | | | |
| Early seral conifer | 126 | <1 | 7 | 18 | 1,094 | 4 | 3 | 365 |
| Conifer-mix & decid.-mix pole | 357 | 1 | 8 | 45 | 425 | 2 | 12 | 35 |
| | | | | | | | | |
| Young conifer | 2,123 | 4 | 31 | 68 | 3,456 | 14 | 5 | 691 |
| Young conifer mix | 1,019 | 2 | 20 | 51 | 700 | 3 | 14 | 50 |
| Young & mature decid.-mix | 0 | 0 | - | - | 233 | 1 | 4 | 58 |
| | | | | | | | | |
| Mature conifer | 31,554 | 64 | 23 | 1,372 | 12,263 | 49 | 28 | 438 |
| Mature conifer- mix | 4,485 | 9 | 27 | 166 | 1,947 | 8 | 20 | 97 |
| Pure deciduous | 1,438 | 3 | 24 | 60 | 637 | 3 | 20 | 32 |
| Multi-late | NA | NA | NA | NA | NA | NA | NA | NA |
| Total | 48,773 | | | | 24,321 | | | |

Seral stages are defined in Appendix D.
NA = information not available.

Unfortunately, the historic vegetation map reflects only upland, not riparian, vegetation patterns. Vegetation patterns resulting from wind, flood or landslide disturbances are not evident in the map. The mainstem valleys were homesteaded at the turn of the century, and vegetation was changed considerably for pasture, farming and homesites. Also, many creeks were channelized and used for mill ponds or splash dams. Streamside vegetation was often removed in the process.

## Effects of *Phellinus weirii* on Vegetation Patterns

*Phellinus weirii* affects vegetation patterns at a small scale, but is widely distributed throughout the Coast Range. Fire occurs episodically in association with climatic cycles, while root rot is ongoing with a fairly consistent pattern of spread. The disease moves relatively slowly through stands and is persistent for up to 75 years in large roots and stumps of trees that have been cut or killed (Hadfield 1985). Before human activities became the dominant agents of disturbance on the landscape, distribution and spread of the fungus was most likely influenced by fire history in an area, i.e., the fire determined the location, spread and longevity of the host trees over the landscape and thus, that of the fungus.

A study in the northern Oregon Coast Range found a significant association between laminated root disease and slope position in 70- to 100-year-old Douglas-fir stands. The percentage of plots containing P. weirii-infected Douglas-firs was highest on ridges and decreased downslope. No relation was found, however, between laminated root disease and plant community type or aspect (Kastner et al. 1994).

Those sites in the Indian/Deadwood watershed that have supported a more continuous occupation by Douglas-fir will have greater likelihood of laminated root disease occurrence and this distribution will not have changed much in the recent past. In other words, the disease will be found much where it has existed since the last large fire, and we can expect more in the Deadwood drainage with a fire history of smaller, less severe fires than the Indian drainage with its history of more intense, stand-replacement fires.

## Plant Association Groups (PAGs)

Plant Association Groups refer to a community of plant species that inhabit a climax (late-succession) forest. PAGs are often considered to be hypothetical units, because landscape disturbances, both natural and human-caused, prevent many sites from reaching 'climax' condition. Nevertheless, if one hypothetically excludes disturbance from the picture, and assumes that succession will follow certain trajectories, then potential vegetation communities can be predicted for a given site (USDA 1996).

PAGs are groupings of "Plant Associations" which are a finer scale classification of potential vegetation communities frequently used in field work to characterize the vegetation community of the plot location. Plant associations reflect micro-site characteristics, which may change over short distances. The more general (or macro) environment is best expressed when grouping individual plant associations into plant association groups. The distribution of the plant association groups has recently been mapped for the Siuslaw National Forest lands and extended across adjacent private lands using models based on environmental factors (See Map 4.5).

PAGs are useful for several reasons, even if the predicted vegetation types will never inhabit a site. First, the resulting PAG map is an ideal proxy of micro-environmental conditions, i.e., it should have a set of environmental characteristics common with other sites that are also predicted to support the same vegetation type. Second, the macro environments are easier to manage and are most useful for identifying potential changes in stand composition, structure and successional pathways. They also indicate relative differences in soil fertility and wildlife use. Third, knowledge of tree density and species composition differences among plant associations and their relative locations and abundance can provide guidance for development of silviculture prescriptions designed to promote late-successional structure in plantations.

Plant species and soil characteristics of the most prevalent plant association groups in the watershed are displayed in Tables 4.4 and 4.5. Within the western hemlock series, salal, swordfern and salmonberry are common in the Coast Range, whereas rhododendron occurs only rarely on the Siuslaw except for the Mapleton District. A complete list of Plant Associations in each Plant Association Group is shown in Table 4.4.

Table 4.4. Plant Associations included in the Plant Association Groups (PAG):

| PAG | Common name for PAG | Plant Associations included in PAG | Environment PAG Represents |
|---|---|---|---|
| RUSP | "The Salmonberry PAG" | •TSHE/OPHO<br>•TSHE/RUSP<br>•TSHE/RUSP-ACCI | Wet |
| POMU | "The Swordfern PAG" | •TSHE/OXOR<br>•TSHE/POMU<br>•TSHE/ACCI-POMU | Moist |
| GASH | "The Salal PAG" | •TSHE/BENE<br>•TSHE/BENE-GASH<br>•TSHE/GASH<br>•TSHE/ACCI-GASH | Dry |
| RHMA | "The Rhododendron PAG" | •TSHE/RHMA-BENE<br>•TSHE/RHMA-GASH<br>•TSHE/RHMA-POMU<br>•TSHE/RHMA-VAOV2<br>•TSHE/VAOV2 | Very dry |

See Hemstom and Logan (1986) for description of each Plant Association.

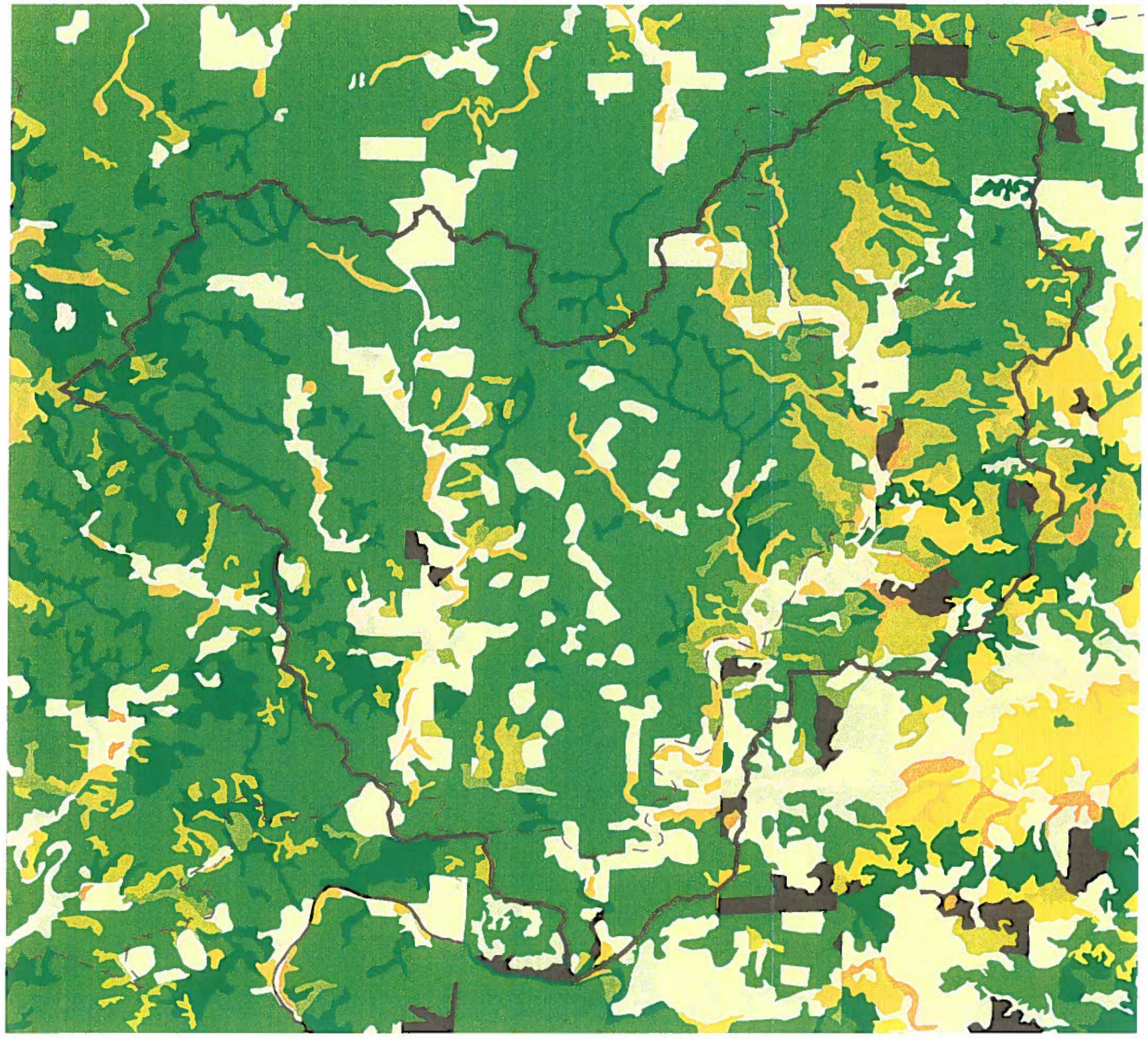
## PAG Distribution by Ecological Unit

The distribution of PAGs from west to east across the watershed shows a gradation of environmental conditions from wet to dry with associated changes in species composition, stand structure, and differences in succession. These components are described for each of the three Ecological Units in the watershed including the role of the dominant PAGs. Appendix E further describes the finer scale patterns of the ecological units by topographic position.

**West Ecological Unit**--The West Unit is wet with a wide distribution of wet and moist PAGs. Drier PAGs occur primarily as small bands on ridgetops. This unit has relatively low relief, broad valleys and sharp ridges. The landform of the West Unit is asymmetrical or questaform (one side of the ridges highly dissected with steep, short slopes, and the other side less dissected with longer, gentle slopes). See Map 4.3. The two sides of the ridges have environmental differences resulting in different species composition, structure and rates of succession.

On the steep, highly dissected slopes dominated by salmonberry (RUSP) and swordfern (POMU), stands 120 years old have many attributes of old-growth structure. They are multilayered and have an open overstory of large Douglas-fir bearing large limbs and wide crowns. An understory of clumpy cedar and hemlock develops as the alder senesces about 75 years after the initial stand establishment. By contrast, on less dissected gentle slopes dominated by GASH, stands 120 years old are much more simple with single-story, even-aged Douglas-fir and little evidence of old-growth structural features.

**Middle Ecological Unit**--The central portion of the watershed, is a transition zone. It is more mixed and variable than the East and West Units , but has few unique characteristics of its own. The area is highly dissected with steep, short, angular, even-faceted slopes. Soils are moderately deep on ridge systems to very deep where few scattered areas of ancient earthflows occur. The ridge shape varies from sharp and narrow to rounded and wide. The steepest, most unstable slopes are on upper portions of long ridge systems. These are



## Indian/Deadwood
## Pre-logging Seral

Approximately 1940

- Grass/Forb
- Very Early Seral
- Early Seral Conifer
- Conifer Mix and Decid. Mix Pole
- Young Conifer
- Young Conifer Mix
- Young and Mature Decid. Mix
- Mature Conifer
- Mature Conifer Mix
- Pure Deciduous
- Untyped
- Fire Regime Boundary
- Watershed Boundary

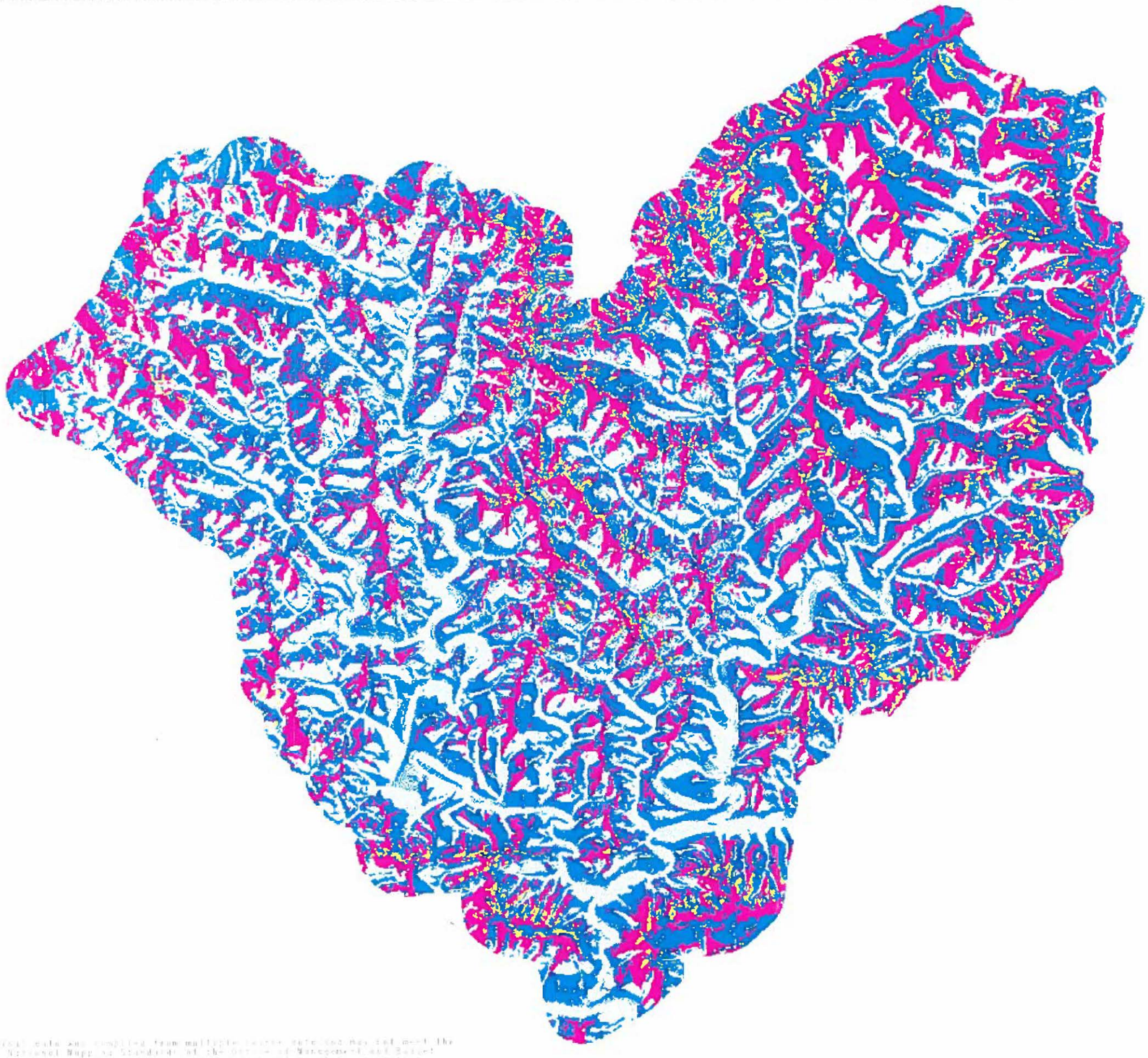
0 1 2 3 4

MILES

RF 1:103605

June 14, 1996

Map 4.4



## Indian/Deadwood Plant Association

- Rhododenron (RHMA)
- Salal (GASH)
- Oxalis Swordfern (POMU)
- Salmonberry (RUSP)

0 1 2 3 4

MILES

RF 1:101695

June 12, 1996

Map 4.5

generally very productive conifer stands with a low component of alder. The environment is more moderate and PAGs are more evenly distributed than the East or West Units.

Table 4.5 Plant Associations and Soil Conditions

| Plant Association | Major Overstory Tree Species | Major Shrub Species | Major Herb Species | Soil Fertility & Stand Growth | Soil Moisture and Slope Position |
|---|---|---|---|---|---|
| **TSHE/RUSP Western hemlock/ Salmonberry** | Douglas-fir and alder. | Primarily salmonberry. Also evergreen huckleberry, red huckleberry. | Few herbs. Low amounts of oxalis and montia. Swordfern in openings. | Soil is nitrogen enhanced by pure stands of alder. Conifer growth excellent. | Wet environment. Very moist soils, high organic matter content. Lower slope positions including riparian. |
| **TSHE/POMU Western hemlock/ Swordfern** | Some alder; Douglas-fir associated with western hemlock and redcedar in lower layers. | Usually has limited cover but consists of red huckleberry, salal, salmonberry and vine maple. | Swordfern is most common with Oregon oxalis, deerfern, Pacific trillium and bedstraw common. | Soil fertility high. Natural stands normally well stocked. Red alder regenerates and develops well. | Moist environment. High moisture, but well drained soils. Usually midslope position. Can occur in riparian. |
| **TSHE/GASH Western hemlock/ Salal** | Douglas-fir and western hemlock. some western redceder. Some bigleaf maple and chinquapin. | Dense salal. | Swordfern. | Douglas-fir grows moderately well. Salmonberry and alder are not as aggressive. | Dry environment. Drier soils. More common at higher elevation at tops of slopes and on ridgetops. |

(From Hemstrom and Logan 1986)

**East Ecological Unit**--The East Unit has a dry to moist environment with a wide distribution of drier PAGs and wet PAGs limited to riparian areas. This part of the watershed has relatively high relief with long, steep slopes and moderate dissection. Landforms are larger and ridges are broader.

Vegetation in this part of the watershed is unusual in several ways. It is quite dry as indicated by prevalent huckleberry, chinquapin and rhododendron. The dry plant association groups are much more dominant in this block of the watershed. Blue huckleberry, which is the driest plant association on the Forest and of rare occurrence, is frequently found on ridge tops in the East Unit.

Regeneration of the "Salal" PAG results in dense young conifer stands and considerable self-thinning from young through mature succession stages. We would expect a simple stand structure; however, variability in the terrain and fire on this side of the watershed increase stand complexity, especially remnants from pre-fire stands. The pre-logging map indicates more small patches and more seral types in this part of the watershed

than elsewhere. Interestingly, the patchiness of the area continues today although a similar management strategy (patch clearcuts) has been imposed evenly across the watershed. This indicates the patchiness of the area may be intrinsic (environmental) rather than due only to fire effects. A large distribution of pure deciduous stands in the southeast corner of the watershed may be due to poor conifer regeneration following wildfires in 1850, 1910 and 1930.

**Generalized Forest Succession**

The flowcharts below indicate the successional pathways expected for three types of environments. These pathways were developed from examination of data summaries in the Plant Association Guide (Hemstrom and Logan 1986) and knowledge of plantation success and difficulty in each of the PAG types. See Appendix C, "Development of Proposed Successional Pathways", for discussion of the method used. The flowcharts of successional pathways indicate expected species composition through time. These pathways may be used at the appropriate age to guide restoration treatments of plantations where the objective is to favor species composition common in natural stands of similar age. Due to lack of information, they should be regarded as hypotheses that need to be tested and present excellent opportunities for monitoring and adaptive management.

The **dry environments** (salal PAG) probably have two successional pathways, both beginning with Douglas-fir (PSME) in the early seral stage (first 10 years). In the young seral stage (10-80 years), shade tolerant western hemlock (TSHE) may be a small component of the understory and increase as a component in mature (80-150 years) and late seral stages. Regeneration of dense stands with conifer results in considerable self-thinning between the young and mature seral stages. Old-growth structure probably develops slowly--150 to 180 years after stand initiation when gaps develop. Deciduous trees are a small component of stands throughout succession and are not shown as a species in the flowchart.

**I. DRY ENVIRONMENT Salal Types (TSHE/GASH):**

| Dominant Seral Composition | Early Seral (0-10 yrs) | Young Seral (10-80 yrs) | Mature Seral (80-150 yrs) | Late Seral (150-300 yrs) |
|---|---|---|---|---|
| 1. Conifer → | PSME | → → | PSME/TSHE | TSHE |
| 2. Conifer → | PSME | PSME/TSHE | → → | TSHE |

The **moist environments** (swordfern PAG) may have four pathways, two dominated by conifers throughout succession and two with a conifer/deciduous mixture. The two groups occur with equal probability (50/50%). In the stands that are conifer throughout succession, the first pathway begins with Douglas-fir in the early seral stage; the second pathway with a mix of Douglas-fir and western hemlock (PSME/TSHE). By the mature seral stage, both paths develop a mixture of PSME/TSHE. Stands that have a mixture of conifer/deciduous species represent the third pathway for the moist environments. These begin with a mixture of alder and Douglas-fir (ALRU/PSME) in the early and young seral stages. In the mature seral stage, the major species would be Douglas-fir and western hemlock/ western red cedar (PSME/TSHE (THPL). A fourth pathway begins with alder (ALRU) in the early through young seral stages and develops into a TSHE stand in the mature and late seral stages.

**II. MOIST ENVIRONMENT Swordfern Types (TSHE/POMU):**

| Dominant Seral Composition | Early Seral (0-10 yrs) | Young Seral (10-80 yrs) | Mature Seral (80-150 yrs) | Late Seral (150-300 yrs) |
|---|---|---|---|---|
| 1. Conifer → | PSME | → → | PSME/TSHE | TSHE |
| 2. Conifer → | PSME/TSHE | → → | → → | TSHE |
| 3. Conif/Decid Mix → | ALRU/PSME | → → | PSME/TSHE-THPL | TSHE/THPL |
| 4. Conif/Decid Mix → | ALRU | → → | TSHE | → → |

The **wet environments** (salmonberry PAGs) could have six pathways. The most common is a conifer/dedicuous mix. Regeneration of conifers is sparse. Alder has a larger role than conifers in early seral stages and remains a large component in young and mature stages. In highly disturbed areas, succession to conifer may never occur. Understory development of conifer is slow due to high salmonberry competition There are often 1-2 seral stages present at any one time since wide spacing of conifers allows for understory development to begin early in succession. The rapid growth and tree shape of Douglas-fir that results from wide spacing appears to accelerate old-growth structure earlier (at about year 120) than in the other PAGs.

**III. WET ENVIRONMENT Salmonberry Types (TSHE/RUSP):**

| Dominant Seral Composition | Early Seral (0-10 yrs) | Young Seral (10-80 yrs) | Mature Seral (80-150 yrs) | Late Seral (150-300 yrs) |
|---|---|---|---|---|
| 1. Conifer → | PSME | → → | PSME/TSHE | TSHE |
| 2. (uncommon) → | PSME/TSHE | → → | → → | TSHE |
| 3. Conif/Decid mix → | ALRU | → → | ALRU/TSHE | TSHE (THPL) |
| 4 → | ALRU/PSME | → → | PSME | TSHE (THPL) |
| 5. → | ALRU/TSHE | → → | TSHE (THPL) | TSHE (THPL) |
| 6. Deciduous → | ALRU | → → | → → | → → |

For all western hemlock PAGs, the theoretical climax consists of all-aged stands of western hemlock or western hemlock/western redcedar. Small scale disturbance like wind and laminated root rot usually accelerate a site's succession, but a fire disturbance would return the site to an earlier stage of succession.

In general, a high intensity fire at any stage of stand development would probably return the site to the shrub/herb dominated stage of development. Some shrub fields may last for many decades before conifers can re-establish. The next stage (early seral) consists of stand initiation dominated by Douglas-fir and/or alder seedlings and saplings. If no fires burn, the stand will eventually develop through the young, mature and old-growth phases. These high intensity conditions seem to be typical of the West and Middle Ecological Units.

Depending on fire severity and stage of forest succession, fires tend to either accelerate or retard stand development to varying degrees. The East Ecological Unit seems to have had fires of moderate severity and variable conditions which created a mosaic forest through a mix of crown fires and underburning. However, fire severity from one fire event to the next is often highly variable. The next fire event could be a low intensity fire in the stem exclusion phase which would thin out the

understory with little effect on the overstory. Repeated low intensity fire would keep western hemlock in the understory at greatly reduced numbers and favor two-storied stands.

## Coarse Woody Debris

Although it may seem logical that coarse woody debris (CWD) levels vary with plant association, research indicates little relationship between the two (Harmon et al. 1986). Intensive ecoplot data compiled for the Siuslaw western hemlock series reveals no differences in CWD by PAG alone (Hemstrom and Logan 1986). The data indicates that different plant associations in the Coast Range have similar levels of snags and widely varying, but unpredictable, levels of down logs across the western hemlock series.

Coarse woody debris levels are more likely the result of stand age and severity of the last fire event. During a fire, large amounts of live biomass are converted to dead matter. While some biomass is consumed in a fire, much more is converted from live to dead (Harmon et al. 1986, Agee and Huff 1987, Spies et al 1988). CWD has been found to be highest just after a fire. It decreases to its lowest level in mature stands because of decay, rises in late succession as mortality from the regenerated stand increases, then levels off when mortality and decay reach a steady state.

Figure 4.1 shows a model of two principal ways CWD is created. First, it is recruited as an increment of mortality in a live stand. Assuming there is no CWD material on the site, as the stand grows, CWD appears as a percent of the live stand. This CWD results from a variety of small scale disturbances and disease, such as windthrow, landslides, laminated root rot and beetle kill. As the stand grows, the CWD accumulates proportionally. When stand growth levels off, the CWD levels reach a steady state. The curves illustrating these phenomena are S-shaped curves because they have two bends or inflection points.

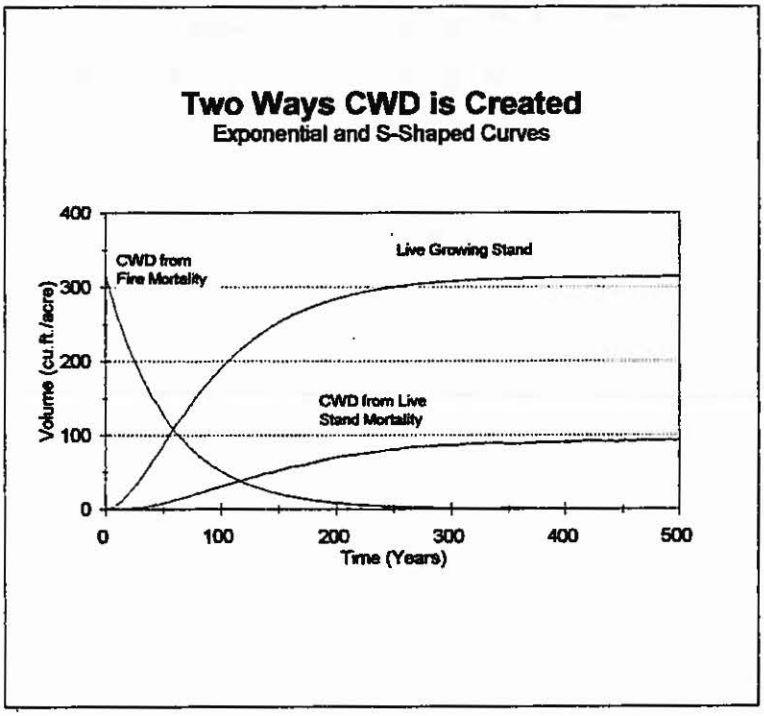



Figure 4.1 Two principal sources of coarse woody debris through succession

The second method and most important way CWD enters a system is from a disturbance. The strongest determinant of CWD amount is the time since disturbance and the magnitude of the disturbance. Upon disturbance, a large portion of live biomass is converted to dead biomass. It is this input of CWD that makes time since disturbance a more significant factor of CWD than site productivity or plant association. A look at the graphs reveals that the quantities of CWD from mortality can be as much as 3 or 4 times the levels achieved from mortality of a new stand. It also reveals that the assumption that CWD was lowest after a fire is incorrect, and in fact, that is when it's highest.

Fire input is infrequent and because CWD decays exponentially, it has a steep, rapid decline and is mostly decomposed within 100 to 150 years. When the steep curve from fire mortality is combined with the S-shaped curve of CWD recruited from a new stand, a U-shaped curve is produced (Figure 4.2). This shows the general path that CWD levels take following a disturbance. Figure 4.2 illustrates that the lowest levels are reached about 100 to 150 years after a fire when the stand matures. It also shows the significant influence of time on levels that will be found on a site.

An analysis of CWD formation in Indian/Deadwood was made by characterizing stand age, structure and composition, and fire history across the watershed. Two patterns of CWD are apparent: one in the West and Middle Ecological Units and one in the East Ecological Unit.

The West and Middle Units represent a classic Coast Range fire regime (Figure 4.3). In the mid-1800's high severity, stand-replacing fires burned in this area.. Douglas-fir regenerated rapidly and even-aged stands were established. The CWD input from the fire was about 300 cu. ft./acre. This CWD decayed exponentially and is now at about its lowest point, 45 cu. ft./ acre. In late succession, CWD levels are expected to increase and, in the absence of disturbance, reach a steady state (around 110 cu. ft/ acre) in the next 60-80 years. The West and Middle Units have high site productivity (site class 2 and 3), so the biomass in the old-growth stands (300+ cu. ft./ac.) and the CWD (110 cu. ft./ac) is expected to be higher than in the slightly less productive East Unit.

Fire history of the East Ecological Unit is somewhat different, but the underlying dynamics of CWD development are much the same. The area has a slightly lower site productivity (site class 3), conifer dominated stands of more varying age classes (often two-storied stands) and smaller trees. The East Unit burned most recently in the 1930s and is believed to have a fire return interval of 160 to 190 years (Long 1995). Figure 4.4 illustrates two fires 175 years apart, assuming fire mortality is about 75% of the live stand and fire input is about 200 cu. ft./acre.

As in the West and Middle Units, CWD decays exponentially and reaches its lowest point, at about 120 years after a fire. Currently, it is assumed that CWD levels are around 50 cu. ft/ac and still declining. These stands can be expected to reach a low CWD level of 30 cu. ft./ acre about mid-21st century. Later, when CWD levels begin to rise again, laminated root rot and associated beetle kill may be responsible for a large amount of CWD recruitment from new stands. Fire suppression aside, CWD levels would not be expected to reach a steady state, because a fire disturbance would probably occur before that. The fire would inject another pulse of CWD.

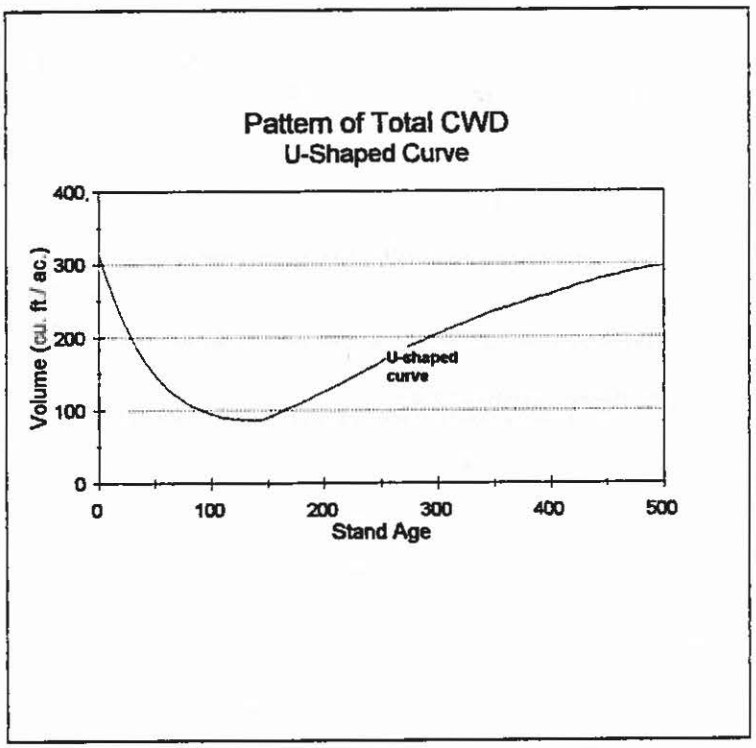
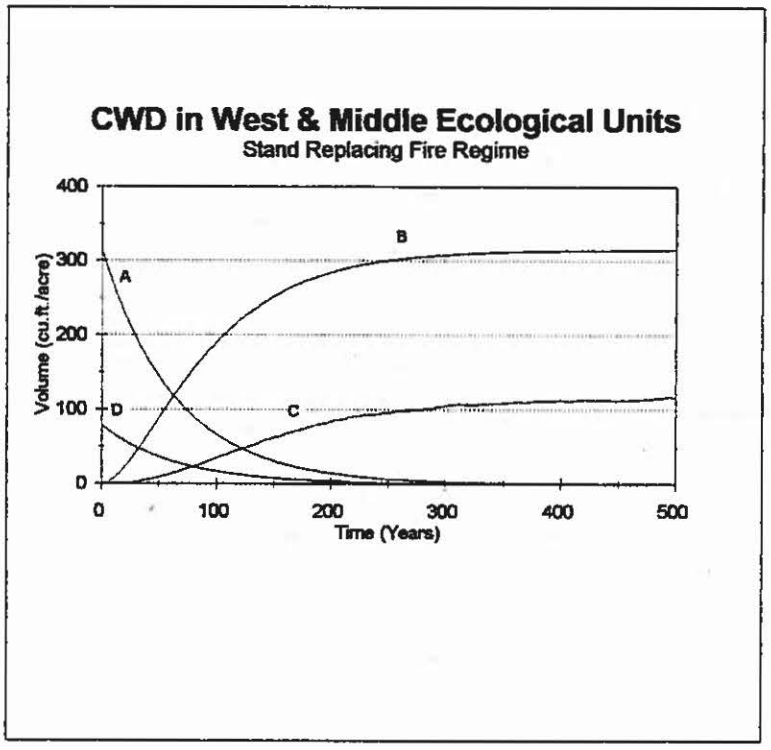
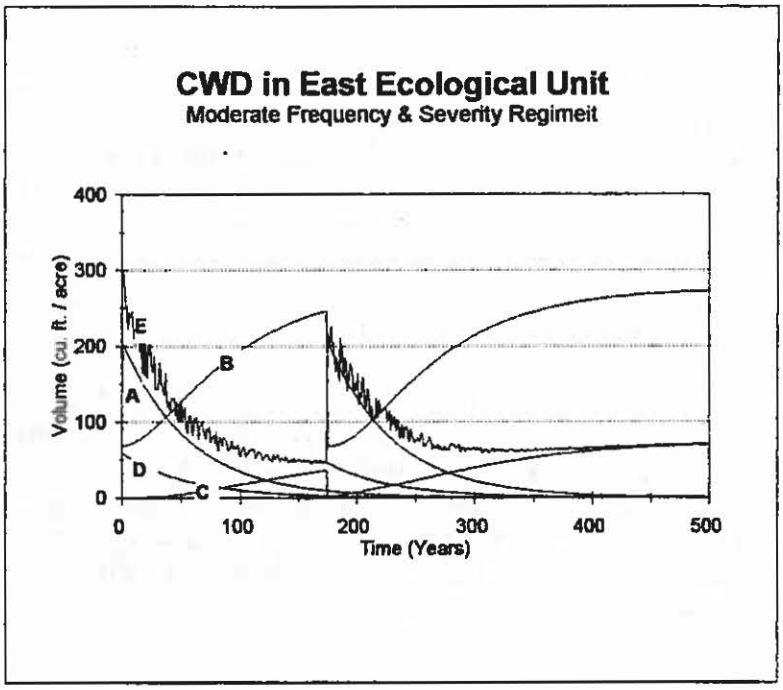



Figure 4.2 Pattern of coarse woody debris accumulation through succession




Legend
A -- CWD From Fire Mortality
B -- Live Tree Volume
C -- CWD from New Stand
D -- Carry Over From Previous Sta

Figure 4.3 Coarse woody debris in West and Middle Ecological Units




Legend
A – CWD From Fire Mortality
B – Live Tree Volume
C – CWD Input from New Stand
D – Carry Over from Previous Star
E – Total CWD

Figure 4.4 Coarse woody debris in East Ecological Unit

As shown in Table 4.6, the West and Middle Ecological Units have higher levels and more variation of CWD through succession. The high pulse from fire input takes longer to decay and serves as a "bridge" that sustains organic matter and its various functions from the time when CWD levels are low (100-130 years after fire disturbance) until recovery begins. By comparison, the East Ecological Unit has lower CWD levels with lower, more frequent input and less variation in CWD through succession. The bridging of CWD fire input is probably less significant in this Unit.

Table 4.6 Coarse Woody Debris Volume, in cu. ft./acre, by Ecological Unit through Succession.

| Ecological Unit | Fire Return Interval | Before Fire | Fire Mortality | Year 150 | Old Growth |
|---|---|---|---|---|---|
| West & Middle | Episodic | 100 | 300 | 45 | 110 |
| East | 160-190 yr. | 50 | 200 | 30 | Not applicable |

## Summary

Scale is important to understanding the complex patterns and processes occurring on the landscape. Climate and geology affect physical characteristics at a large scale. The soil/climate zones were a grouping of similar soil and climate characteristics. Fire behavior differences appear at this scale. Landforms are a result of topography and soils. The groupings of these into Landtype Associations help explain differences in drainage patterns and erosional processes at an intermediate scale. Plant Association Groups (PAGs) occur at a small scale, providing an indication of the site climate and soil moisture levels. These vary by topographic locations, e.g., ridges, slope aspect and position, and provide insights into vegetation patterns across the watershed.

- There is a gradation of soil moisture environments from west to east across the watershed, with wetter environments in the western portion. The distribution of PAGs reflects this. The western portion of the watershed supports greater proportions of the salmonberry PAG and lower proportions of the salal PAG. Salmonberry PAGs are distributed from valley bottom to upper mid slopes in the wet environment. The eastern portion of the watershed supports greater proportions of the salal PAG and less salmonberry PAG. Salmonberry PAGs are restricted to valley bottoms, and salal types occur along the ridges and upper one-third of slopes.

- Fire is the dominant natural disturbance process affecting the patch size and seral stage distribution of vegetation in the watershed. In the portion of the watershed west of Deadwood Creek, large, stand-replacing fires occurred infrequently (on greater than 200 year return intervals), and resulted in very large (> 10,000 acre) patches of single seral stage vegetation. Large patches of mature conifer were found in this portion of the watershed prior to logging in the 1950's. In the eastern portion of the watershed (east of Deadwood Creek), fires may have occurred more frequently and burned variable size areas and severities, creating a finer mosaic of various seral stages. Patches appeared to be 100-1000 acres in size.

- Laminated root rot appears to be endemic to the watershed, especially in Deadwood. Intensive management of the forest to promote Douglas fir-dominated stands has probably increased the level of infestation above natural levels.

- In the Indian/Deadwood watershed, current CWD levels are the combined result of fire regime, species composition and laminated root rot (which can produce widely spaced trees and high levels of dead trees). Since fire may be more frequent in the East Ecological Unit where trees are younger and smaller, we expect more frequent but smaller volumes of CWD input than in the West or Middle Units. The East Unit also has particularly high levels of laminated root rot and bark beetles and a lower alder component. All of these, in combination, probably result in considerable differences in CWD levels and nutrient cycling across the watershed.

## HISTORIC WILDLIFE RESOURCES

Wildlife diversity and abundance are related to vegetation pattern and human presence. Historic changes in vegetation patterns (size and type) are described elsewhere in this document, however, shifts in wildlife abundance and location is temporary, as grass forb acres give way to sapling-pole stands that eventually grow into mature conifer forest. This dynamic played an important role in shaping the wildlife resources in the Indian/Deadwood watershed, but at no time threatened any

species existence on the landscape. All but a few species of animals that reside in Indian/Deadwood today were present historically. Exceptions to this would be due to exotic species introductions (English sparrow, pheasant, starling, pigeon, etc.) by European man between 1800 and present day.

Certain indigenous wildlife did not decline until the time of the first settlers in Oregon. Grizzly bear, Pacific fisher, and gray wolf were last reported in the Coast Range around 1860, 1913, and 1934, respectively. The Indian/Deadwood watershed most likely held a wider diversity of other species longer than areas near large settlements. However, some species that were once widespread although uncommon were extripated by mid 1980, e.g., wolverine - 1972 and lynx - 1984. Other species that were common are now uncommon to rare but still exist in habitats found in the Indian/Deadwood area (e.g., American marten, northern spotted owl, marbled murrelet, peregrine falcon, bald eagle, etc.). A more detailed description of historic wildlife habitats and uses is found in the North Fork Siuslaw Watershed Analysis (USDA 1994a). North Fork of the Siuslaw watershed is adjacent to Indian Creek watershed and accurately portrays historic wildlife resource conditions in the Indian and Deadwood drainages.

## AQUATIC ENVIRONMENT

The previous section focused on larger (>50,000 acre) patterns and processes that influence terrestrial vegetation and wildlife dynamics. The following discussion focuses on watersheds to characterize stream systems and the aquatic environment.

Processes operating throughout the watershed result in material eroded from hillslopes and ultimately delivered to and routed through the stream network. Fire and associated landslides infrequently input large pulses of sediment and wood, followed by long periods of upslope recovery as vegetation grows. Floods and landslides more frequently influence the riparian areas and stream channels. Stream channels respond quickly and sensitively to change. The aquatic ecosystem is formed by the interaction between physical processes, biological processes and interactions with the terrestrial environment.

More than 900 miles of streams (7.8 mi/sq. mi average stream density) flow through the Indian/Deadwood watershed. The majority of the streams are steep, first and second-order channels. There are three main drainages in this analysis area--Deadwood Creek and its tributaries, Indian Creek and its tributaries and Lower Lake Creek which includes the small Green Creek subwatershed as well as the rest of the Lake Creek watershed (Map 4.6). Table 4.7 summarizes and displays the ranges of some of the inherent characteristics of the subwatersheds. The following discussion describes how aquatic habitat is related to the underlying geology, valley confinement, channel gradient, large wood, riparian vegetation, disturbance history, and inputs of flow, sediment and wood. This historic picture lays the foundation for understanding the current aquatic conditions, trends in those conditions and future potential conditions.

### Channel Classification and Dominant Inputs

Stream channels are complex and dynamic systems. At a watershed scale, headwater reaches include channel processes and function that are different than valley bottom mainstems. Different portions of the watershed have unique channel processes and sensitivity to change that help determine the riparian vegetation and aquatic life in each location. Systematic and local differences in transport capacity and the nature and magnitude of inputs (water, sediment and wood) through the channel

network result in a distribution of different channel types and conditions throughout the stream network. Quantifying differences between channel types involves elements of channel morphology and channel condition. The use of valley confinement and gradient is an effective way to systematically examine differences in channel morphology and condition throughout the watershed. It also provides a framework for predicting responses to change. Certain channels are more or less sensitive to similar inputs which helps to guide upslope, riparian and instream management activities.

Using aerial photographs, orthoquad maps and records of past management in the Indian/Deadwood area, the GIS streams layer was updated to more accurately define the stream channel network across all landownerships (See Appendix C for a detailed description of methods.) Accuracy in terms of stream density and exact location may vary across the landscape based on landform, photographic coverage and seral stage of vegetation impeding view of small scale topographic relief. First-order intermittent and perennial channels are especially elusive, but it is estimated to be about 75% accurate and provides enough of a picture to analyze hydrologic function and potential Riparian Reserves.

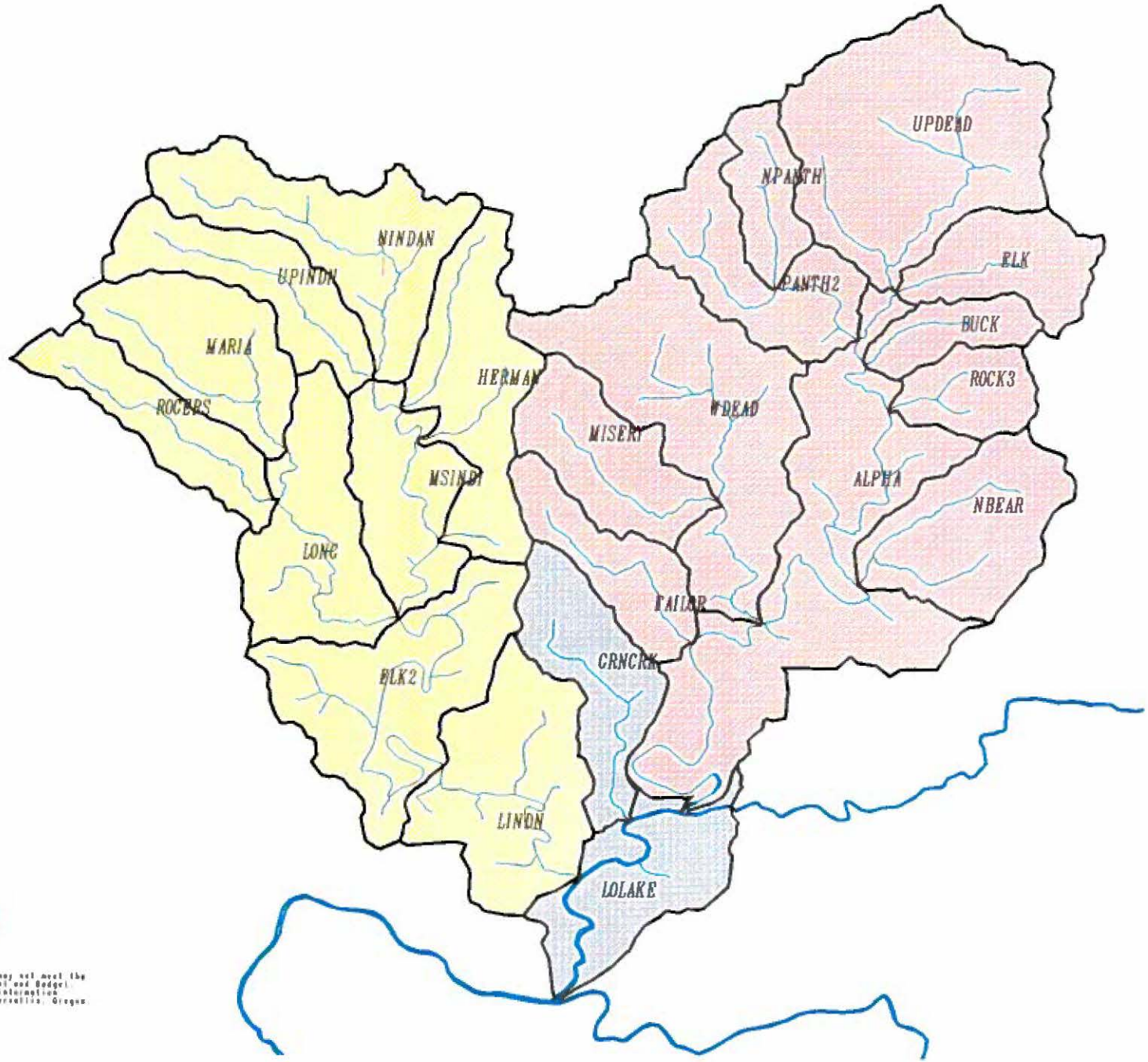
Table 4.7. Characteristics of Subwatersheds in Indian/Deadwood

| Watershed | Subwatershed | LTA | Stream Density (mi/sq mi) |
|---|---|---|---|
| Indian | North Indian | 3C1, 3C | 9.68 |
| | Upper Indian | 3B, 3C1 | 8.35 |
| | Herman | 3C | 9.19 |
| | Mainstem Indian | 3C2, 3C | 7.02 |
| | Maria | 3B | 8.56 |
| | Rogers | 3B | 8.47 |
| | Long | 3C2, 3B | 8.64 |
| | Elk2 | 3C2, 3C | 8.0 |
| | Lower Indian | 3C | 8.9 |
| Deadwood | Upper Deadwood | 3F | 7.59 |
| | North Panther | 3F | 9.17 |
| | Panther2 | 3C | 8.57 |
| | Elk | 3F | 8.1 |
| | Buck | 3F | 7.53 |
| | Rock3 | 3F | 7.4 |
| | North Bear | 3F | 8.72 |
| | Alpha | 3F | 7.12 |
| | Misery | 3C | 8.12 |
| | West Fk Deadwood | 3C | 8.44 |
| | Failor | 3C | 7.66 |
| Lower Lake | Green Creek | 3C | 8.22 |
| | Lower Lake | 3F | 7.5 |

The streams were classified by confinement and gradient classes following the Montgomery and Buffington methodology described in the Washington state watershed analysis manual (Washington DNR 1993). (See Appendix C for more information on methods.) Confinement controls aspects of potential response and reflects the long-term history of a valley where past events leave an imprint. Gradient is a surrogate for stream energy, the dominant control on channel morphology. Three

Map 4.6

# Indian/Deadwood Watersheds




Lolake

Indian

Deadwood

N Sub-Watersheds

confinement classes, (unconfined, moderately confined and confined) and six gradient classes (0-1, 1-2, 2-4, 4-8, 8-20, 20+ %) were identified. Like segment types are expected to have similar characteristics under equivalent watershed conditions and to respond to changes similarly. The Indian/Deadwood stream network is dominated by steep, confined channels with a relatively low percentage of total stream network in moderate to low gradient and moderately to unconfined. An exception to the typical valley widening downstream is evident in the lower reaches of Indian, Deadwood and Lake Creek where the valley changes from unconfined, low gradient to moderately confined and low gradient.

The dominant elements that change through the stream network over time in response to various disturbances are water flow, sediment and large woody debris. A framework to understand these dynamics is useful to compare before and after Euroamerican settlement.

**Water** -- Streamflow patterns follow the annual precipitation cycle and longer-term climatic cycles. Streamflow is also influenced by the seral stage of vegetation or time following a disturbance (e.g., fire). Parameters of water quality (temperature, dissolved oxygen, pH, etc.) reflect the flow regime and thus vary throughout the system. For example, small perennial tributaries can serve as important sources of cool water to the larger, warmer streams.

**Sediment** -- The main source of sediment for channels and valley floors originates from debris torrents and slumps. Torrent deposits can be large and provide a long-term source of sediment and wood for the channel. In this landscape, debris torrents are most common while the occurrence of slumps is more isolated. Fluvial processes gradually distribute the sediments. There is an interplay between the sediment supply and the ability of the stream to transport sediment, i.e., dependent on amount of water and gradient of stream. In general, sediment is transported from the high gradient streams and deposited in the low gradient streams. Cobbles and small boulders are usually found in streams with higher gradients. Accumulations of gravel and sediment are often found in areas of lower stream energy, such as upstream of debris torrent deposits, log jams and wood pieces or in low-gradient sections of mainstems.

**Large Wood** -- Large wood is a basic structural component in Pacific Northwest aquatic ecosystems. Large wood is delivered to stream channels by debris torrents, landslides, by falling from adjacent riparian areas and by transport from upstream sites. The dominant input process is from debris torrents with most of the wood coming from the middle to lower ends of debris torrent tracks. In the channel and on the floodplain, large wood has many beneficial functions. When large wood enters a stream, sediment accumulates upsteam creating a low-gradient flat. The size of the flat is related to the amount and size of the wood and confinement and gradient setting. These low gradient flats are most common just upstream of tributary junctions, the usual deposit site for debris torrents. As these flats develop, the channel can shift positions on the floodplain, causing some bank erosion and large wood recruitment. Channel shifts bring in terrestrial biomass and nutrients for the aquatic ecosystem to process, and they are a major way in which side channels, high-flow channels and wetlands are formed. They retain organic matter and gradually release them into the system. Optimal fish habitat conditions require a relatively constant source of large trees to replace the existing large wood in the channel as it decays or is carried away by floods.

## Stream Function Segments

In order to understand stream function, confinement and gradient segments were grouped to describe source, transport, and deposition of sediment and wood. Historically, the areas with less confinement

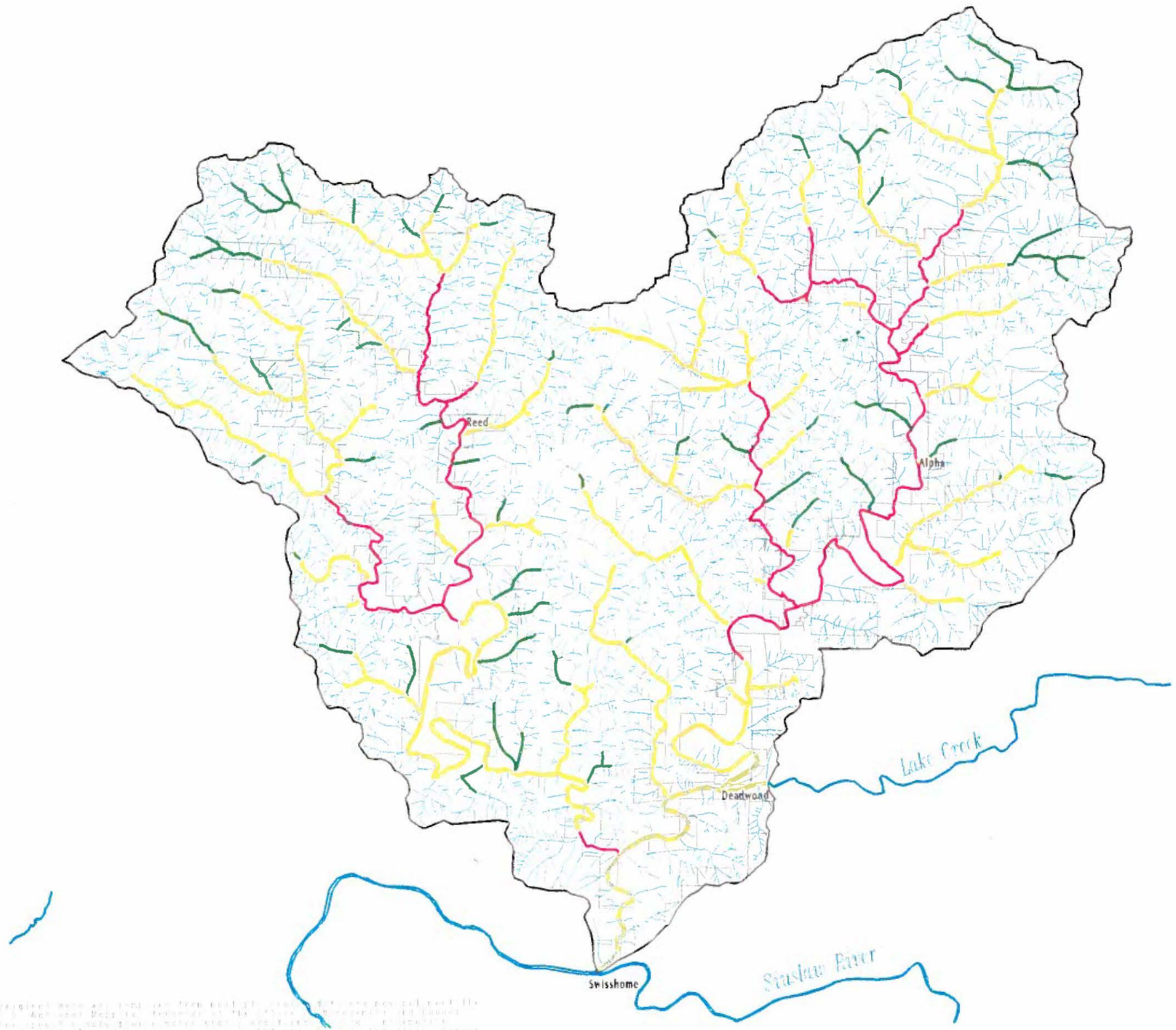
and lower gradients (less than 4%) were the areas that had the highest productivity for the aquatic resources, whereas the highly confined and steep areas provided little in the form of actual habitat for those resources (Map 4.7). Disturbances that affect the stream segments and the function of those segments vary by their confinement and gradient.

Source reaches have gradients greater than 8% and are either confined or moderately confined. They respond quickly to storm events and are subject to periodic scour by debris torrents. They are important sources of cool water and pulses of sediment and wood to the rest of the stream system. Riparian vegetation typically occurs in narrow bands along these segments and may be dominated by a deciduous or coniferous overstory. Aquatic habitat is generally limited although cutthroat trout and steelhead do use these areas for spawning, and cutthroat trout may remain as residents in some of these areas.

Transport reaches have relatively high gradients (4-8%), are confined or moderately confined and are called transport because these are the stream segments where wood and sediments are stored for short periods of time before being pushed through to the next stream segment by high flows. A small percentage of transport reaches are in confined areas with gradients between 2-4% in the Indian/Deadwood watershed. These reaches are fairly resistent to changes in stream morphology because any increase in sediment input is relatively quickly passed downstream. There are transitory accumulations of large wood that trap sediments behind them until the majority of the mass is pushed out. Riparian vegetation occurs in wider areas here than in the source areas and consists of a mixture of deciduous trees with clumps of conifers. Aquatic habitat responds to these temporary sediment and wood accumulations. Cutthroat trout and steelhead are still the fish species that use these areas although coho will spawn in these areas as well. Rearing conditions are variable and are best when the number of log jam accumulations are high and lowest after the accumulations are passed down the stream.

Deposition reaches have gradients less than 4% and are moderately confined or unconfined. Deposition reaches with gradients of 2-4% serve as a transition from the transport reaches. More typical deposition reaches are divided into two categories: moderate deposition where the streams are moderately confined with gradients less than 2% and main deposition where the streams are unconfined with gradients less than 2%. The moderate deposition reaches are transition zones between transport reaches and main deposition reaches in the main tributaries to the mainstems. These deposition reaches, if functioning properly, tend to interact often with the floodplain during high water events. These reaches experience significant changes in stream morphology as sediment and wood supplies increase from upslope or upstream. During floods, these reaches can shift laterally and become long-term storage sites for sediments and wood. Gravels accumulated in these reaches can provide excellent spawning habitat for salmonids. Historically many of the moderately confined reaches probably provided the best spawning habitat for coho and steelhead as well as rearing habitat for these species, while the unconfined reaches were used more for chinook spawning and rearing of coho and steelhead juveniles. Floodplains of these reaches also provided refuge areas for juvenile fish during flood events. Riparian vegetation in moderate deposition reaches consists generally of a mix of deciduous trees with scattered shade-tolerant conifers in the understory and clumps of conifers coming near the stream along toeslopes. In the main deposition reaches the riparian area is more likely to consist of a predominantly deciduous stand with areas of scattered large conifers and occasional pockets of conifers approaching the stream.

Map 4.7 displays the confinement and gradient groupings (stream function segments) described above as they are geomorphically distributed in the Indian/Deadwood watershed. Table 4.8 summarizes the




# Indian Deadwood

Stream Function Segment

- Source
- Transport
- M Deposition
- U Deposition
- Non Federal Lands

0 1 2 3 4

MILES

RF 1:103605

June 12, 1996

Map 4.7

amounts and dominant functions and features. The source areas are the dominant feature comprising 82.7% of the stream reaches. The depositional reaches are the next most common (13.5%) and the least common are the transport reaches (3.8%).

## Riparian Vegetation

Riparian vegetation performs several important functions in aquatic ecosystems: 1) it provides a primary source of nutrients for small streams, 2) it maintains channel and floodplain stability during floods, 3) it slows channel shifts by holding onto sediment with its root system and trapping floating wood with branches and stems, 4) it supplies sources of large wood that maintains an active floodplain, forms a variety of surfaces on which riparian vegetation develops and creates high quality fish habitat, and 5) it shades streams and wetlands to keep water temperatures suitable for a wide variety of aquatic species.

Riparian vegetation contains some of the most complex vegetative patterns on the landscape. Fire, debris torrents, flooding and blow down all interact with floodplain and toeslope surfaces to develop a complex mosaic of vegetation containing all potential seral stages. The processes which operate to form riparian vegetation patterns differ between stream function segments.

After small streams (source segments) are scoured to bedrock by debris torrents, adjacent hillslopes are colonized by alder and salmonberry. Conifers become established upslope of the channels and over time begin to shade out the alder. Upslope conifers periodically fall into the channel, providing nurse logs and openings for other conifers to become established near the channel.

In larger channels (transport and deposition), flooding and blow down are the dominant disturbance mechanisms. Following fire, debris torrent and burned riparian areas deliver large amounts of wood and sediment to these channels. Large volumes of sediment are stored upstream of debris torrent deposits and wood accumulations. Eventually, as wood breaks and floats downstream, streams cut though these deposits and leave terraces upstream of the old deposits. Terraces are continually being formed and cut in channels with abundant wood.

The height of terraces, extent of soil development, and availablility of nurse logs strongly influence the riparian vegetation patterns found on the floodplains of large, unconfined and low gradient streams. The oldest and largest trees (typically conifers) are found on the highest ground. Younger trees grow on the lower terraces closer to the stream channel.

## Fish Habitat

The Indian/Deadwood watershed contains over 360 miles of perennial fish bearing streams, of which 150 miles are anadromous fish habitat. The area has historically supported a substantial portion of anadromous fish populations in the Siuslaw River basin. Anadromous fish species included chinook, coho, and steelhead salmon, and sea-run cutthroat trout (Map 4.8). There is no historical population data available for either Indian or Deadwood Creeks, but there is commercial fish harvest data for the Siuslaw River around Florence from 1889-1956. Harvests averaged approximately 60,000 coho annually from 1892-1914, excluding the 1899 harvest of 462,000 coho which is believed to be extraordinary. After 1914 coho salmon harvest did not exceed 50,000 fish per year and decreased to lows below 10,000 per year in the 1950's to no commercial fishing in mid 1990's (ODFW 1995).

Table 4.8 Stream Function Segment Summary

| Stream Function Segment (Confinement & Gradient) | Sediment | Wood | Water |
|---|---|---|---|
| C,M >8% (82.7%) | SOURCE pulses with debris slides | SOURCE pulses with debris slides | Cool Temperature; low-intermittent flow in summer (flashy flows in winter) |
| M,C 4-8% (3.4 %) | TRANSPORT amount & distribution dependent on debris slides and major storm events | TRANSPORT individuals move to complex accumulations; highly variable spotty floodplain interaction | Cool Temperatures; perennial flow |
| C,M,U 2-4% (4.3%) | C = TRANSPORT M,U = DEPOSITION of coarse and areas of transport Dam break pulses and some bank erosion | periodic accumulations with debris slides; expect lots of wood both singles and complexes | temperature more variable; some groundwater contributions to low flow |
| M 0-2% (5.8%) | DEPOSITION of coarse and fines bank erosion and debris slides from confined steep tributaries may directly influence channel | DEPOSITION (in general) some input of valley floor individuals; expect lots of wood from debris slides and upstream | warmer temps (cool temperature contributions from subsurface/ small tribs - shading); Larger storm events influence stream movement in valley & wood accumulations |
| U 0-2% (3.8%) | DEPOSITION fines and some coarse bank erosion change with big storm events | DEPOSITION (in general) some valley floor contribution down wood present on floodplain | Temperature strongly influenced by shading and subsurface contribution |

Confinement: C = confined, M = moderately confined, U = unconfined
Gradient classes: >8%, 4-8%, 2-4%, and 0-2%

Table 4.8 Cont. Stream Function Segment Summary

| Riparian Vegetation | Aquatics |
|---|---|
| Narrow hardwood strip, conifers close to stream (variable by PAG and/or N-S aspect) | Poor rearing, few pools;<br>some steelhead and cutthroat spawning |
| Narrow hardwood strip & conifers more variable;<br>some stream movement and some beaver activity | Rearing associated with wood and beavers<br>Spawning for coho, steelhead and cutthroat;<br>short-term nutrient storage |
| More hardwood patches;<br>(i.e. various aged alder)<br>variable patches of conifer (spatial and structural) | C = some spawning and rearing in association with wood<br>M,U = spawning and rearing, variable habitat;<br>floodplain interaction |
| Important hardwood component, scattered conifers, nurse logs may be important for conifer establishment, floodplain interaction throughout; spotty wetlands, beavers active | Chinook, Coho, Steelhead spawning, some resident cutthroat;<br>good rearing with complex habitat and sidechannels, abundant food |
| scattered large conifers, hardwood dominated;<br>nurse logs may be important;<br>wetland willows | Chinook spawning;<br>good rearing habitat;<br>deep pools, lots of food, side channels<br>high diversity of other aquatic species |

Assuming a harvest rate of 40% and using the average harvest of 60,000 coho from 1892-1914, the average total run size historically was likely around 150,000 coho per year. This compares with total runs approaching 4,000 coho per year presently or approximately 3% of the historic run.

Fall chinook salmon runs are considered to be healthy based upon increasing trends in both sport catch and spawning escapement over the past 20 years. Population sizes are probably the highest since the early 1900's. The highest chinook commercial harvest was 16,500 chinook in 1891. Again assuming a 40% harvest rate, the historic population estimate would be about 41,000 chinook per year. However, it should be noted that impacts to chinook habitat were already occurring at this time due to log drives, splash dams and settlement of the mainstems.

The low gradient mainstems of the creeks were the main producers of chinook salmon. These areas captured the larger size gravels that the chinook use for spawning. Coho salmon use smaller gravels for spawning than chinook and require deep pools with cover to rear the juvenile fish until the following year when they migrate to the ocean. These areas were most likely found farther up stream systems and up major tributaries in relatively low gradient areas, although it is very likely that the best rearing for coho juveniles was in the low gradient mainstem sections with large deep pools. Steelhead will use the same type of areas as coho but will often use higher gradient stretches of the creeks as well. Cutthroat trout generally use small tributaries and have also been known to be dependent on small intermittent tributaries (Sea-Run Cutthroat Symposium, 1995 pers. comm.). There is generally some overlap between species' spawning areas and the process of evolution. Habitat changes will determine where upper and lower limits to the species exist.

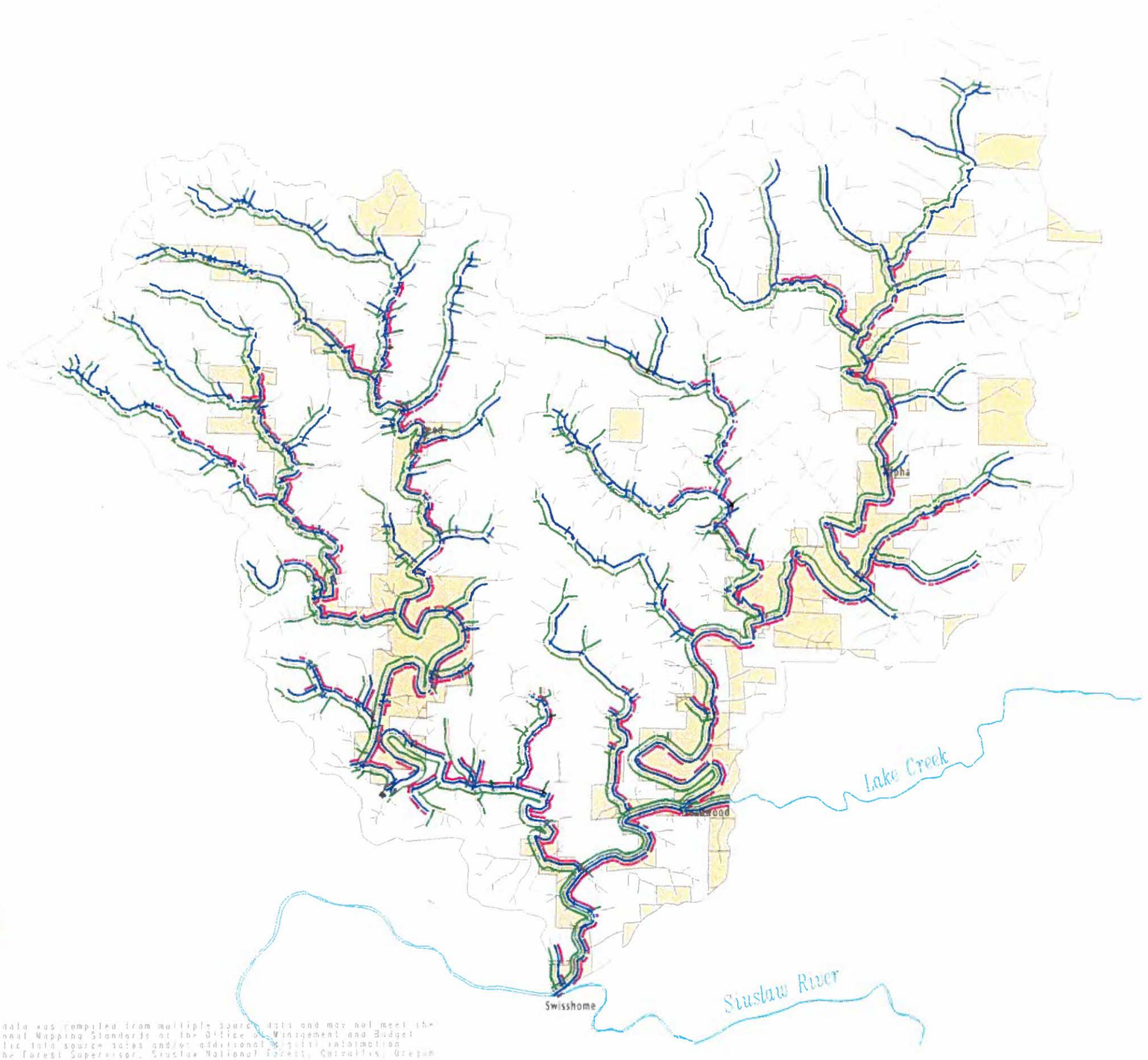
Other fish species historically present in the Indian/Deadwood watershed included resident cutthroat trout, redside shiner, dace, brook and pacific lamprey, various species of sculpin, and suckers.

**Summary**

- The landscape is characterized by steep, highly dissected bedrock dominated ridge systems. Shallow rapid landslides are the predominant erosion process. The main source of sediments for channels and valley floor comes from debris slides and torrents. Maintaining roads across slopes and even some ridges which are prone to slumping can be costly.

- Streamflow reflects the annual precipitation cycle with flashy, high flows in the winter months and low baseflows during the dry summer months. Flooding due to heavy rains occurs about once in two years, usually in the late fall and winter. This level of high water maintains channel condition. Large floods occur less frequently and are responsible for the most extensive changes in channel conditions and riparian vegetation. The changes are not uniformly distributed across the landscape.

- The extensive stream network is dominated by steep, confined headwater streams (83%) that serve as source areas for wood and sediment to the system. There are a few moderate gradient stream reaches (4%) that serve to transport these materials downstream. Relatively few miles of unconfined, low gradient stream reaches (13%) historically provided the best aquatic habitat.




# Indian/Deadwood Historic Fish Distribution

- Non Federal Lands
- streams
- Coho
- Steelhead
- Chinook
- Cutthroat

0 1 2 3 4
MILES

RF 1:103605

June 17, 1996

Map 4.8

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional map data information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

## HISTORY OF HUMAN SETTLEMENT

### American Indian Uses

Historical use of the Coast Range and the lower Siuslaw River Basin by coastal American Indians, and particularly the Siuslaws, has been well documented in the Federal Lands Assessment (USDA 1995b), the North Fork Siuslaw Watershed Analysis (USDA 1994a) and the Lake Creek Watershed Analysis (USDI 1995). In the 100 years prior to Euroamerican settlement of the area, populations of America Indians residing on the Siuslaw River ranged from about 900 in the early 1800's to about 45 at the end of the 1800's.

The Siuslaws harvested fish, game and berries from the Indian Creek and Deadwood Creek areas. Although a few camps were established along Indian Creek--one near the confluence with Cremo Creek and one near the confluence with West Fork Indian Creek, and a sweathouse was built near the mouth of Deadwood Creek, no permanent villages were established in those watersheds. The Indian peoples preferred to reside in areas closer to the Coast and use the inland forest areas for hunting, fishing and gathering of plant materials during the summer and fall. Lamprey were caught and dried at the mouth of Lake Creek, and beaver were trapped in the Lake Creek area, probably to sell to early trappers. One favorite fishing spot was located on Indian Creek at some falls located about 4 miles upstream from Lake Creek.

American Indians are thought to have inhabited the coastal areas for millenia. They lived in relatively peaceful, self-supporting isolation until December 21, 1865, when a presidential order opened the Yaquina Bay area to Euroamerican settlement. On March 3, 1875, the Indian Appropriations Act, ostensibly written to fulfill treaty stipulations, actually dispossessed about 737,000 acres of land along the coast from Indian reservation and opened additional settlement area south of the Bay (Schwartz 1991). By 1880 there were only 68 Siuslaws living at a village on the Siuslaw River, while about 97 Euroamericans had settled along the lower Siuslaw River.

### Euroamerican Settlement

Prior to 1881, there were no reports of settlers above the mouth of Lake Creek. The earliest settlers to the lower Lake Creek area came from towns like Gardiner on the coast (south of the Siuslaw River), since the area was relatively inaccessible from the Willamette Valley for anything but pack horses. One of the lower Siuslaw River settlers was impressed by the bottomlands found along Lake Creek and its tributaries. In June 1881, Rev. Cary A. Wooley wrote:

> "The narrow bottoms of rich lands extending up and down the Siuslaw, the Lake Creek and their tributaries, will furnish houses for four to six hundred families...the timber resources of the Siuslaw and Lake are almost inexhaustible, while their waters abound in delicious fish." (Steinhauer 1974, p. 13).

With such favorable reports, some of the local settlers requested surveys of lands beyond the mouth of Lake Creek. The earliest settlers to the area claimed the choicest, most convenient lands along Lake Creek between the mouths of Deadwood and Nelson Creeks (just east of the Indian/Deadwood watershed). As lands along the Siuslaw River and Lake Creek became occupied, later settlers began exploring the bottomlands along tributaries.

The first settlers to the Indian/Deadwood area found suitable land near the mouth of Deadwood Creek. John Whisman was the first to make improvements on a claim in September 1881 and established residence in November 1882. Other early settlers in that year included Thomas Pope, John Pope and John Pyle who claimed lands nearby. Only one early settler was reported coming into Deadwood from the north, via Five Rivers. Ben Kilgore developed a homestead in 1887 about 11 miles up Deadwood Creek without realizing other settlers had developed homesteads about 6 miles downstream from him (Ellingson 1980).

The first settler in the Indian Creek watershed was I. Bristow in 1884, who settled along Indian Creek about 7 miles upstream from Lake Creek, where Indian Creek makes a large bend in a wide valley bottom. Subsequent settlers to Indian Creek were forced to seek land further upstream on less desirable, but still suitable locations for small farming activities (Ellingson 1978).

In 1878, the settlers of Lower Siuslaw presented a petition to the Lane County Commissioner's Court requesting a wagon road to the Willamette Valley. In 1879, a route was surveyed that would travel southwest from Elk Prairie (present-day Hale Valley), a few miles west of Noti, over Cougar Pass to Wildcat Creek, then follow Wildcat Creek to the Siuslaw River (along present-day State Route 126), and follow the Siuslaw River to the confluence with Lake Creek, at present-day Swisshome. Construction of the route took longer than expected due to difficult traverses below rocky outcrops and the lengthy stretch following the winding path of the Siuslaw River. Even with a well mapped route, travel was treacherous. Numerous river and creek crossings, including crossing Lake Creek at its mouth, had to be negotiated by wagon to reach the desirable western side of Lake Creek. By 1884, when the route was completed, a steady stream of Valley residents began making the difficult trip to the lower Lake Creek area (Steinhauer 1974).

Wagon routes to the lower Lake Creek area improved slowly between 1884 and the early 1900's. By late 1884, the Nelson Mountain Road was declared a "public highway", providing an alternate route to Lake Creek from Elk Prairie, ending at the mouth of Nelson Creek. In 1887, bridges were built to cross Nelson Creek, Deadwood Creek, Indian Creek, and the mouth of Lake Creek at the Siuslaw River. These made access and travel along Lake Creek and to the Willamette Valley much easier and extended the travel season into the winter months. By 1889, roads were opened up Deadwood Creek and up Lake Creek east to Blachly. In 1896, a stage coach route was established between Seaton (now Mapleton) and Junction City, and by 1915 a railroad was completed between Florence and Eugene, providing for more convenient transport of goods in and out of the area.

By 1890, all the best bottomland along the first 5 miles of Deadwood Creek was settled, and by the early 1900's about 100 families lived up Indian Creek. Map 4.9 shows locations of early roads, trails and homesteads prior to 1900. The early settlers used the land's resources to provide housing and food. They had small gardens to meet household needs and hay was grown to feed stock animals. A few raised fruit, potatoes or other crops for sale, but only in small amounts. As ground was cleared of forest vegetation, cattle were brought in for milk, cream and meat.

Most of the settlers sought outside employment to supplement their meager farm incomes. Some worked at the fish canneries on the Siuslaw River, some worked at the small lumber mills, others worked at farms in the Willamette Valley. Illnesses and difficult living conditions affected most of the early settlers and few remained for longer than about 5-10 years in the area.

## Fishing

While the Indians had used the resources of the river basin for food and shelter on a subsistence scale for centuries, the new occupants began converting resources to commercial products within years of settlement. Salmon canneries were established on all the coastal rivers beginning in 1886 at Waldport. Close to that time, three canneries were established in Florence along the Siuslaw River. By today's standards, the catch numbers were enormous. Gill nets were used to harvest salmon from the main Siuslaw River. Although regulations were placed on the fishery to help conserve the salmon runs, there was little enforcement and the regulations were largely ignored.

By 1914, the number of fish being caught for the canneries had plummeted and eventually dwindled to levels too low for commercial cannery operation. The last report of fish processed at a cannery on the Siuslaw River was in 1956. Commercial salmon fishing has continued on the Siuslaw River at a much smaller scale than in the early 1900's and provides fish for non-cannery markets. In mid-1990, all commercial fishing of coho salmon was stopped.

## Logging and Road Building

The first logging in Indian/Deadwood was associated with early settlers opening up fields and cutting timber to construct buildings on their homesteads. Most of this occurred along the mainstem valleys of Indian and Deadwood Creeks and at the mouths of these creeks where they flow into Lake Creek and where Lake Creek joins the Siuslaw River.

Commercial logging operations began about the same time as commercial fishing. Within 18 years after the Indian reservation was opened up to settlement, five large sawmills were in operation in the Cushman-Florence area. Much of the timber was east of Indian/Deadwood, but the only way to market it was by ship from the mouth of the Siuslaw River. At the turn of the century, both Indian Creek and Deadwood Creek were beginning to be logged and logs were floated down the creeks to the Siuslaw River. Small intermittent operations and full-scale logging camps for year-long operations were established. The logs were yarded down canyons and valley bottoms to the streams by steam and later diesel-driven donkeys. They were stored in the streams until high fall and winter precipitation, when they would be floated downstream to the river.

About 1910, splash dams were used in the watershed to aid movement of logs from higher and drier locations--one splash dam was located on Indian Creek; five dams were located on upper Deadwood Creek (Map 4.9). Dynamite was sometimes used to remove obstructions in the creek and free frequent log jams. With no shortage of anadromous fish in the Siuslaw River, the effect of these logging activities on a few streams was not a serious consideration at the time.

In addition to the mills in Cushman-Florence, several small and large sawmills were built within the Indian/Deadwood watershed. These were often located along the side of a tributary, which would be dammed to provide a floating-pond for logs destined for the mill. The earthen dams would be 50 to 80 feet in height. In a few locations along Deadwood Creek, the mill operators dammed the mainstem to create a holding pond for logs. The mills in Deadwood watershed typically operated for 10 to 15 years, while those in Indian drainage operated for only 1-2 years. When the mills closed down, the dams were blown up and debris in the pond was washed downstream.

About seven such mills operated in the Deadwood watershed during the 1930's and 1940's. See Map 4.9 for locations. Most of the mills were located along the mainstem, but a few were located along

Panther Creek (the largest in the watershed), Misery Creek and Failor Creek. After 1950, these mills dwindled to two near the lower end of Deadwood Creek, that operated during the 1960's, and one located along Misery Creek that operated sporadically during the 1970's and 1980's. (See Appendix F for a listing of the mills.)

Numerous small "tie" mills also operated throughout the Deadwood watershed during World War II to feed the large demand for railroad ties. These mills were set up and torn down quickly, often operating for only a couple months, before being moved to other sites to harvest available timber. Although operations were short-lived, the waste from these mills was large. Unused sidecuts from the milling were discarded over a slope, some ending up in a stream channels.

The Indian Creek watershed supported about four such mills during the 1930's and eight during the 1940's. Most of the mills were located either along Indian Creek , with about six in the upper portion of the stream, or along a tributary of the North Fork Indian Creek at the northern end of the watershed. No mills or splash dams had been built on Rogers or Maria Creeks (in present day Key Watershed). Two of the oldest mills in the Indian/Deadwood watersheds were located in the Indian Creek drainage, both built about 1889, initially to mill lumber for two of the early homesteads in the upper portion of Indian Creek.

Until the late 1920's, all logging occurred from the valleys, with logs being dragged or floated downhill to the river. About 30 miles of road existed in the watershed, generally built along valley bottoms (Map 4.10). During the 1940's, 11 miles of road were added to access upper reaches of Indian Creek and the ridge between Rogers and Maria Creeks, though relatively few acres were harvested compared to the late 1900's.

**Increasing demand** – Until 1940, the population of all Oregon was about one million. A large (40%) increase in population occurred between 1940 and 1950 and with it a large demand for building materials. The population of Oregon continued to increase after 1950, frequently exceeding the population growth rates of the United States as a whole. By 1990, Oregon's population had grown to 2.8 million.

Lane County, with a population of 162,890 in 1960, grew 32% between 1960 and 1970 and 28% between 1970 and 1980 before slowing down in the last decade to about 3% growth rate. Today, Lane County has about 301,900 people, and although the demand for lumber products has slowed down from the 1970's, there continues to be a steady market for lumber in this region.

**Logging of federal land**--Lands now identified as the Siuslaw National Forest were created on March 2, 1907, when President Theodore Roosevelt signed an Executive Order adding 16 million acres to the forest reserves, just days before Congress took those powers away from the President. In 1916, lands on the eastern portion of the watershed came under federal management through the Chamberlain-Ferris Act (which revested about 2 million acres to the federal government). Those lands came under management of the Bureau of Land Management in 1946.

Logging of national forest lands began in the early 1900's, though no records were kept until 1922. Small sales were negotiated with land and mill owners and all harvests were concentrated near the valley bottoms and lower slopes.

The state Department of Transportation had been slowly improving the road from Florence to the Willamette Valley, beginning in 1929 with the stretch from Cushman to Rainrock and completing a

second improvement in 1936 from Florence to Mapleton. The major route to the Valley continued to be along Lake Creek (present-day State Route 36) to Blachly for many years. It was not until 1955 that a road was tunneled through the hills east of Mapleton to provide a direct route to Noti. This new road (State Route 126) surmounted one of the last barriers for easy access and transport of logs to mills in the Willamette Valley.

In response to the larger demand for lumber, political pressures were exerted on national forests in the 1950's to provide wood to offset some of the growing demands. Extensive road building and logging operations occurred on federal lands in the Indian/Deadwood watershed between 1960 and 1990. About 150 miles of road were built between 1952 and 1973 to allow access to the upper slopes of the watershed and logging of upslope areas became more ambitious (Map 4.10). By 1990, there were about 285 miles of county and federally maintained roads in the watershed, with additional miles on private industrial forest lands. Logging of previously inaccessible areas became relatively easy and in the 1970's the invention of skyline cable yarding allowed harvest of trees from very steep slopes.

After 1950, the harvest of national forest acres increased rapidly, peaking during the 1970's (Table 4.9).

Table 4.9. Acres Harvested on National Forest Land

| Time Period | Indian | Deadwood | Total |
|---|---|---|---|
| 1922 - 1949 | 137 | 136 | 273 |
| 1950 - 1959 | 918 | 753 | 1,671 |
| 1960 - 1969 | 4,843 [1/] | 4,975 [1/] | 9,818 |
| 1970 - 1979 | 5,074 [2/] | 3,970 | 9,044 |
| 1980 - 1989 | 2,620 | 2,710 | 5,330 |
| After 1990 | 571 | 1,217 | 1,788 |
| TOTAL | 14,163 | 13,761 | 27,924 |

[1/] A small portion of the acres were partial cut (1480 and 612 acres of Indian and Deadwood Creeks, respectively.)
[2/] 350 acres of the Indian Creek harvests were partial cut.

The vast majority of the harvest activity after 1960 was clearcutting, as this was found to optimize regeneration of Douglas-fir, the fastest growing timber-producing tree in this area. By 1994, about 56% of national forest land in the Indian Creek drainage and 42% of national forest land in Deadwood Creek drainage had been logged. Concern for watershed protection surfaced during the 1970's and limits were placed on the percent of a subwatershed that could be harvested at any one time. The extensive road network through the watershed was built to accommodate a dispersed (staggered) setting harvest pattern, thought to be most beneficial to watershed protection. The result has been a very fragmented natural forest with islands of mature/late-successional stands surrounded by young, Douglas-fir-dominated plantations.

# Indian Deadwood Past Land Use

Taylor Butte

Klickitat Mtn.

Saddle Mtn.

To Five Rivers

To Blachly

Reed

Alpha

Windy Peak

To Junction City

Low Pass Road

Nelson Mtn. Road

Lake Creek

Deadwood

Swisshome

Siuslaw River Road

Siuslaw River

Class 1,2,3 Streams

Contours

Historic Roads

Historic Trails

Early Grazing

Mills - Pre 1945

Mills - Post 1945

Splash Dams

Homesteads - Pre 1900

Historic Indian Site

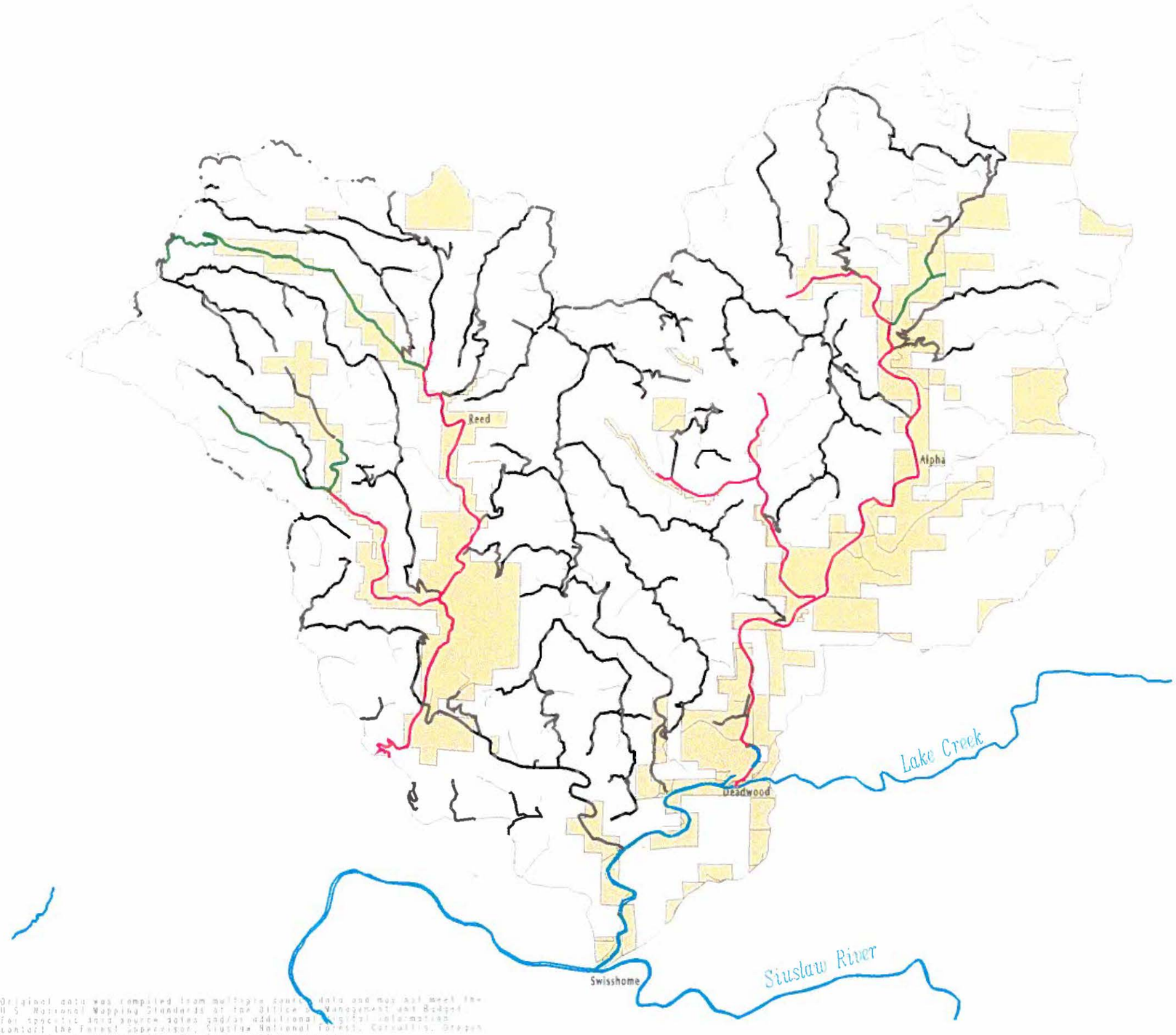
0 1 2 3 4

MILES

RF 1:103605

June 13, 1996

Map 4.9




# Indian/Deadwood

## Historic Roads

30 miles of roads built prior to and including 1910

1911 to 1952
11 miles of Roads built

1953 to 1973
149 miles of Roads build

Non Federal Lands

0 1 2 3 4
MILES

RF 1:103605

June 17, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional spatial information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties, to its content or accuracy.

Map 4.10

# Chapter 5 - Current Conditions

This chapter presents the current conditions of resources relevant to the three issues identified in Chapter 3. These resources include vegetation and associated wildlife habitats, aquatic resources and resultant fish habitats. Current range, distribution, condition and trends of these resources are described. Lastly, a brief summary of current human uses and expected trends is included at the end of the chapter.

## VEGETATION

The Indian/Deadwood watershed lies completely within the Western Hemlock (*Tsuga heterophylla)* Zone (Franklin and Dyrness 1988). Douglas-fir, western hemlock and western redcedar are the most common overstory tree species. The current dominant tree species is Douglas-fir because of the large fires in the 1850's and 1930's and intensive timber management during the last 30-40 years. Red alder regenerates readily in areas recently disturbed either by landslides or logging. Currently, it is most commonly found in wet areas, especially along valley bottoms and riparian zones.

### Seral Stage Distribution

The watershed contains a wide distribution of seral stage vegetation types, as shown on Map 5.1. Since the 1950's, when intensive timber management began, there has been a decrease in mature conifer distribution and patch size, an increase in early seral and young conifer and conifer-mix, and an increase in pure deciduous stands. These changes are displayed in Table 5.1 and Figure 5.1. Figure 5.2 shows the differences in mean patch size of each seral stage. The trends in differences between the seral stage distribution of the 1940's and 1990's are similar to those described in the Federal Lands Assessment (USDA 1995b) and other watershed analyses on the Forest.

Mature conifer currently occupies the most area (24%), though this is much less than the 60% that existed in the 1940's. Past timber management activities, including harvesting mature conifers and soil compaction from road building, has probably increased the area occupied by deciduous stands on upper and mid slopes in wet environments. Alder is more competitive than conifer on these sites following disturbance and conifer regeneration has been poor. The southeast portion of the watershed contains pure deciduous stands, which may be due to numerous reburns and poor conifer seed source.

Table 5.1. Changes in Seral Stage Distribution from the 1940's to Current (Acres and Percent)

| Legend | Seral Stage | 1940's | Current |
|---|---|---|---|
| 1 | Grass/Forb | 1,810 (2%) | 1,148 (2%) |
| 2 | Very early seral | 9,427 (13%) | 4,942 (7%) |
| | | | |
| 3 | Early seral conifer | 1,220 (2%) | 4,856 (7%) |
| 4 | Conifer and deciduous-mix pole | 782 (1%) | 1,799 (2%) |
| | | | |
| 5 | Young conifer | 5,578 (8%) | 8,593 (12%) |
| 6 | Young conifer-mix | 1,719 (2%) | 5899 (8%) |
| 7 | Young & mature deciduous-mix | 233 (0%) | 7,129 (10%) |
| | | | |
| 8 | Mature conifer | 43,819 (60%) | 16,586 (24%) |
| 9 | Mature conifer-mix | 6,432 (9%) | 7009 (9%) |
| 10 | Pure deciduous | 2,074 (3%) | 10,242 (15%) |
| 11 | Multi-storied, late seral | Unknown | 2,047 (3%) |
| | Total | 73,094 | 70,250 |

Note: Data is for all landownerships, but does not include the Lower Lake parcel due to different vegetation mapping.

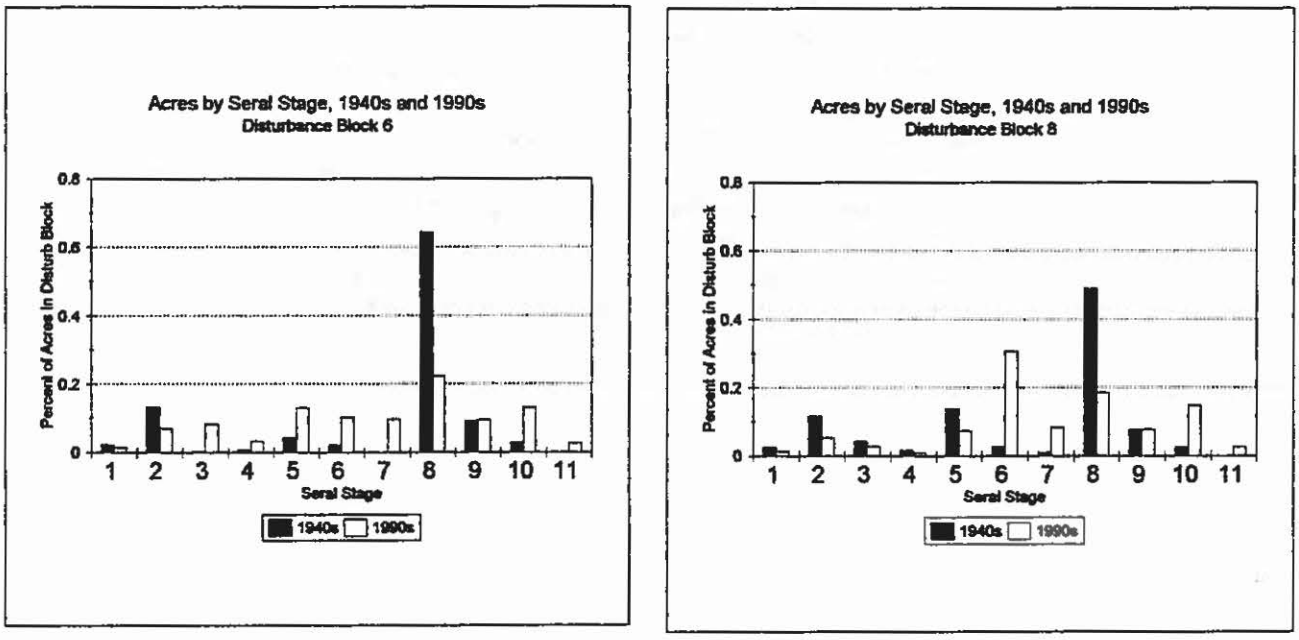
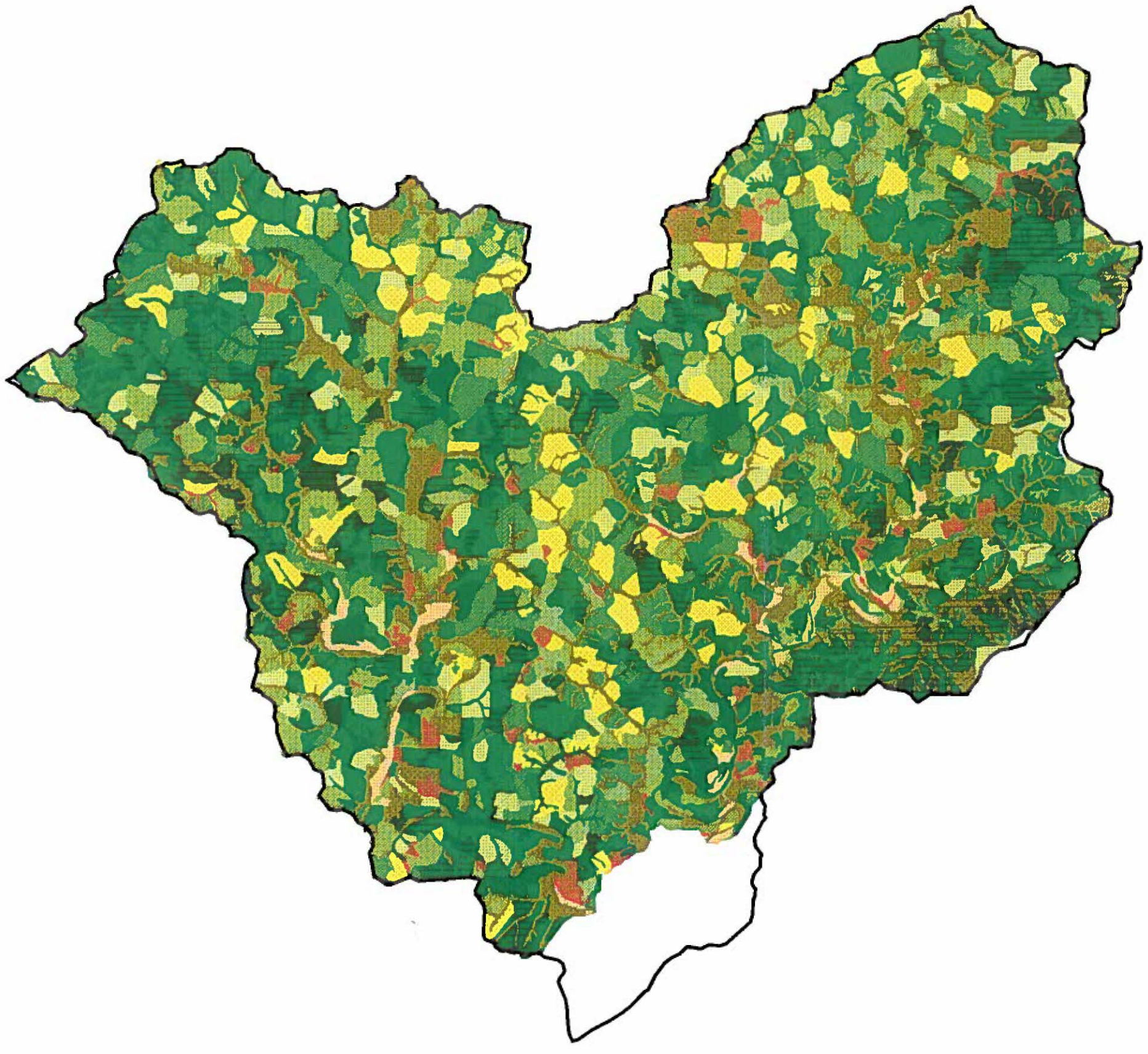



Figure 5.1. Percent seral stage acres in 1940's and 1990's; - Block 6 (left) and Block 8 (right)
(Refer to Table 5.1 for legend of seral stage numbers.)



# Indian Deadwood Current Vegetation

- Grass/Forb
- Very Early Seral
- Early Seral Conifer
- Conifer Mix and Decid. Mix Pole
- Young Conifer
- Young Conifer Mix
- Young and Mature Decid. Mix
- Mature Conifer
- Mature Conifer Mix
- Pure Deciduous
- Multi-Storied Late Seral
- Remants Present
- Fire Regime Boundary
- Watershed Boundary

0 1 2 3 4

MILES

RF 1:103605

June 14, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties in its content or accuracy.

Map 5.1

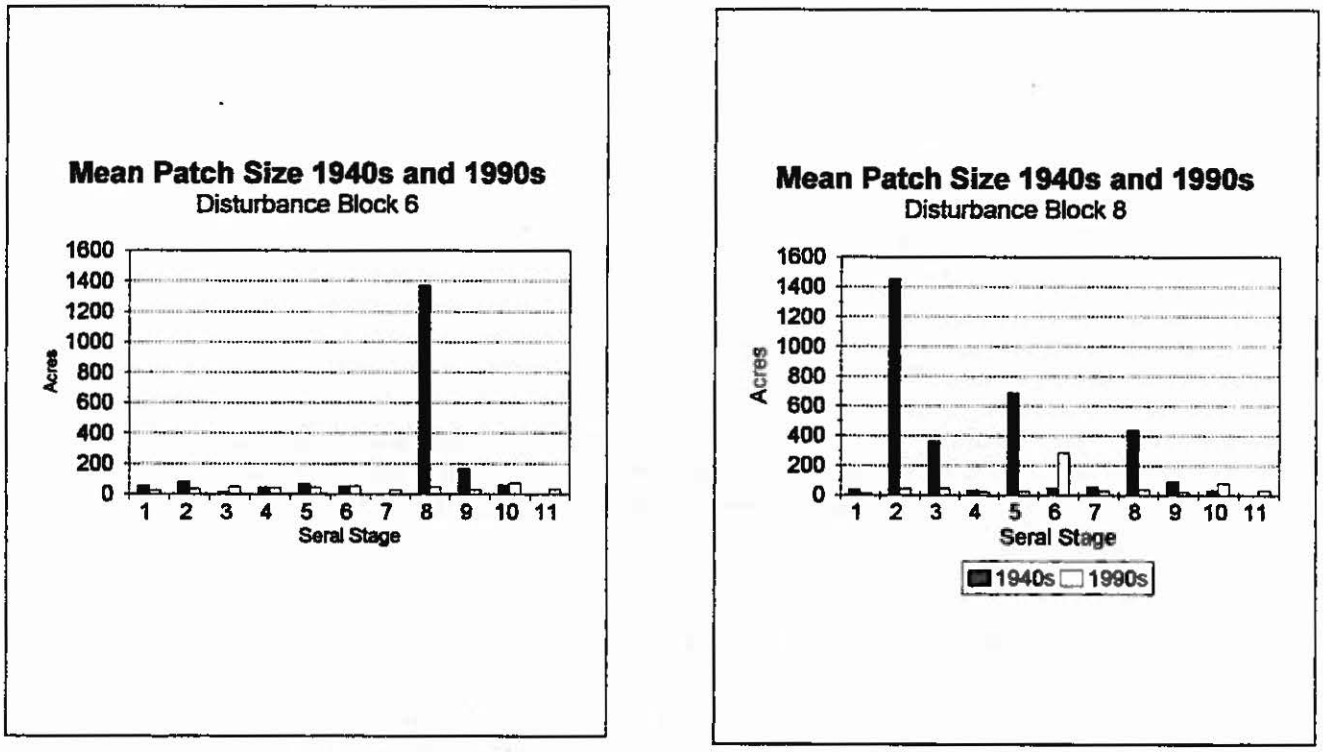



Figure 5.2. Mean patch sizes of seral stages for 1940's and 1990's
(Refer to Table 5.1 for legend of seral stage numbers.)

## Species Composition and Structure

Intensive timber management changed the natural range of species composition and structure that used to dominate the watershed. After a natural stand of mature timber was harvested, the combination of site preparation, genetically-improved nursery seedlings, and early use of herbicides contributed to the rapid reforestation of conifers. In natural conditions, early seral stages in wet to moist sites could have a large alder component that would persist for 30-50 years, before the Douglas-fir species would take over. Reforestation techniques shorten the time to 10-20 years. Additionally, the amount of coarse woody debris remaining on a site after harvest was a small fraction of that found in natural young stands (Spies and Cline 1988).

Plantations contain denser stands of trees than most early natural stands. Dense planting was intended to ensure survival and re-establishment of conifers to a given stocking level. The higher stocking levels were also planned as part of the management regime that contributed to intermediate thinning entries to increase total yields of timber. The species selected for regeneration was the shade intolerant Douglas-fir. With clearcutting as the predominant regeneration system, shade intolerant conifer species were planted to take advantage of site conditions. Shade-tolerant species (western hemlock and western red cedar) were expected to seed in naturally as site conditions became more favorable. Precommercial thinning of very young stands in the 1960's and 1970's favored the faster growing Douglas-fir as croptrees over the slower growing shade tolerant trees.

Today, about 39% of the federal lands in the watershed are in managed stands less than 45 years old. About half of these plantations are in the 25-45 year age class, potentially eligible for commercial thinning (Table 5.2).

Table 5.2. Acres of Plantations by Age Class

| Age Class | Acres |
|---|---|
| 1-10 | 2,991 |
| 11-20 | 4,900 |
| 21-26 | 4,587 |
| >26 | 9,177 |
| Total | 21,655 |

[1] Data based on 1994 inventory

Distribution of the managed and natural stands are shown on Map 5.2. About 2400 acres of the remaining natural stands, especially those close to roads or clearcuts, were thinned in the 1960's and 1970's in an effort to salvage commercial trees nearing mortality and improve tree growth of the remaining stock.

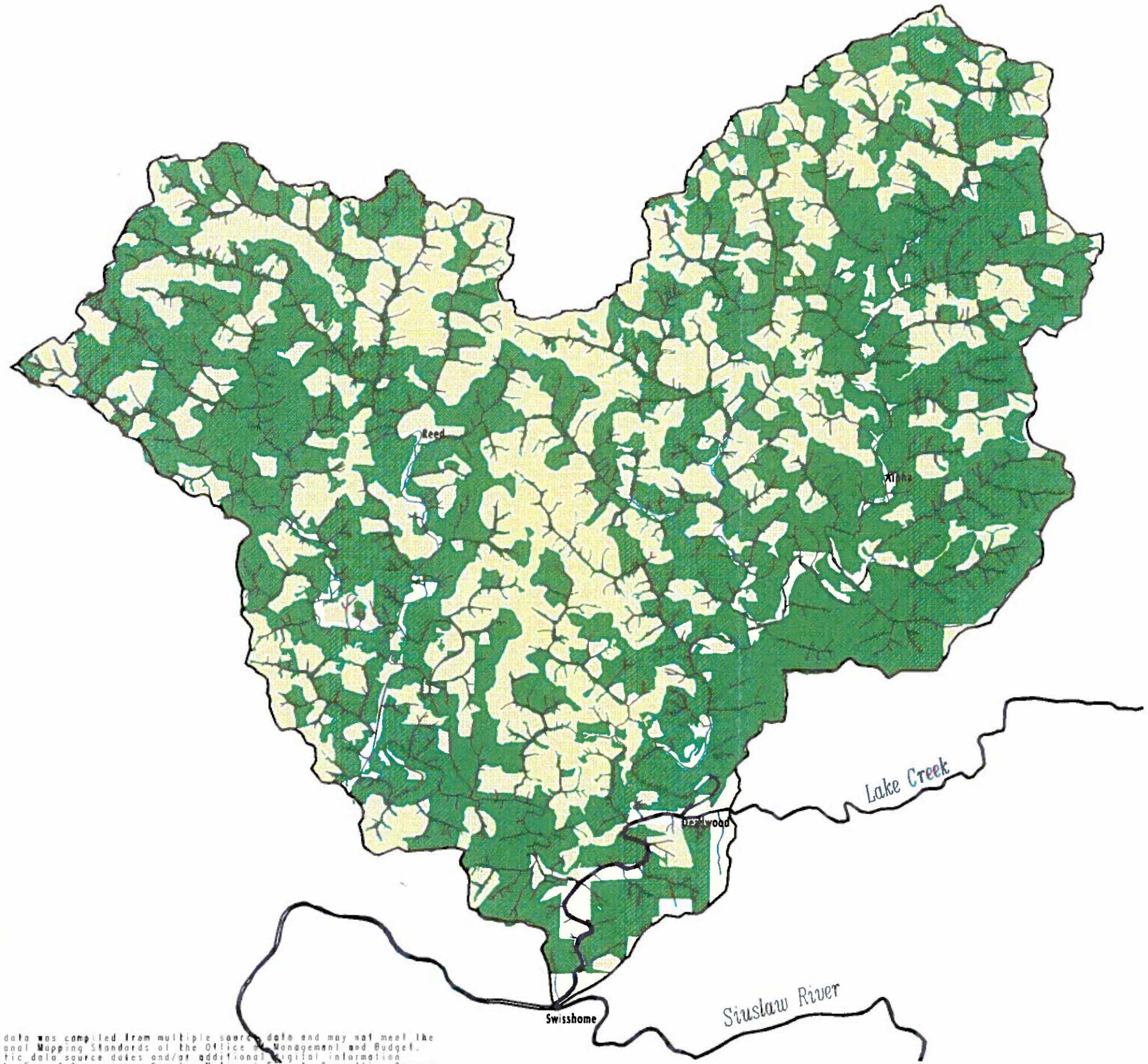
## WILDLIFE SPECIES AND HABITATS

The Indian/Deadwood watershed contains a wide variety of habitats due to existing combinations of cover type and successional stage. Species for which there exists the most information include northern spotted owls, marbled murrelets, elk, deer, marten and pileated woodpecker. Most of these species reside in late succession conifer forests that contain specific types of structural components. Spotted owls, for example, do best in coniferous stands of multi-storied canopies and mixed tree species that contain large cavities for nesting, as well as habitat for preferred prey species such as the northern flying squirrel, red tree vole and bushytail woodrat. Marbled murrelets do best in large old growth trees as well, however their nesting habits require a flat secure nesting platform to lay an egg. Nesting platforms are often the result of moss growth on large horizontal limbs, debris accumulation, or clumps of mistletoe. Pileated woodpeckers require large standing dead trees to excavate a cavity for nesting. The overall amount (23,533 acres) of these habitats comprises only 32% of the watershed. Loss of these habitats is primarily due to timber harvest, however, natural events such as windthrow, disease, and landslide are also factors but to a lesser degree.

### Big Game Habitat

Big game species (elk and deer) do best in landscapes that offer a variety of habitats. Naturally occurring or man-made openings and cover areas serve to meet the yearlong nutritional and security needs of dear and elk. The Oregon Department of Fish and Wildlife (ODFW) monitors big game trends in number and specific demographic parameters through harvest levels and post hunting season counts. The number of elk have steadily increased in the Indian/Deadwood watershed as a result of successful reintroductions after most elk were extripated from the Coast Range shortly after European settlement. The current condition of the watershed is very good for elk and deer due to a diverse mix of successional stages and cover conditions.

The capability of the landscape, based primarily on landform, was mapped cooperatively with ODFW and is part of the resource information base available to assist in planning of resource activities.




# Indian Deadwood Natural Stands

Natural Stands

Managed Stands

0 1 2 3 4

MILES

RF 1:103605

June 13, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

Map 5.2

Capability is classified as high, medium or low and represents the opportunity level to effectively provide continued forage and cover for elk.

Indian/Deadwood watershed contains high and moderate elk habitat capability areas. North Indian, Maria, Rogers and Herman Creek subwatersheds are high, and the remaining lands moderate. Activities such as converting roads to stringer meadows when no longer needed for access or developing cooperative noxious weed programs to address containment or eradication are two activities that could be used in the Indian/Deadwood watershed to benefit big game.

## Species Guilds

Analysis of habitat suitability across a landscape using a computer model, HABSCAPES, was conducted for four groups (guilds) of species (Austin 1996). The model considers amount, patch size and juxtaposition of required habitat, and the ability of a species to use patches of habitat (aggregates of habitat) even though the habitat may be separated by unsuitable habitat areas.

The four groups contain the following representative species:

Guild 1-(TLML) (Species that use large trees, have large home ranges, and are ABLE to aggregate patches of preferred habitat in a mosaic).

- Northern spotted owl
- Northern goshawk
- Pacific fisher
- Pileated woodpecker
- Marten

Guild 2-(TSPL) (Species that use large trees, have small home ranges, and are UNABLE to aggregate patches of preferred habitat in a mosaic).

- Marbled murrelet
- Northern flying squirrel
- Pacific-slope flycatcher
- Red tree vole
- Shrew-mole
- Trowbridge's shrew

Guild 3-(TSMO) (Species that use open habitats, have small home ranges, and are ABLE to aggregate patches of preferred habitat in a mosaic).

- Mountain quail
- American goldfinch
- Brewer's blackbird
- Bushtit
- Scrub jay

Guild 4-(TSPO) (Species that use open habitats, have medium-sized home ranges, and are UNABLE to aggregate patches of preferred habitat in a mosaic).

Common garter snake
Horned lark
White-crowned sparrow
Western bluebird
MacGillivray's warbler

Habitat that is currently suitable for each of the above Guilds is displayed on Map 5.3. Guilds 1, 2, 3, and 4 have current overall suitability ratings of 28%, 27%, 10%, and 10%, respectively. The suitability ratings are based on the amount of suitable habitat in the watershed expressed as a percentage of the entire watershed. For example, a 30% suitability rating for a given guild means that 30% of the watershed contains suitable habitat for species associated with that guild. Each guild suitability rating would be expected to fluctuate as habitat conditions in the watershed change. For example, guilds that use open habitats would have a high suitability after fire events at the same time guilds that use mature habitats would have a low suitability.

## Mature Conifer Habitat

A few species that reside in the watershed and use primarily mature conifer habitat have been surveyed and monitored over the past 5-10 years as part of the timber sale program. Detailed information exists on spotted owl, marbled murrelet and bald eagle habitat in the watershed. The following habitat condition analyses address habitat amounts and location for each of these species and are integral to assessing the relative health of mature conifer habitats for many other species that reside in the watershed.

**Spotted Owls** – There are all or portions of 29 spotted owl home ranges (26 pairs and 3 territorial singles) on federal lands in the watershed. The acreage of suitable habitat (conifer > 18 inches diameter) within the median home range (1.5 mile radius) for each owl pair or territorial single is shown in Appendix G, Table 1. The average amount of habitat within the owl pair home ranges is 1,448 acres, with a range from 368 to 2,438. Owl activity centers that are below 40% mature conifer habitat (1,906 acres) in the median home range radius are below the threshold used by the U.S. Fish and Wildlife Service (FWS) for "take". Of the 29 spotted owl home ranges in the watershed, 22 are currently below the threshold. (Appendix G, Table 1).

Interior mature conifer habitats ( > 500' from the edge of mature stands) are critical to certain species sensitive to moisture, light, and ambient air movement for either their long term existence in one area or for mobility across the landscape for dispersal and genetic exchange with other individuals. Acreage of interior forest is presented in Appendix G, Table 2, and shown on Maps 1 (Appendix G) and Map 5.4. Percent of mature interior forest varied from 22% in the area of Rock/Buck/Elk Creeks to 0% in Panther Creek.

Based on HABSCAPES described above, the best habitat for species that use habitat similar to spotted owls occurs in the area of Rogers, Maria, Upper Indian and upper portion of Deadwood Creeks. Occupied habitat in other drainages is also valuable, however, because it is more scattered, the suitability on a larger sub-watershed scale is less.

In general, mature conifer connectivity between large, more intact conifer forest to the east and west is weakest in upper West Fork Deadwood, Misery and Herman Creeks. This creates a large gap within the Late-Successional Reserve lands in Indian/Deadwood.

**Marbled Murrelets** -- There are all or portions of 27 marbled murrelet reserves (area of contiguous suitable habitat within 0.5 mile of an occupied site and containing the occupied site) on federal lands in the Indian/Deadwood watershed. The amount of contiguous suitable habitat (conifer > 18 inches diameter) within each site is shown in Appendix G, Table 3. The average amount of habitat within each 0.5 mile circle is 181 acres, with a range from 37 to 382.

The murrelet habitat base consists of all mature conifer stands throughout the watershed regardless of size and surrounding habitat. The areas of upper Rogers, upper Maria, Upper Indian, North Indian and Upper Deadwood Creeks contain the most suitable habitat. Stand improvement activities aimed at aggregating stands to reduce fragmentation and increase contiguous mature conifer patches would in the long term directly benefit marbled murrelets.

**Bald Eagles** -- There are two bald eagle management areas in the watershed. One is active and located on lower Indian Creek. The other is an inactive territory, located along lower Lake Creek. Both are among the 23 territories in the Coast Range required to attain recovery of the bald eagle in the Pacific Northwest (USFWS 1986).

Manipulation of stands within these management areas to enhance bald eagle habitat is not a high priority. Any adjustments to stand density need to address each area individually to assure that the goals of the management area are met. Some manipulation may be beneficial to develop dominant/co-dominant, multi-layered stands for future nest sites and roosting habitat.

### Centers of Biodiversity

Scattered throughout the Indian/Deadwood watershed are a few conifer stands that are multi-storied and contain a wide diversity of plant species. These stands are some of the oldest and most complex of all the forested land in the watershed. They are called "biodiversity hotspots" for this analysis. Upper Rogers, upper Maria, Indian and Upper Deadwood Creeks contain the most residual late seral conditions in the watershed. The largest area of residual late seral forest is in the Elk Creek drainage (Map 5.4).

These stands have a higher number of late seral vascular and nonvascular plants when compared to plantations or other younger natural stands. In addition, some vertebrate species may also reside in such habitats that do not occur in similar less complex types. The species richness in these stands is due primarily to the lack of a recent stand-replacing fire or the occurrence of an intermediate non stand-replacing fire. This in turn allowed development of older conifer forest conditions.

### Special Habitats

Special, or unique, habitats include cliffs, talus slopes, caves, rock faces, lakes, marshes and sloughs. There are none of these known in the watershed at present. However, beaver activity produces many habitat features that are associated with wetland environments. There are many streamcourses in the watershed that have beaver activity and have special wetland habitats as a result. See Map 5.7 for location of some of these features.

## Botanical Resources

The known botanical resources in the watershed include vascular plants that are on the Regional Forester's Sensitive Species list (Appendix H) as well as selected mosses and lichens that are part of a multi-forest air monitoring program. Fungi and many other non-vascular plants have suitable habitat in the watershed but species specific surveys or inventories have not been performed.

**Vascular plants**-- Surveys for all Regional Forester's sensitive plants were performed prior to past ground disturbing activities. Loose flowered bluegrass (Poa laxiflora) is the most common of the sensitive plants with 13 separate locations documented in the watershed. A management strategy and monitoring plan has been developed for loose flowered bluegrass on the Forest. This strategy provides adequate protection to the species and permitted removal from the R-6 Sensitive Species List. The Indian/Deadwood watershed contains four sites key to the Forest management strategy. One is a 'no impact site' and the remaining three are 'protected' sites with a 400-foot buffer that require adjustments in management if necessary. Map 5.4 shows locations of Poa laxiflora management sites.

Opportunities to enhance botanical resources through stand level manipulation is very limited. Recovery and management is best accomplished through close coordination with other resources.

**Nonvascular plants**-- The only nonvascular plants that have been sampled in the watershed are epiphytic macrolichens. The sampling, done in 1994 and 1995, is part of monitoring over a large area of the Siuslaw Forest. Other nonvascular plants certainly exist in the watershed but have not been collected and identified. The biodiversity of lichens is highly positively correlated with the percent gaps, wolf trees, and old-growth remnants in the stands. The 17 species of macrolichens documented in the watershed are in Appendix G, Table 4.

## Range

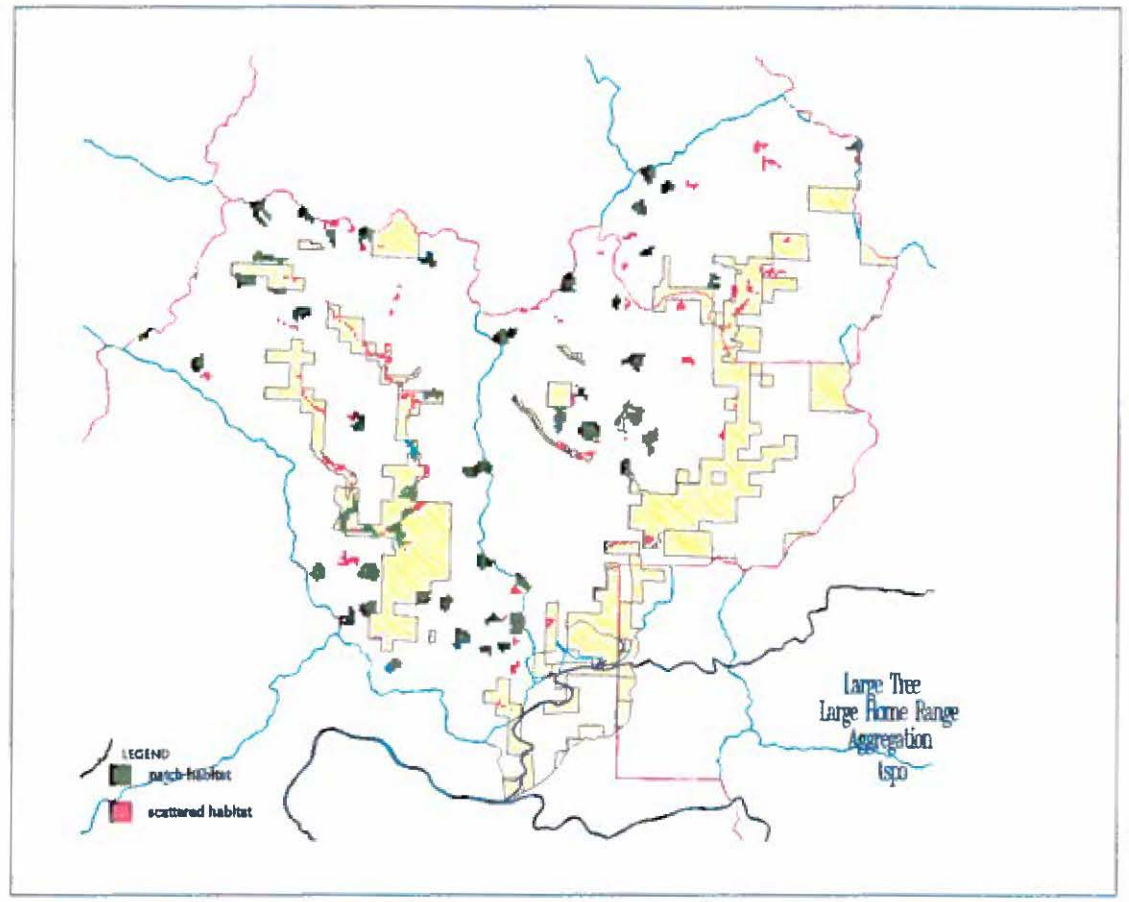
Range resources vary throughout the watershed from transitory range, created as a result of timber harvest during the past 1-8 years, to permanent forage found in meadows and along roadsides. Permitted grazing on federal lands is located along the North Fork of Indian Creek on approximately 30 acres via a temporary permit for up to 17 cow/calf pairs, in addition to a two special use permits for small pasture lands.

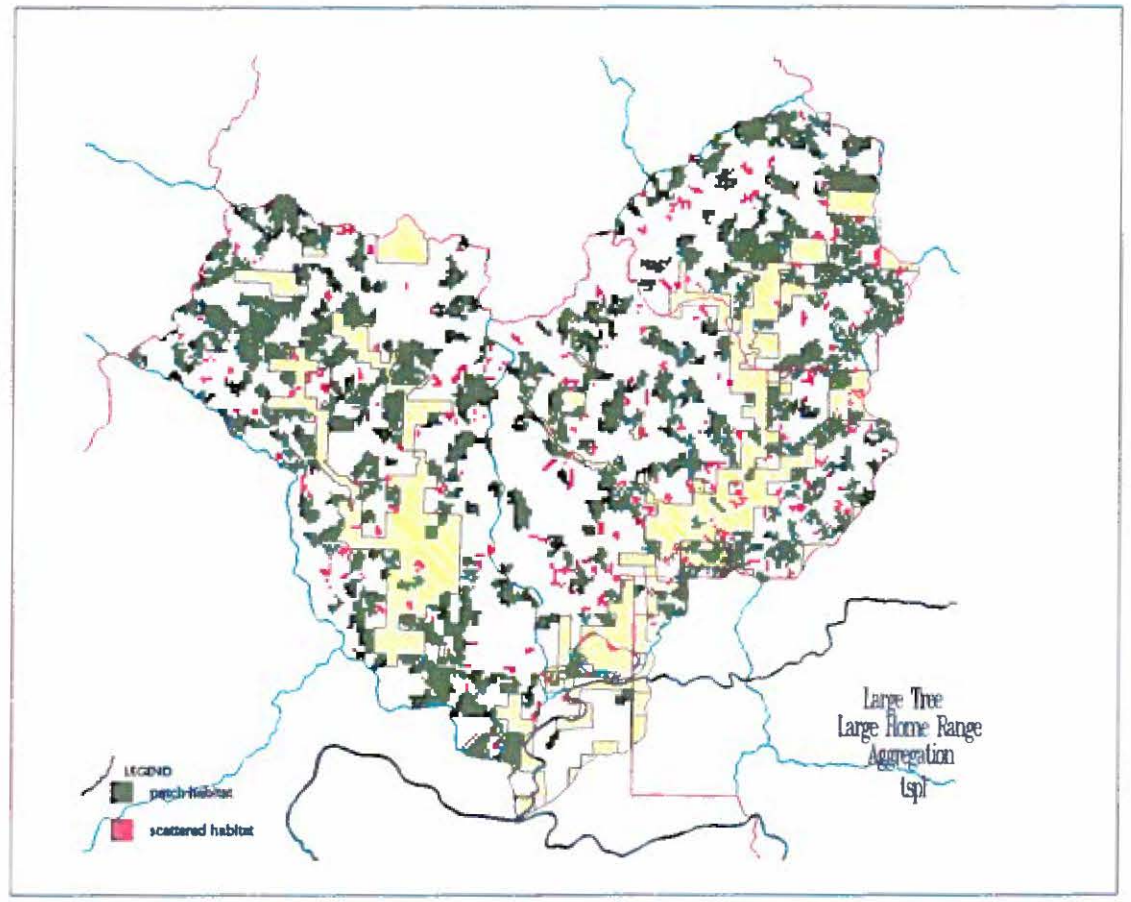
The range condition in the allotment is poor. Stream bank stability is a concern as is the encroachment of noxious weeds, mainly yellow tansy, thistle and blackberry.

## Riparian Reserves

The Northwest Forest Plan established Riparian Reserves on federal land to provide areas along all streams, wetlands, ponds, lakes and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Riparian Reserves are important to the terrestrial ecosystem as well as serving, for example, as dispersal habitat for certain terrestrial species.

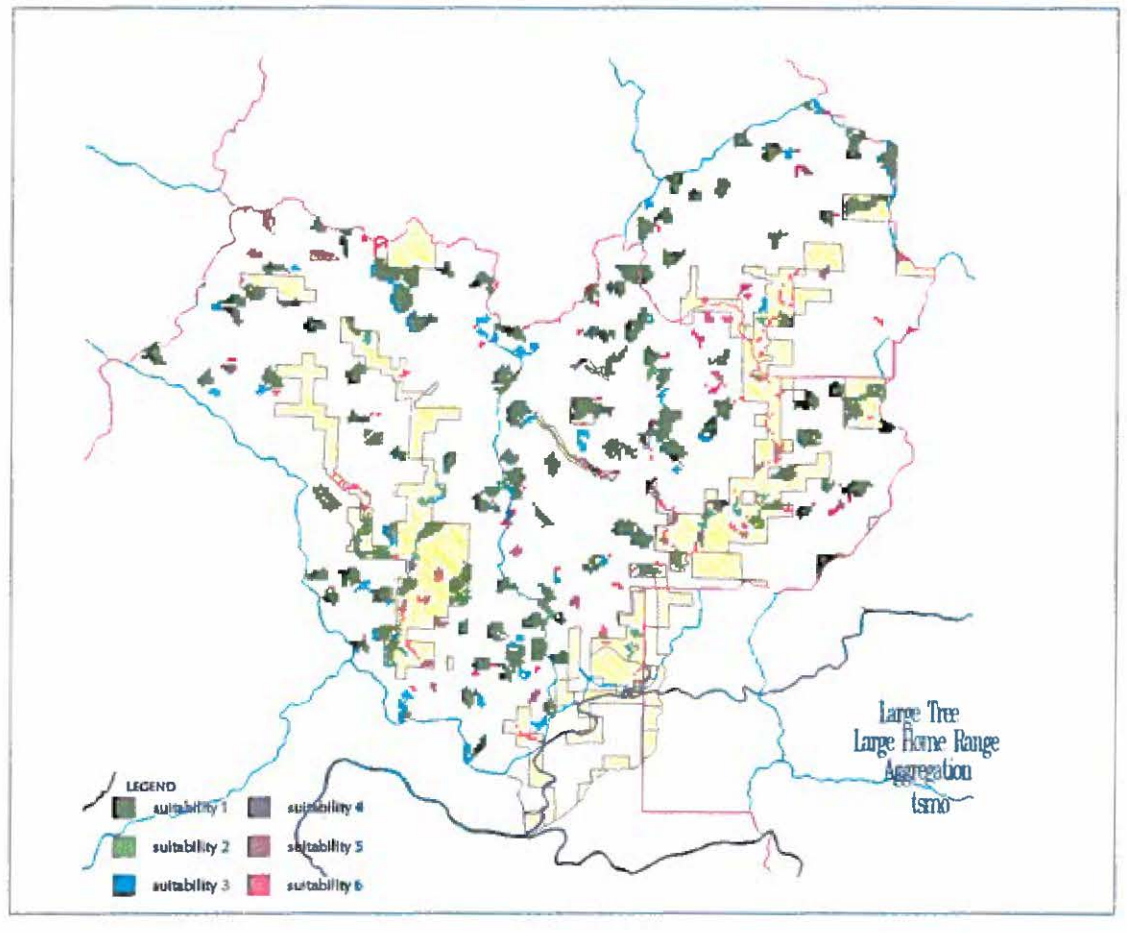
Riparian Reserve health and condition is an intergral component of a fully functioning ecosystem. Plantations and other environments manipulated by man do not provide the full range of habitat components (vertical and horizontal structure, large woody debris, etc.) that are needed to support the full complement of riparian-dependent species. The existing makeup of Riparian Reserves on federal

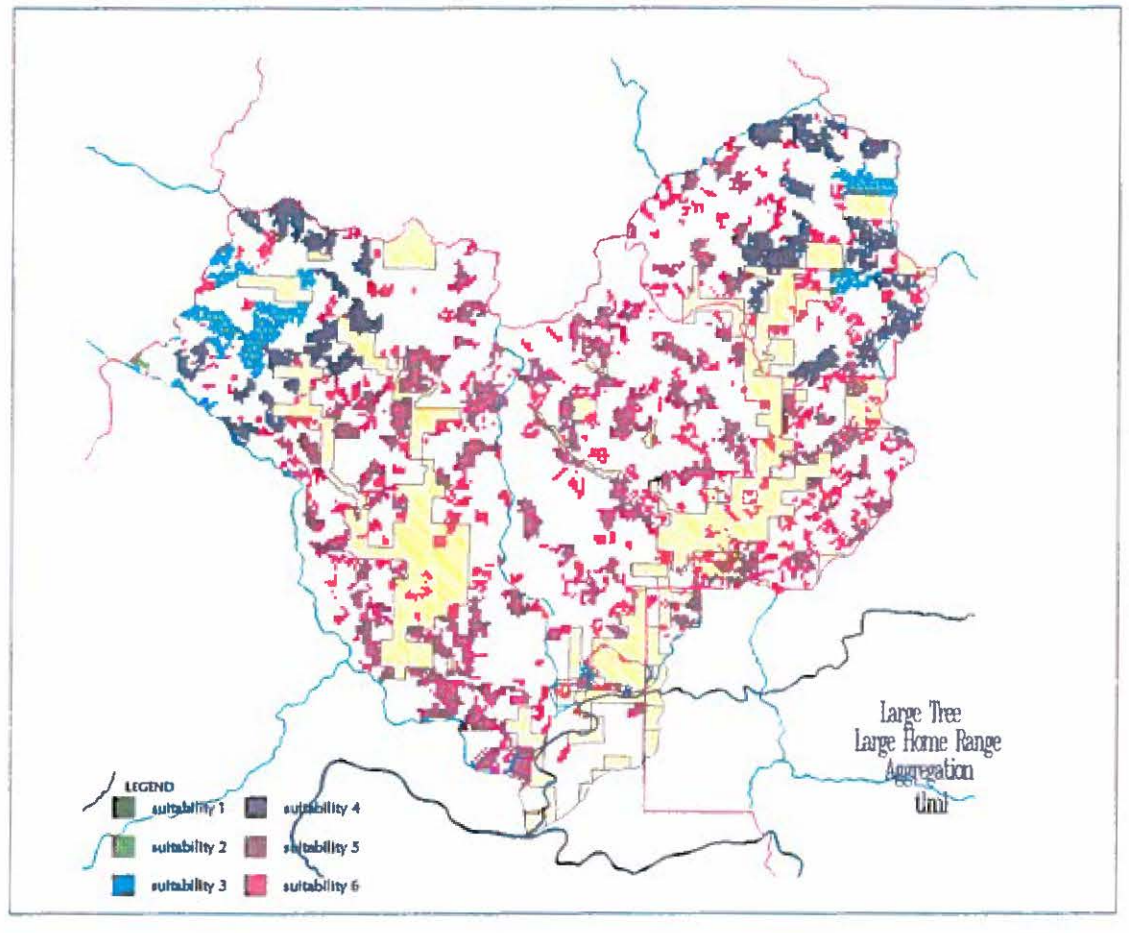



# Indian/Deadwood Habscape Guilds

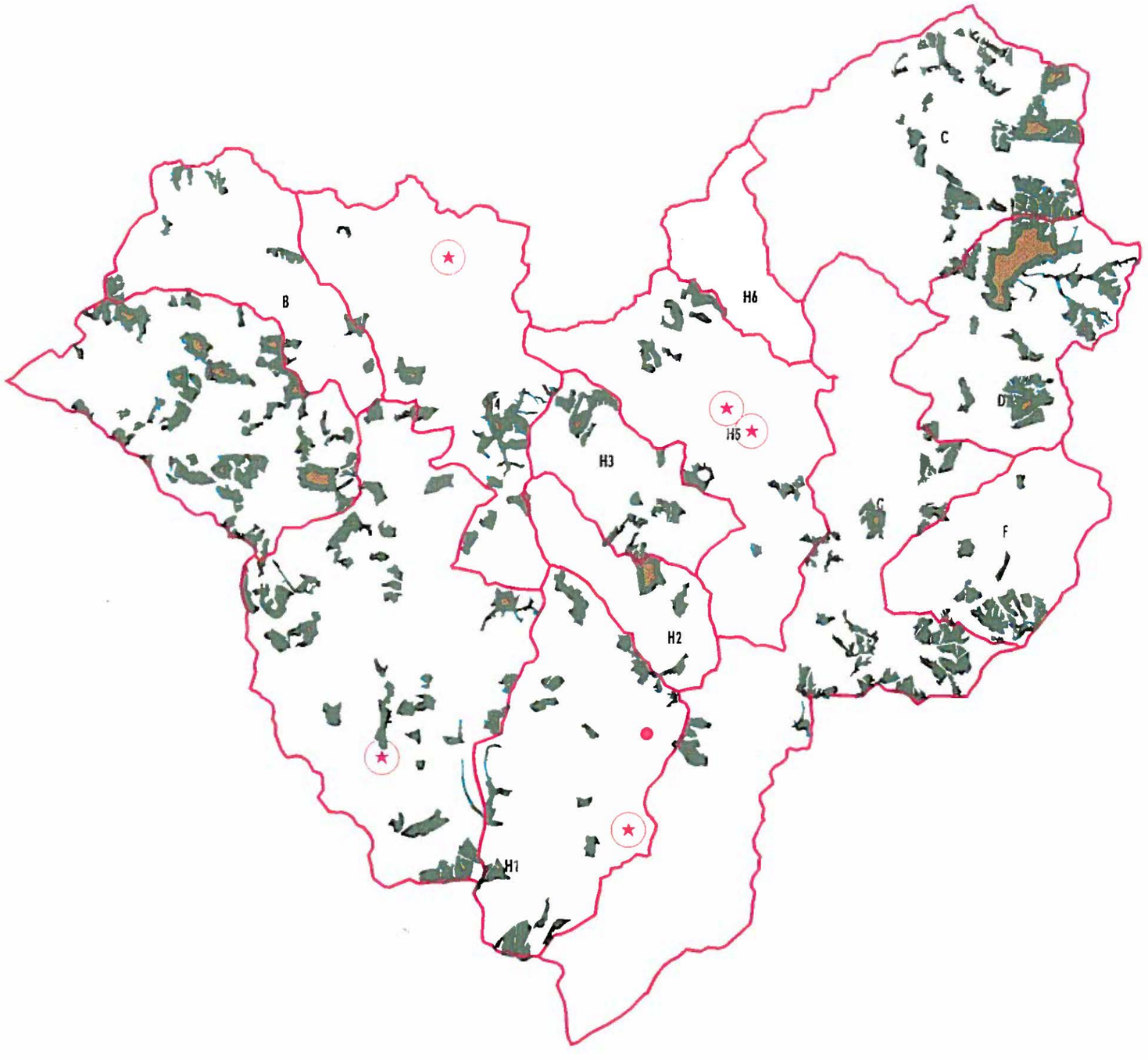
- Watershed Bndrys
- District Bndrys
- Non Federal Lands




June 03, 1996

Map 5.3




# Indian/Deadwood

Hotspots of Highest Mature Conifer Forest Biodiversity

Landscape Blocks

Interior Habitat

Late Successional

No Impact Poa Site

Buffered Poa Sites

0 1 2 3 4

MILES

RF 1:103605

N

June 03, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

Map 5.4

land is 54,840 acres of which 60% is in natural stands. The remaining acres are in plantations (managed stands). Assuming that natural stands provide fully functioning habitat, the Riparian Reserves in the watershed are currently functioning at 60% or greater of potential for terrestrial species, reptiles and amphibians.

The area of weakest Riparian Reserve connectivity for terrestrial species between upper and lower portions of a drainage occurs in Failor Creek. Connectivity between subwatersheds is weakest from North Indian Creek to Upper Indian Creek. Other areas of poorly functioning Riparian Reserves occur throughout the watershed.

### Summary

- The least fragmented mature conifer stands, especially those with remnants of very old trees and multi-storied late seral conditions (called "biodiversity hotspots"), are found in the upper western and eastern edges of the watershed (in Elk/Buck/Rock and in Rogers/Maria subwatersheds). HABSCAPES model indicates that these two areas contain the best habitat for species associated with a large tree, large home range habitat, e.g., northern spotted owl and pileated woodpecker.

- The most fragmented mature conifer within Riparian Reserves is found in the middle portion of the watershed (i.e., within Failor and Misery Creek drainages) and between Upper Indian Creek and W. Fork Indian Creek drainages. Connectivity habitat for species traveling between natural stands and between drainages is in poor condition.

- Good habitat within the bald eagle management areas is limited to a few small patches near the present nesting sites.

- Poor connectivity for late-successional species is found in the middle of the northern portion of the watershed (within Herman to West Fork Deadwood). To improve connectivity between the western and eastern sections of the Late-Successional Reserve lands within the watershed, the vegetation structure and diversity should be improved in this area.

## AQUATIC ENVIRONMENT

### Human Disturbances

A variety of land use practices have affected channel and fish habitat conditions in the Indian/Deadwood area since the late 1800's. Because we have a mix of old and new management practices on the landscape any disturbance, flood or landslide, has a strong component of historical legacies composed of both human actions and natural events. Various land use practices have been concentrated on different areas of the landscape therefore affecting different parts of the channel network. Because of the dynamic nature of stream systems and the movement of sediment and wood through the system with high flow events there is a cumulative effect of the landuses often in the mainstem stream reaches. The following discussion highlights the major effects of various land use practices since Euroamerican settlement. The combination of these 'human disturbances" and natural disturbances result in the current conditions of the aquatic system.

**Valley Settlement**

Settlement of valley bottoms and the many associated activities that began in the 1880's and continue today have had significant impacts to the low gradient mainstem creeks. The result is stream corridors with little or no large wood in the riparian areas, infrequent stream interaction with the floodplain, channel entrenchment and reduction in the amount of side channels and alcoves (rearing coho, steelhead). Widespread removal of riparian vegetation has contributed to the reduction of shade resulting in increased stream water temperatures.

**Splash Dams and Log Drives**

Much of the channel entrenchment that typifies the mainstems of Indian and Deadwood Creeks may have originated from the splash dams and log drives that took place in the early 1900's (see Chapter 4, "Logging and Road Building" for history of these.) The Siuslaw Navigability report (Farnell 1979) describes various entities using explosives to clear out logs and blow out boulders in order to clear the channel for logs to move more easily down the creeks. By removing roughness elements from the channel, water velocity increases and causes the creek to scour, cutting both down and laterally. This is likely the initial reason that the majority of mainstem streams in this watershed are scoured down to bedrock. These events have impacted primarily the spawning and winter-rearing habitat for chinook and summer and winter-rearing habitat for coho. Additional impacts are increased water temperatures with reduced subsurface flow.

**Road Building**

Roads have a significant impact on slope stability and water routing. Road location and design determine their potential to destabilize watersheds. The position of a road on the slope (ridgetop, mid-slope, valley bottom) influences both the amount of water that is intercepted and rerouted, and in valley bottoms restricts natural channel migration. Some roads may increase the timing and magnitude of peak flows by effectively increasing the 1st-order channel network. The road construction method influences its potential for failure. Unstable sidecast portions have and will continue to fail during large storms. Until the mid-1970's, most roads were constructed using sidecast methods which made them more prone to failure than roads constructed by "compacted-fill" technique. A large proportion of the existing roads in the watershed were sidecast constructed. Appendix I lists construction characteristics of the roads. (See also Chapter 4, "History of Human Settlement", and Map 4.10 and Map 5.9.) In general, the road network has increased the efficency of water and sediment delivery and routing through the watershed.

In the process of designing and building roads, impacts to the aquatic resources were not always recognized or accounted for. Many roads and associated culvert installations were placed in such a manner that passage for fish, amphibians, and possibly other aquatic organisms was impeded. This is especially true in many of the smaller tributaries that were, at that time, believed to not contain or not be important for aquatic resources maintenance. Much has been done to alleviate this problem although there are still roads and culverts that preclude passage to available habitat.

The ability of the Forest to maintain roads has dwindled because road maintenance was funded mostly through collections from timber sales. By the early 1990's, the Forest was no longer able to maintain all of the roads to standards that would insure stability during major storms. As a temporary measure to reduce excess surface runoff that could degrade roads and nearby streams, some roads were waterbarred (predominantly in Key Watersheds). Since 1992, the Siuslaw NF has waterbarred

approximately one-fourth (812 miles) of the existing Forest road network, including about 1 mile in Indian/Deadwood. In addition, approximately 30 miles have been decomissioned on the Forest (J.Dillingham personal communication, 4/96). These treated roads appear to have "survived" the 1996 flood far better than the untreated roads.

**Timber Harvest Activities**

The effects of early logging along the mainstem valleys were to remove some riparian vegetation and probably increase fine sediments into the aquatic environment. As logging moved upslope, soil and woody debris were dragged downhill and often entered streams. After 1950, when timber harvests began increasing dramatically, clearcuts became larger and extended to the streams in many areas. Impacts to tributaries that contained habitat for cutthroat, coho, and steelhead included vegetation loss to the stream edges and larger amounts of sediments being introduced into the streams, clogging gravels and filling pools.

In the late 1970's, the practice of leaving trees in unstable or potentially unstable areas was adopted. These leave areas serve to maintain normal root strength and windfirmness, primarily in steep headwall areas above intermittent streams. Riparian buffers were implemented in the 1970's as well and reduced the direct impacts to the perennial streams in a harvest unit but did little or nothing to protect the intermittent tributaries to the perennial streams, which are the sources of material used for habitat in the perennials. Additionally, wood debris and large wood were cleared from many of the creeks that were believed to impede fish passage. This caused winter and summer rearing habitat for juvenile fish to be degraded. This practice continued until the early 1980's.

Landslides are a natural erosion process and only becomes a concern when the rate of landsliding is above natural levels. Removal of vegetation results in a loss of root strength and an increase in the potential for landslides to occur until root strength is re-established. In the Coast Range it takes about 15 years for re-establishment. Harvest units younger than 15 years located in areas of high risk for debris slides are especially at risk. When debris slides occur, the amount of sediment added to a stream may overwhelm the stream's ability to transport and distribute the sediment. Research has shown that landsliding increases several fold for one to two decades after clearcutting and even higher rates of sliding occur per acre of road than per acre of forested or clearcut area. Various landslide surveys of the Mapleton Ranger District indicate that debris slides and torrents have increased in frequency due to past timber harvest and road building practices.

Timber harvest also affects water yield and timing. The differences between harvested and forested basins vary by season and the amount of rain that falls. Clearcutting and roads increase the size of small and moderate peak flows in small watersheds (< 250 acres). Although large (>25 sq mi) watersheds and large floods have received less attention, a recent study (Water Resources Research, 1996) suggests that effects of clearcutting and roads in large watersheds may be greater than previously thought. Summer baseflows also increase for a short amount of time when 15-20% of small watersheds have been logged. Changes in the hydrologic regime from timber harvest lessen as vegetation re-grows and evapotranspiration rates are re-established.

**Fishing, Estuary Modification, and Exotics**

Factors affecting the populations of fish species that are being monitored include those described above as well as commercial and recreational fishing, ocean conditions, and natural climatic events (floods, fire, landslides). Commercial and recreational fishing can remove a significant portion of a

fish run, especially when the populations are in decline. Unfortunately, this is also the time when fishermen value fish the most. Historically, coho salmon were the main targets of commercial and recreational fishery, and chinook salmon were the next most targeted. There were impacts to chinook and coho habitat early in the 1900's as discussed above. Based on commercial catch numbers the populations of chinook and coho both declined throughout the first half of the century (ODFW 1995). Then in the 1970's the coho populations plummeted. Although the major impacts to coho habitat happened throughout the 1950's, 1960's and 1970's, drastic population declines of coho were not noted until the 1970's.

Recent theories have demonstrated that ocean conditions may have been responsible for the delayed response of coho. Ocean conditions were favorable for coho during these periods until there was a regime shift in 1976, when ocean conditions changed for the worse for coho. The combination of poor ocean conditions and poor instream habitat conditions may have caused dramatic declines in the coho populations (NMFS and OSU 1996.)

Estuaries have also changed dramatically since settlement. Dredging of channels, removal of large wood, and human development on floodplains have all affected the intertidal environment that smolts must pass through on their way to the ocean. Introduction of exotic fish, (e.g., shad and others) may also have affected the anadromous fish populations

## Current Conditions

All of the subwatersheds in Indian/Deadwood have had some logging and road building--some have had log drives and others are dotted with homes. Both the concentration of different land use practices on various parts of the landscape and differences in the processes impacted by these practices have influenced the aquatic ecosystem we see today.

Current aquatic conditions are best described by subwatershed since events that affect aquatic resources stay within watershed boundaries. Table 5.3 provides a summary of land uses by subwatershed. Appendix J contains subwatershed summaries that provide more detail on each subwatershed, including aquatic habitat conditions and recommendations, inherent physical and terrestrial characteristics, and summaries of the management legacies. These were developed to provide managers and field personnel a quick reference description of each subwatershed and a general description of the potential direction of the subwatershed.

Results of the changes in regimes of water, sediment and wood vary by stream function segments (identified and discussed in Chapter 4). These are summarized in Table 5.4. The steep, confined source segments of the stream network have been influenced predominantly by logging and road building. The location and age of plantations or roads have implications for the type and extent of past and potential future impacts to the aquatic resources. Processes that have been substantially altered in the source segments are an increase in the rate of landslides, a decrease in the current source of large woody debris (LWD) and a change in the water yield and timing.

The moderately steep, moderately confined transport segments of the stream network have also been influenced predominately by logging and road building. With an increase in road-related debris torrents, the nature of the material delivered to streams may be more sediment-rich. Changes in composition and structure of the riparian vegetation along many of these segments to younger conifers and hardwoods have altered the nature and rate of LWD input. Although transport segments are generally more resistent to changes in flow, sediment and wood inputs, increased rates of landslides

and several years of below average precipitation (before the 1995-96 water year) may have periodically overwhelmed these segments with sediment.

The cumulative effects of valley settlement, log drives, logging, stream cleanout, valley bottom roads, and effects from upstream and upslope land uses are significant in the depositional segments of the stream network. In some cases the overall function of the stream reach has changed from one of deposition to one of transport due to diking and entrenchment. The unconfined lowest gradient depositional segments are the most sensitive to change and the most highly altered since Euroamerican settlement. These areas are also the prime agricultural and residential sites. The objectives of different landowners have directly influenced the nature of land use practices. Therefore, landownership of different stream function segments is important and displayed in Figure 5.3.

Table 5.3. Summary of Land Use by Subwatershed

| Watershed | Subwatershed | Total Mgd %[1/] | Mgd ac <15 yrs | Road Density Mi/sq mi | Log Drives & Splash Dams[2/] | Valley Settlement |
|---|---|---|---|---|---|---|
| Indian | North Indian | 51.6 | 369 | 2.19 | yes | mod |
| | Upper Indian | 30.5 | 435 | 3.53 | yes | extensive |
| | Herman | 44.9 | 159 | 2.4 | no | low |
| | Mainstem Indian | 28.2 | 93 | 2.76 | yes | extensive |
| | Maria | 22.1 | 315 | 1.73 | no | none |
| | Rogers | 31.8 | 123 | 2.95 | no | low |
| | Long | 30.0 | 221 | 2.85 | no | low |
| | Elk2 | 42.7 | 574 | 2.24 | yes | low |
| | Lower Indian | 38.1 | 529 | 2.55 | yes | extensive |
| Deadwood | Upper Deadwood | 36.4 | 505 | 2.56 | yes | mod |
| | North Panther | 45.3 | 205 | 2.12 | yes | low |
| | Panther2 | 39.9 | 398 | 2.94 | yes | mod |
| | Elk | 22.4 | 47 | 1.16 | yes | mod |
| | Buck | 46.9 | 252 | 3.56 | no | low |
| | Rock3 | 24.1 | 135 | 1.42 | no | low |
| | North Bear | 11.7 | 336 | 1.15 | no | mod |
| | Alpha | 20.3 | 361 | 1.85 | yes | extensive |
| | Misery | 47.0 | 315 | 2.55 | no | mod |
| | West Fk Deadwood | 43.5 | 586 | 2.47 | no | mod |
| | Failor | 63.7 | 275 | 2.17 | no | none |
| Lower Lake | Green Creek | 52.7 | 72 | 4.13 | no | mod |
| | Lower Lake | 34.8 | NA | 1.94 | yes | extensive |

[1/] Total managed acres does not include pure deciduous or mixed deciduous seral stage stands
[2/] Yes = log drives and/or splash dams distributed through subwatershed; no = none or very limited use

Table 5.4 Confinement and Gradient Summary

| Stream Function Segment (Confinement & Gradient) | Sediment | Wood | Water |
|---|---|---|---|
| **C,M >8%** (82.7%) | SOURCE pulses with debris slides | SOURCE pulses with debris slides | Cool Temperature low-intermittent flow in summer flashy in winter |
| *changes caused by:* logging & road building | ↑ instability ↑ landslide rate | ↓ supply | altered flow pattern |
| **M,C 4-8%** (3.4 %) | TRANSPORT amount & distribution dependent on debris slides and major storm events | TRANSPORT individuals move to complex accumulations, highly variable, spotty floodplain interaction | Cool temperatures, perennial flow |
| *changes caused by:* logging, road building,, homesteading, splash dams & log drives | some entrenchment & channelization ↑ landslide rate | ↓ source from upslope and floodplain | ↑ temperature |
| **C,M,U 2-4%** (4.3%) | C = TRANSPORT M,U = DEPOSITION of coarse material and areas of transport Dam break pulses and some bank erosion | periodic accumulations with debris slides, expect lots of wood both singles and complexes | temperature more variable; some groundwater control to low flow |
| *changes caused by:* logging, road building, homesteads, splash dams, grazing | ↑ fines from bank erosion, channelization and entrenchment | ↓ source existing structure removed | ↑ temperature |

Confinement: C = confined, M = moderately confined, U = unconfined
Gradient classes: >8%, 4-8%, 2-4% and 0-2%

Table 5.4 Cont. Confinement and Gradient Summary

| Riparian Vegetation | Aquatics |
|---|---|
| Narrow hardwood strip, conifers close to stream (variable by PAG) | Poor rearing, few pools,<br>some steelhead and cutthroat spawning |
| ↓ root strength in young plantations<br>↓ shade | ↓ pools<br>sediment filling and/or removal of habitat with ↑ landslide rates<br>↑ bedrock dominated channels with ↑ mass wasting |
| Narrow hardwood strip & conifers more variable;<br>some stream movement and some beaver activity | Rearing associated with wood and beavers;<br>Spawning for coho, steelhead and cutthroat;<br>short-term nutrient storage |
| ↓ shade<br>↓ amount, structure, species composition | ↓ spawning and rearing,<br>simplified habitat |
| more hardwood patches, i.e., various-aged alder;<br>variable patches of conifer (spatial and structural) | C = some spawning and rearing in association with wood<br>M,U = spawning and rearing, variable habitat floodplain interaction |
| ↓ amount of conifers and hardwood | ↓ spawning and rearing, simplified habitat |

Table 5.4 Cont. Confinement and Gradient Summary

| Stream Function Segment (Confinement & Gradient) | Sediment | Wood | Water |
|---|---|---|---|
| **M 0-2%** (5.8%) | DEPOSITION of coarse and fines; bank erosion and debris slides from confined steep tributaries may directly influence channel | DEPOSITION (in general) some input of valley floor individuals, expect lots of wood from debris slides and upstream | Warmer temperatures (cool temp controls from subsurface/ small tribs.- shading); Larger storm events influence stream movement in valley & wood accumulations |
| changes caused by: logging, rd. bldg., homesteads, grazing, log drives | ↑ fines<br>↑ entrenchment and channelization,<br>large storm events<br>↑ confinement from some valleybottom roads | ↓ supply from upslope, valley bottom and in-stream | ↑ temperature<br>↓ H20 quality |
| **U 0-2%** (3.8%) | DEPOSITION fines and some coarse bank erosion, change with big storm events | DEPOSITION (in general) some valley floor contribution, down wood present on floodplain | Temperature strongly influenced by shading and subsurface contribution |
| changes caused by: homesteading, grazing, road bldg., log drives | ↑ fines,<br>↑ channelization and entrenchment,<br>Change from DEPOSITION to TRANSPORT<br>↑ bedrock dominated channels | ↓ supply from valley floor and in-channel | ↑ temperature<br>↓ H2O quality |

Confinement: C = confined, M = moderately confined, U = unconfined
Gradient classes: >8%, 4-8%, 2-4%, and 0-2%

Table 5.4 Cont. Confinement and Gradient Summary

| Riparian Vegetation | Aquatics |
|---|---|
| Important hardwood component, scattered conifers, nurse logs important for conifer establishment, floodplain interaction throughout spotty wetlands, beavers active | Chinook, coho, steelhead spawning, some resident cutthroat,<br>good rearing with complex habitat and sidechannels, abundant food |
| ↓ stream shading, nutrient input, floodplain roughness, change in species composition | ↓ spawning and rearing<br>↓ complexity from ↓ floodplain interaction<br>↑ bedrock dominated channels |
| scattered large conifers, hardwood dominated,<br>nurse logs important,<br>wetland, willows | Chinook spawning,<br>good rearing habitat<br>deep pools, lots of food, side channels,<br>high diversity of other aquatic species |
| ↓ structural and species diversity | ↓ diversity of in-channel habitat<br>↓ side channels<br>↓ pools (number, depth and complexity) |

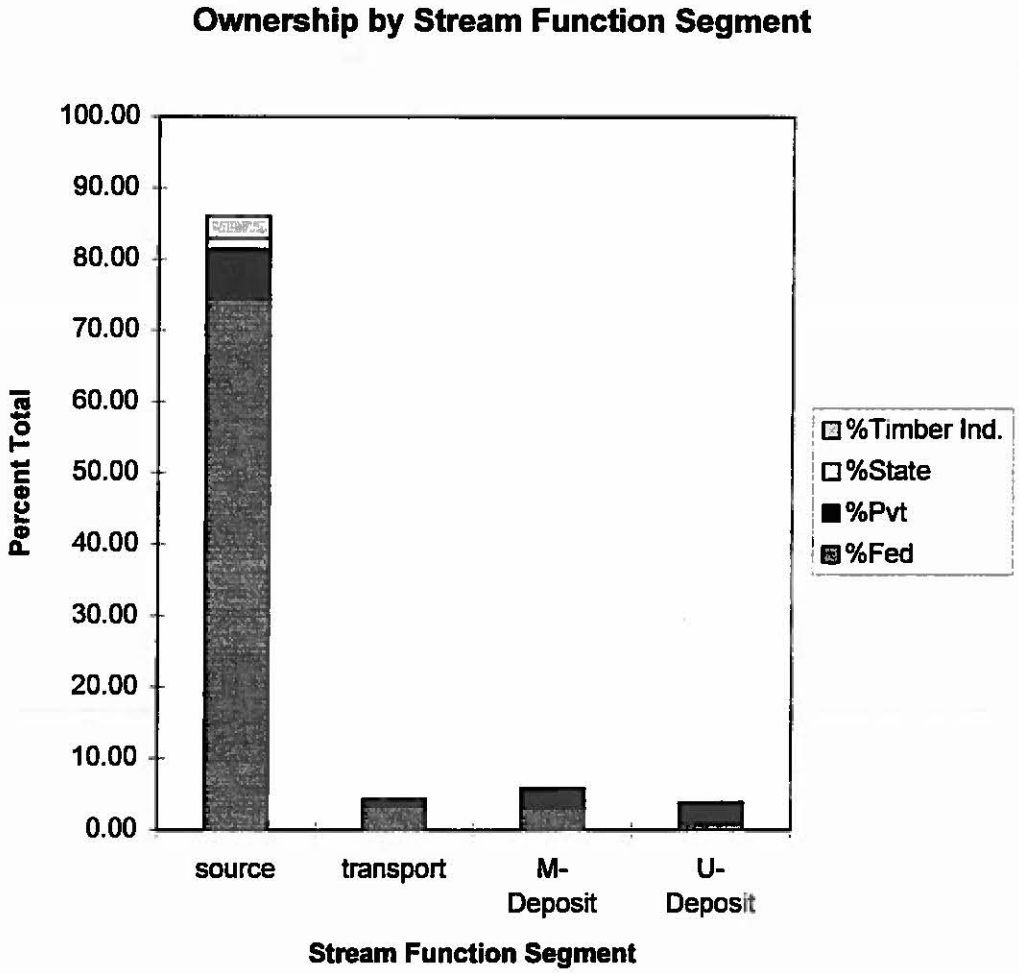



Figure 5.3. Ownership by stream function segment

## Riparian Vegetation

Riparian vegetation species composition and seral stage distribution have changed since Euroamerican settlement. Overall the composition has shifted to a more deciduous-dominated riparian area from an area that was either dominated by conifer or at least had individual recruitment of conifer into deciduous stands. The current seral stage is dominated by early seral stage and smaller diameter trees, whereas historically a greater component of older seral stage larger trees were present. Settlement of the unconfined and moderately confined valley bottoms has also reduced the amount of woody riparian vegetation, both standing and down wood, that line the streams.

The current condition of the vegetation that directly influences the stream environment (riparian area) was considered. Riparian area widths were chosen to be:

- for confined channels: the height of 1 site-potential tree on each side of the creek
- for moderately confined channels: the height of 1 site-potential tree plus 50 feet
- for unconfined channels: the height of 1 site-potential tree plus 100 feet

The total acreage that falls within the riparian vegetation areas is approximately 42,456 acres (57% of the total watershed). This includes:

- 34,303 acres in confined valleys (81% of the watershed)
- 5,149 acres in moderately confined valleys (7%) and
- 3,004 acres in unconfined valleys (4%).

Two functions of riparian vegetation were analyzed: 1) the potential of large woody debris supply to the stream system and 2) the amount of current stream shading.

**Large Woody Debris (LWD)**– Shifts in riparian vegetation affect both stream function and aquatic habitat condition, primarily by affecting the amount of large wood entering a stream. The wood supply and routing story has two parts. The majority of the wood in a stream comes from debris torrent deposits. Logging has had the greatest impact on amount of large debris that enters lower segments of streams from the source areas.

The second part is the recruitment of individual large wood pieces from adjacent riparian areas into streams which provide the building blocks for creating fish habitat. A deciduous-dominated riparian area supplies smaller woody debris to a stream than a conifer-dominated riparian area. The smaller wood supplied from a deciduous stand means that the wood does not last as long in the stream and therefore, does not provide stable, formative features in the stream and the associated fish habitat that forms with wood additions. Combining this information with the current seral stages of riparian vegetation in Indian/Deadwood should mean that as the existing wood that is currently affecting the stream channel decomposes there will be reduced amounts of large wood that will be entering the stream. Without any changes in management woody debris in the creeks and associated floodplains will continue to decline in quantity as will the associated fish habitat.

In order to determine the adequacy of LWD supply potential that currently exists in Indian/Deadwood riparian areas, current seral stages were grouped into the following categories:

- Currently adequate riparian areas - mature conifer-mix, mature conifer, or multi-late seral stage vegetation.

- Near term adequate riparian areas - young conifer, young conifer-mix, and young deciduous-mix seral stages (generally those seral stages with conifer between 9-21 inches DBH).

- Not adequate riparian areas - grass/forb, very early , early, deciduous-mix pole, conifer-mix pole, pure deciduous, and mature deciduous-mix seral stages.

The current condition of LWD supply from these source areas is 35% adequate, 21% near-term adequate and 44% not adequate.

Map 5.5 shows the distribution of the three categories for potential large wood supply across the Indian/Deadwood watershed along moderately confined and unconfined valley areas. Most of the adequate areas in the moderately and unconfined reaches are in small patches distributed throughout the riparian network. There are a few concentrations of adequate, including the lowest reach of the mainstem of Indian Creek and a couple sections of West Fork Deadwood drainage. Some of the least adequate areas are the mainstems of Deadwood and Indian Creeks, Green Creek and Panther Creek. Some areas that have a combination of near-term adequate and adequate are Failor, West Fork Deadwood, Herman and Taylor Creeks. In general, there is some potential for LWD inputs from the source areas dependent on debris torrent frequency and little functional LWD will be recruited from the stream-adjacent stands in moderately to unconfined valleys for several decades.

**Shade**--Stream temperature is a function of several factors including solar intensity, climate, channel morphology, vegetative/topographic shade, channel shape and the amount of stream surface area exposed to solar radiation. Large storms and human activities (harvest and roads) have the potential to influence stream temperature by altering the amount of shade-producing vegetation and channel shape. Along the unconfined valleys of the mainstems of Indian and Deadwood Creeks, deciduous trees are not sufficient in height to adequately shade the mainstem during the summer. The loss of trees and channel changes has resulted in an increase in summer stream temperatures on the mainstems. With the loss of some of the mainstem shade provided by conifers, tributaries with cool water are critical in helping to lower mainstem temperatures.

In order to determine the adequacy of the shade that currently exists in Indian/Deadwood, current seral stages were grouped into categories of adequate and not-adequate for stream shading. The type of tree--conifer or deciduous--, width of valley bottom and actual stream channel width were considered in determining shading adequacy.

In confined valleys:

- inadequate shading in riparian areas - grass/forb, very early, early, conifer-mix pole, and deciduous-mix pole seral stages.

- adequate shading in riparian areas - mature conifer-mix, mature deciduous-mix, mature conifer, multi-late, pure deciduous, young conifer, young conifer-mix, and young deciduous-mix seral stages.

In moderately confined valleys:

- inadequate shading in riparian areas - grass/forb, very early, early, conifer-mix pole, deciduous-mix pole, young conifer, young conifer-mix, and young deciduous-mix seral stages.

- adequate shading in riparian areas - mature conifer-mix, mature deciduous-mix, mature conifer, multi-late, and pure deciduous seral stages.

In unconfined valleys:

- inadequate shading in riparian areas - grass/forb, very early, early, conifer-mix pole, deciduous-mix pole, young conifer, young conifer-mix, young deciduous-mix, and pure deciduous seral stages.

- adequate shading in riparian areas - mature conifer-mix, mature deciduous-mix, mature conifer, and multi-late seral stages.

Map 5.6 displays the shade adequacy along the moderately confined and unconfined valley areas. The majority of the confined valleys (83%) have vegetation that adequately shades the streams. A substantial proportion of the moderately confined valleys (74%) are adequately shaded. Only 20% of the unconfined valleys currently have riparian vegetation that provides adequate shade to the streams. As shown on Figure 5.3, the majority of the lands in unconfined valleys is in private landownership. The adequately covered areas are scattered throughout the moderately and unconfined valleys. This distribution influences the cumulative solar heating. Some of the best areas are Maria, Rogers, Upper Deadwood and Panther Creeks. Some of the worst areas are the middle mainstem of Indian, the middle mainstem of Deadwood, Green, upper reaches of Failor, North Indian and Upper Indian Creeks. The combination of inadequate vegetative cover and reduced subsurface water retention and flow help to explain the water temperatures discussed below.

Appendix C, "Riparian Vegetation", includes an analysis of the types of riparian vegetation found in wet, moist and dry environments and the relationship to stream confinement classes. The analysis indicates that many of the mature and late-successional natural stands in moist and dry environments have a large deciduous component. Managed stands were expected to contain smaller proportions of deciduous species than natural stands in wet environments. This was found to be true, but the current deciduous component was found to be well within the natural range for wet and moist environments in early stages of succession. Management practices appear to have obscured, rather than accentuated, the differences in species composition among the PAGs.

## Water Temperature

Water temperature is a determining factor in the composition and productivity of the aquatic ecosystem in streams. Water temperatures can control or direct the fish and other aquatic organism distribution within a watershed. Warm water species (primarily non-game species such as shiners and dace) can outcompete cold water species (salmonids) when temperatures rise. Subsequently, tributaries that are able to maintain cooler temperatures become more critical to maintain as refugia.

Increased water temperature directly affects fish stress levels. When under stress, fish populations may have reduced fitness, greater susceptibility to disease, decreased growth, and changes in time of migration and reproduction. Optimum temperatures for survival and growth are at or below 58 degrees F. Above 64 degrees F fish begin to be stressed. Survivability and growth decrease as the temperature continues to rise. Sustained temperatures above 70 degrees F will result in mortality for

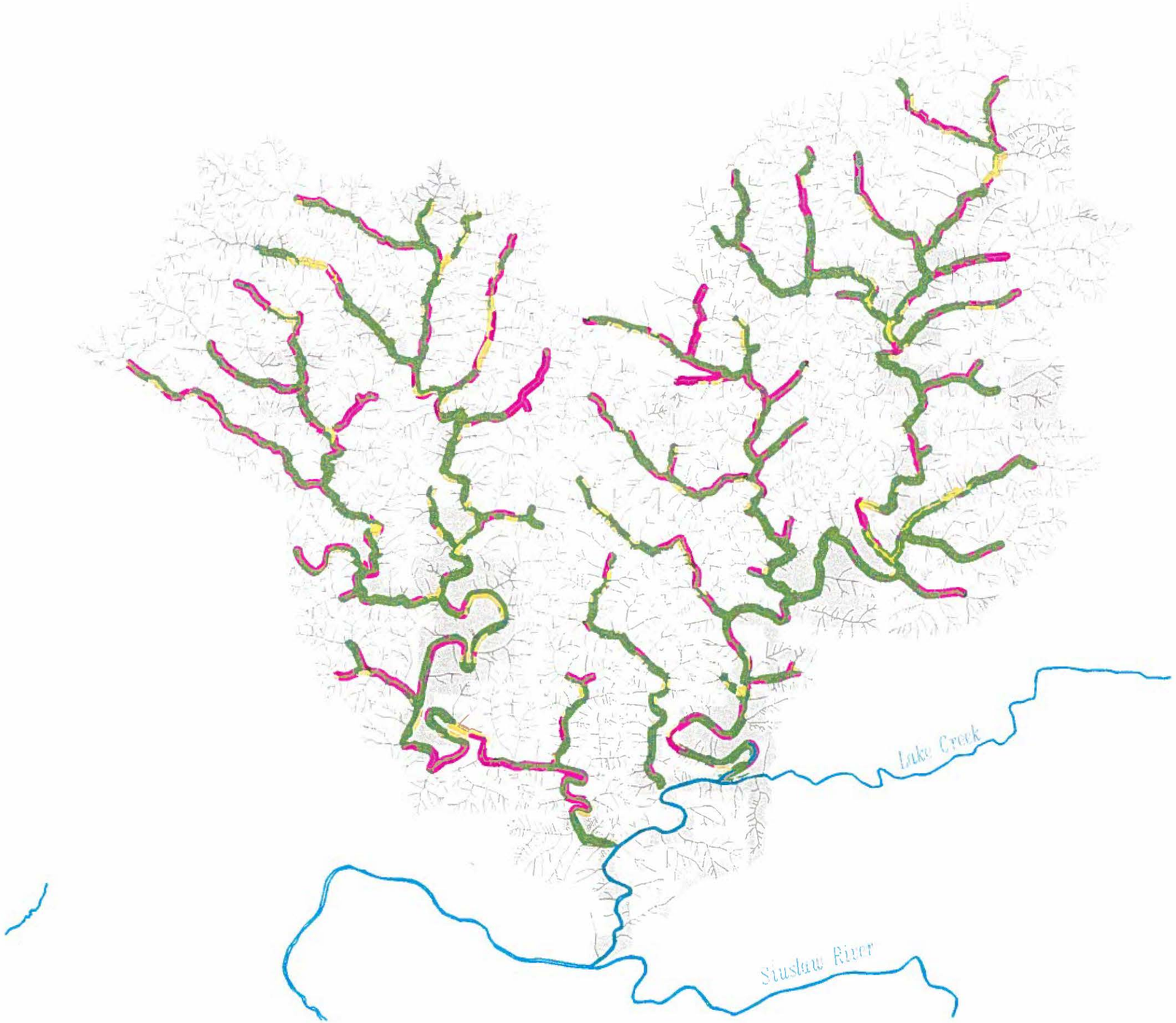
anadromous salmonids. Availability of thermal refuges, such as cooler stratified layers in deep pools, or undergravel seeps can partially compensate for such effects. However, higher water temperatures reduce water oxygen capacity and this, combined with increased metabolic demands from decomposition of organic matter associated with increased temperature, leads to greater stress on fish within the thermal refuges.

Water temperatures have been monitored for the summer months on half-hour intervals in several streams on the Forest for the past few years. One site midway down the West Fork of Indian Creek was monitored in the summers of 1991, 1992 and 1993. In the summer of 1995, ten temperature meters were used to characterize the water temperature regime of the Indian/Deadwood drainages. Table 5.5 presents some summary information. The high temperatures found for these long durations are a stress to the juvenile coho and steelhead and the resident cutthroat trout that are in the streams at this time of year.

Table 5.5 Water Temperatures for Subwatersheds

| ID | Location | Baseflow '95 (cfs) | 7-Day Avg Max | Dates of Max temp | Days >58* F | Days > 64*F |
|---|---|---|---|---|---|---|
| I3 | W. Fk Indian - 1991 | NA | 66 | 8/16/91 - 8/22/91 | 37 | 14 |
| I3 | W. Fk Indian - 1992 | NA | 65 | 7/25/92 - 7/31/92 | 55 | 20 |
| I3 | W. Fk Indian - 1993 | NA | 65 | 7/31/93 - 8/6/93 | 53 | 5 |
| I1 | Upper N.Fk Indian - 1995 | 4.78 | 65 | 7/15/95 - 7/21/95 | 74 | 14 |
| I2 | Lower N.Fk Indian | 5.83 | 64 | 7/15/95 - 7/21/95 | 70 | 5 |
| I3 | W. Fk Indian *** | 1.33 | 60 | 7/14/95 - 7/20/95 | 1 | 0 |
| I4 | Lower Indian | 44.77 | 74 | 7/15/95 - 7/21/95 | 78 | 58 |
| D2 | Upper Deadwood -1995 | 11.36 | 68 | 7/30/95 - 8/5/95 | 66 | 27 |
| D3 | Upper West Fk Deadwood | 3.75 | 66 | 7/30/95 - 8/5 95 | 66 | 11 |
| D4 | Lower West Fk Deadwood | 7.97 | 69 | 7/30/95 - 8/5/95 | 70 | 45 |
| D5 | Failor Ck | 3.42 | 67 | 7/30/95 - 8/5/95 | 66 | 8 |
| D6 | Lower Deadwood | 36.11 | 73 | 8/1/95 - 8/7/95 | 64 | 49 |
| | | | | | | |

*** W. Fk Indian monitoring site was moved downstream (below a tributary) in 1995, that may contribute to the lower 7-Day Avg Max compared to previous years.




# Indian/Deadwood Current Condition LWD Supply

Seral Stages within Moderately Confined and Unconfined Riparian Areas

- Not Adequate
- Near-Term Adequate
- Adequate

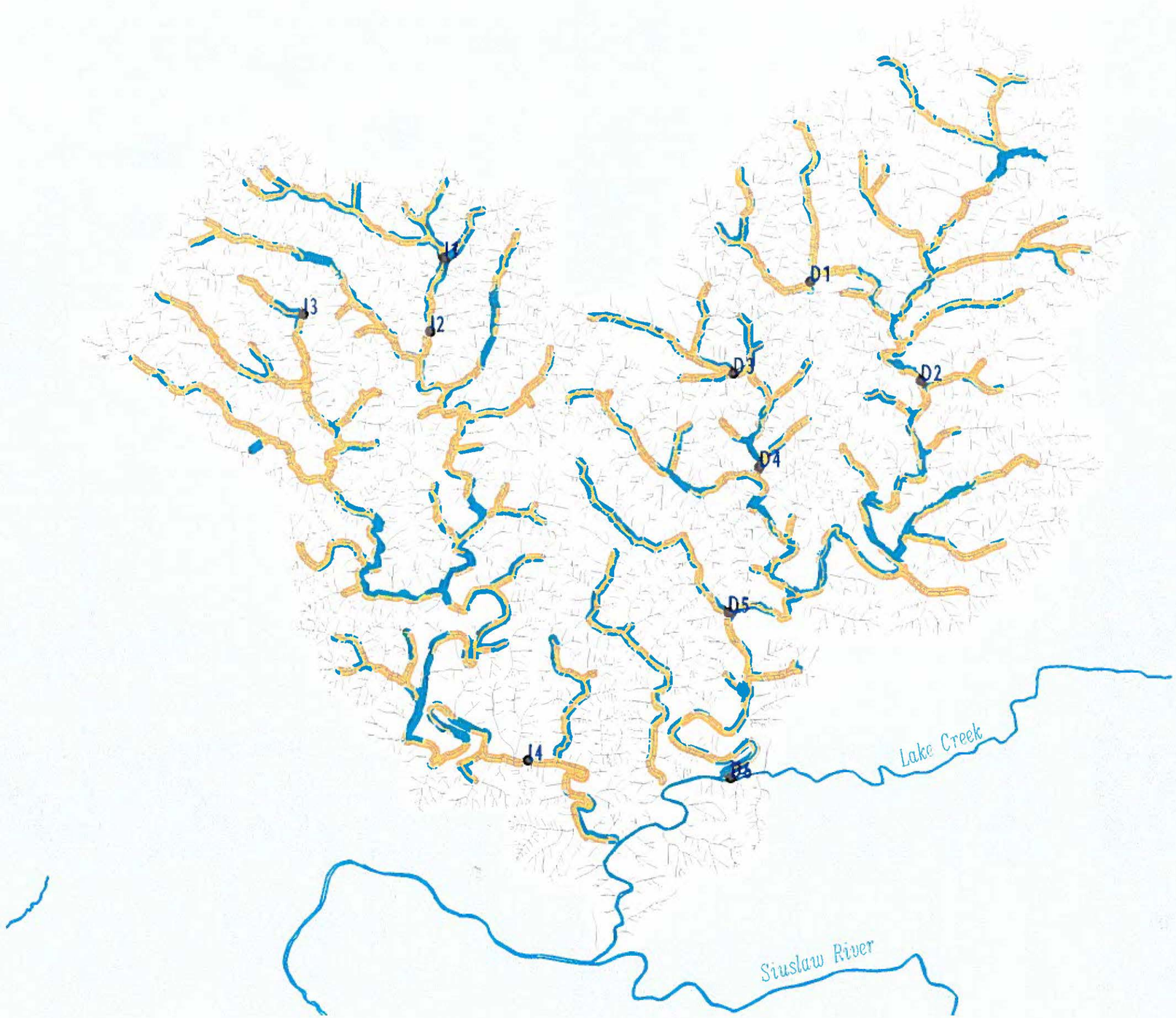
0 1 2 3 4
MILES

RF 1:103605

N

June 17, 1996

Map 5.5




# Indian/Deadwood Current Condition Shade Adequacy

Seral Stages within Moderately Confined and Unconfined Riparian Areas

- Adequate
- Not Adequate
- Temperature Gages

0 1 2 3 4
MILES

RF 1:103605

June 17, 1996

Map 5.6

## Aquatic Habitat

Current conditions of fish habitat within the Indian/Deadwood watershed were determined through the use of existing Level II stream habitat surveys conducted by the Forest Service and other existing survey information from a variety of sources. Habitat was rated for potential for rearing anadromous salmonids (primarily coho). Four habitat components were used to determine the quality of the habitat including percent of stream in pools, percent of deep pools, percent of complex pools and amount of large woody debris per mile. Another component that was used in the rating scheme was the presence of beavers in a stream reach. If there was an extensive beaver population or activity in a stream reach, then a higher rating was given to this reach, because beaver dams have been shown to be very productive for coho rearing. The ratings for each component are shown in Table 5.6.

If a stream reach met all or most of the highest levels for the four components in Table 5.6, that reach was determined to be 'fully functioning'. If most of the components did not meet the lowest levels for those habitat components, that stream reach was determined to be 'not functioning'. Stream reaches that fell in the middle of those determinations were labeled 'partially functioning'. Map 5.7 shows the stream reaches that have completed surveys and the ratings for anadromous rearing habitat given to those stream reaches. Appendix K lists the ratings for each stream reach.

Table 5.6. Fish Habitat Objectives and Rating Criteria

| *FISH HABITAT* | *FUNCTIONING* | *PARTIALLY FUNCTIONING* | *NOT FUNCTIONING* |
|---|---|---|---|
| **Large Woody Debris Pieces Per Mile** (Greater than 24 in. diameter and 50 ft.long) | >80 | 40-79 | <40 |
| **Percent of Stream in Pools** | | | |
| (0-2% Gradient Streams) | >55% | 40-55% | <40% |
| (2-5% Gradient Streams) | >40% | 30-40% | <30% |
| (> 5% Gradient Streams) | >30% | 20-30% | <20% |
| **Percentage of Pools that are Deep Pools*** (Number of deep pools/total number of pools) | >20% | 10-20% | <10% |
| **Percentage of Pools that are Complex Pools**** (Number of complex pools/total number pools) | >20% | 10-20% | <10% |

*Deep pools are >3 feet deep in streams averaging >10 feet wide and 1.5 feet deep in streams averaging <10 feet wide.

**Complex are deep pools with 3 pieces of woody debris associated with the pool.

**Current Condition vs Potential Condition**--Over the entire watershed the stream associated habitat conditions are far below their potential. However this does not mean that some of the creeks are not producing good numbers of fish. Creeks like Rogers, Maria, Failor, and the upper headwaters of Deadwood Creek have reaches that are functioning as good rearing habitat and have great potential for fairly quick gains in aquatic habitat conditions. Stream reaches determined to be 'functioning' totalled 7.1 miles. Stream reaches determined to be 'non-functioning' are the worst areas for salmonid rearing. Many of these areas are in the higher gradient more confined streams where rearing habitat is not expected, but there are also some 'non-functioning' areas in places that have had historic

potential for salmonid rearing. The total miles of 'non-functioning' stream reaches in these surveyed streams is 12.8 miles. Herman Creek and Elk Creek (Indian) have reaches that fall into this category.

The remaining 53.9 miles of surveyed stream reaches are determined to be 'partially functioning'. This category by far has the widest variation of condition ratings. Most of these stream reaches lack large woody debris in the stream channel and lack associated deep complex pools. Many of the reaches meet the criteria for percentage of pools per mile, but unless they are deep pools they have little value for rearing salmonids and providing cover. West Fork of Deadwood and Taylor Creek are examples of streams that are primarily in this category.

### Summary

All of the subwatersheds in Indian/Deadwood have been influenced by logging (ranging from 12% to 64% of the subwatershed) and road building. Landsliding increases several fold for one to two decades after clearcutting and road building. Roads have a significant impact on slope stability and water routing. Road location and design determine their potential to destabilize watersheds. A large portion of the existing road network was sidecast constructed and therefore more prone to failure.

The riparian areas along the mainstems of Indian and Deadwood Creeks are deficient in large conifer trees and other woody vegetation that could contribute woody structure and organic nutrients to the streams and provide shade to reduce temperatures. The riparian areas along most of the tributaries of Indian and Deadwood Creeks are also deficient in large conifer trees, and the upslope areas immediately adjacent to the riparian zones are lacking in large conifer trees needed as future sources of large wood for the streams. The eastern portion of the watershed can support higher concentrations of conifer within the riparian areas, compared to the western portion.

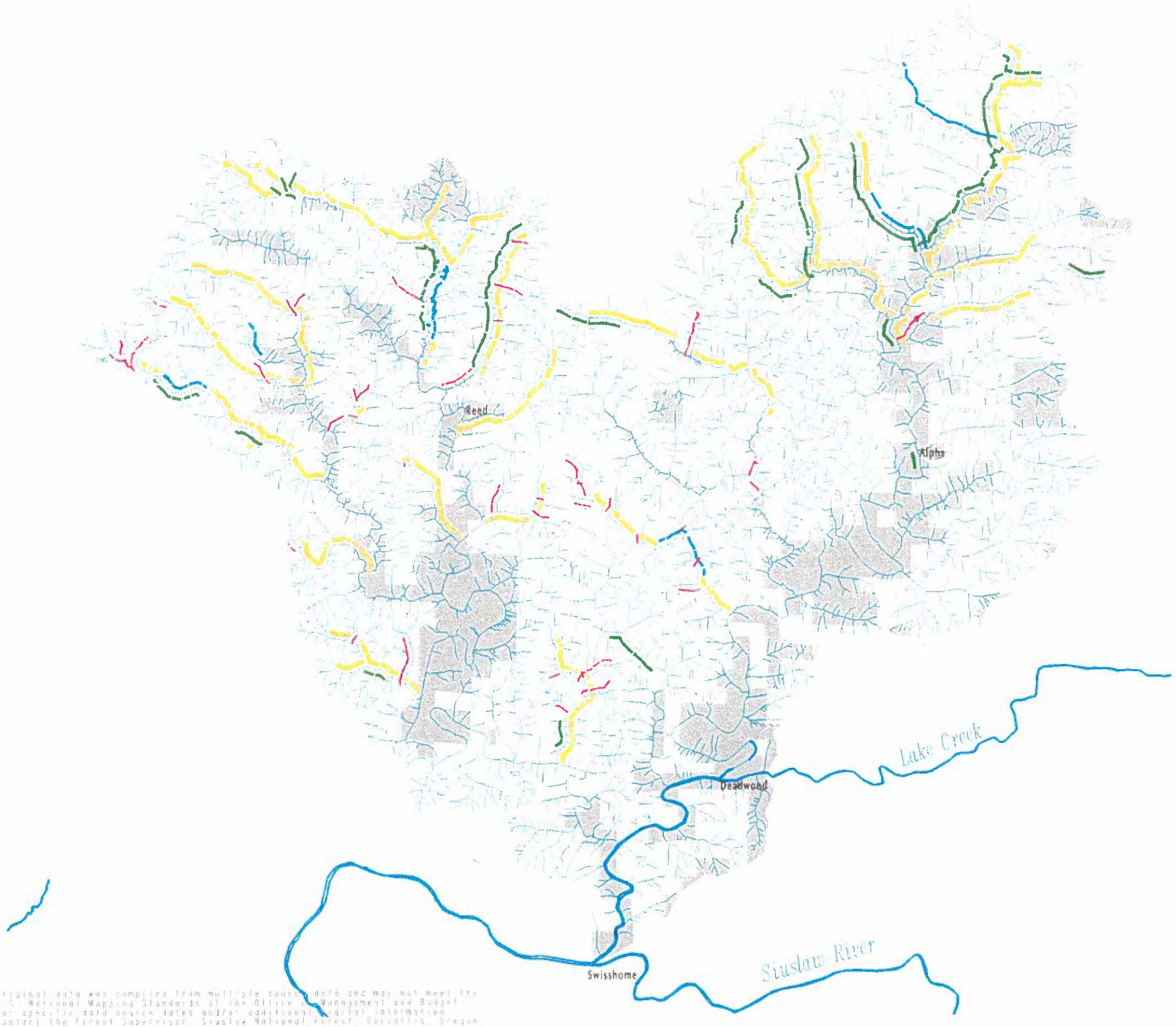
The lands adjacent the mainstems of Indian and Deadwood Creeks are primarily in private ownership. Opportunities to improve the condition of riparian vegetation and stream habitat in the mainstems will depend on the interest and energy of the various landowners.

## HUMAN USES

### Overview of Siuslaw River Basin

The Siuslaw River Basin is comprised primarily of forest land with a small amount of agricultural land. Land ownership is dominated by federal lands (the Siuslaw National Forest and the Eugene District of the BLM), with some state forest land. The western part of the basin is comprised of large blocks of national forest surrounding smaller tracts of private land, while the eastern half has a "checkerboard" pattern of private ownership interspersed with the national forest, BLM and state lands (see Fig. 2.1). A few industrial sites are located within the basin, with many more located outside of the subbasin to the east in Veneta, Eugene/Springfield and Cottage Grove.

A majority of the approximately 18,300 residents of the Siuslaw River Basin live within and near Florence, located near the coast at the mouth of the Siuslaw River. Over one-third (6,185) of the basin's residents live within the City of Florence. The rest of the river basin is lightly populated with most residents living along the valley floors and along major roads (State Routes 36 and 126). There are several small communities in the basin: Mapleton, Swisshome, Deadwood, Greenleaf, Walton, and Lorane. Mapleton is the largest with a population of near 1,000.




# Indian/Deadwood

## Anadromous Fish Rearing Condition

Non Federal Lands

streams

Beaver Activity

Surveyed Streams (74 mi.)

Functioning
7.1 miles

Partially Functioning
53.9 miles

Not Functioning
12.8 miles

0 1 2 3 4
MILES

RF 1:103605

June 17, 1996

Original data was compiled from multiple sources/ data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source notes and/or additional digital information, contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

Map 5.7

## Indian/Deadwood Watershed

The Indian/Deadwood watershed comprises about 74,000 acres within the greater Siuslaw River Basin. Over 80% of the land is under federal management, 2% is managed by the state and the remainder is in private ownership. The state would like to exchange their scattered forested parcels in the Deadwood watershed for other parcels outside the watershed, for example to the east, in order to consolidate their forest lands for more efficient management.

The privately owned lands have four basic uses: industrial forest lands, non-industrial woodlots (many with residences), residential tracts, and farms (see Table 5.7 and Map 5.8). To contrast the two drainages, Deadwood Creek watershed has higher percentages of federally and state managed lands, and more acreage in non-industrial woodlots; Indian Creek has a higher percentage of industrial forest lands. The timber industry landowners in both drainages include Davidson Industries, Diamond B, International Paper, John Hancock Mutual Insurance, Northwest Hardwoods, Seneca Timber, Swanson-Superior, Willamette Industries and Weyerhauser.

Table 5.7. Acres of Private Land by Land Use

| Use Category | Indian Creek | Deadwood Creek |
|---|---|---|
| Residential tract | 90 | 620 |
| Farm [1/] | - | 70 |
| Private woodlot | 2300 | 4100 |
| Industrial forest | 2600 | 3000 |

[1/] Classified as exclusive or non-exclusive farm use by the county tax assessor's office.

There are approximately 35 residences on the tax rolls in the Indian Creek drainage, 95 in Deadwood Creek, and another 60 in the community of Swisshome. About one-fourth of residential property owners have mailing addresses outside the area, so these may represent either vacation homes or rentals. Most homes are on residential tracts, but in the Deadwood drainage over one-third are on farms or private woodlots. Commercial farming is found only in Deadwood on a small number of acres.

### Roads

The Indian/Deadwood watershed currently contains about 285 miles of road, including 27.4 miles of county maintained roads. There are some additional timber operator spurs off the roads, which are closed within a few years of a harvest operation. Since the early 1990's, the Forest's road maintenance budget has declined significantly, primarily due to reduced timber harvest activity. The strategy for addressing this situation is to reduce the Forest road system to a smaller network that can meet access and travel needs of the public and be affordable to maintain. The recent emphasis on watershed restoration also indicates a need for road reductions, and a need to stabilize the roads that will no longer be on the maintained network.

The Forest's access and travel management (ATM) planning effort identified about 78.5 miles of road to be maintained for public access in the Indian/Deadwood watershed. Map 5.9 displays the 'ATM' roads and other Forest system roads in the watershed. Information from this watershed analysis should be used to help identify which roads have high potential for failure due to inherent geologic instability, and thus will be costly to maintain over the long-term.

## Grazing

From the 1930's through the 1960's, the Indian Creek drainage supported an estimated 500 cattle and 25 horses. The Deadwood valley supported an estimated 600-650 cattle and 20 horses. Dairying was the primary grazing use until about 1950, when the market became too competitive for small farmers.

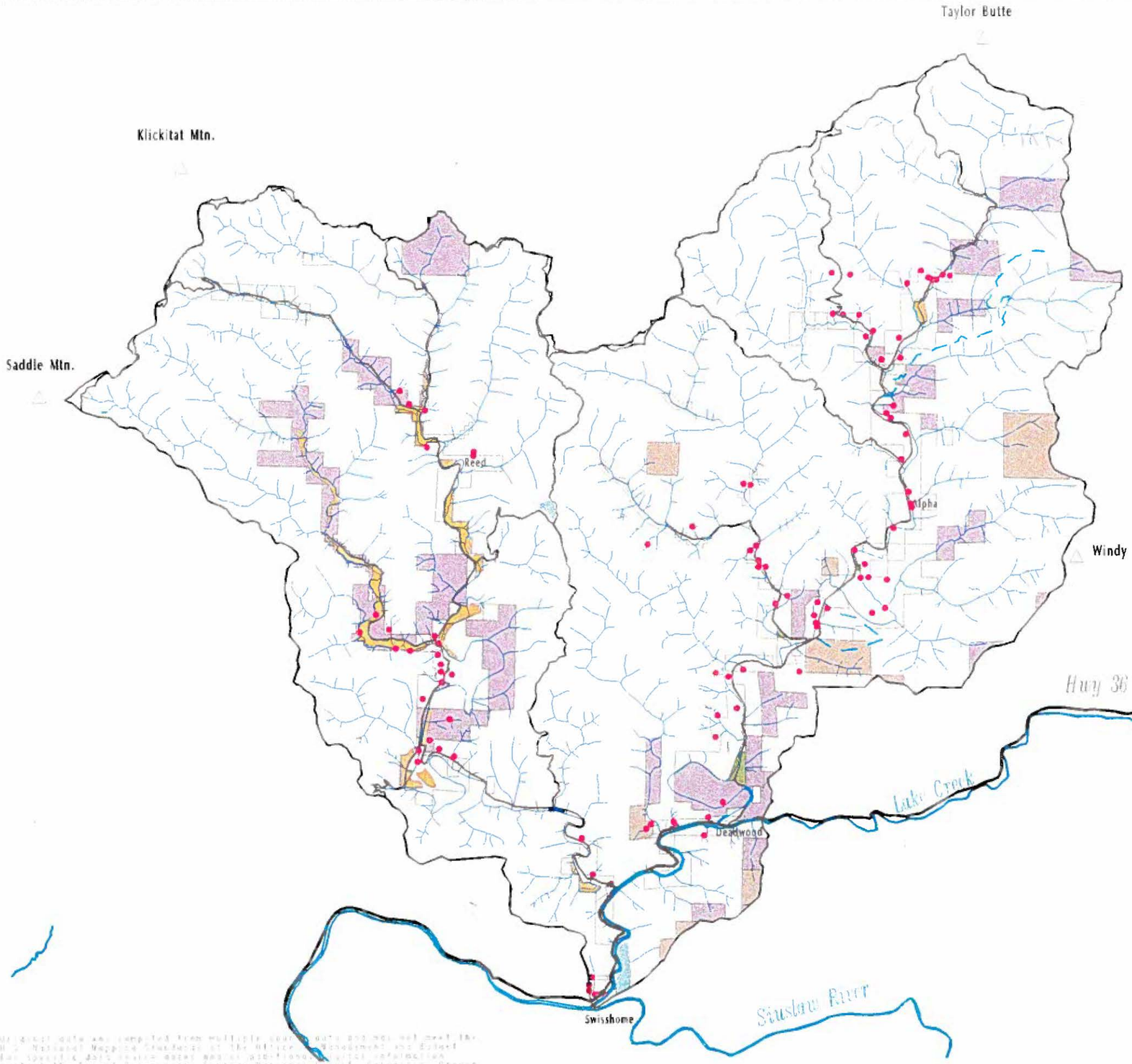
Today, the watershed supports a modest amount of beef cattle grazing, primarily along the valley bottom of Indian Creek and the West Fork of Indian Creek. The Indian Creek drainage is supporting about 255 cattle and 34 sheep, in addition to a scattering of horses and hogs. Deadwood Creek drainage has about 35 cattle, 30 horse and a few llamas. The number of cattle has remained fairly constant since the 1970's. Most of the once-grazed pastures are now growing rank grass, briars and brush.

The Siuslaw NF has only one grazing permit located adjacent the North Fork of Indian Creek, and grazing is permitted for up to 17 cow/calf pairs. Two other grazing permits are also issued--one for 15-20 cattle in conjunction with adjacent private pasture near the mouth of Elk Creek on Indian Creek; and the other for one horse near the mouth of Gibson Creek.

## Recreation

A few undeveloped recreational sites are located in Indian Creek drainage, including primitive campsites along Indian Creek about 2 and 3 miles upstream from Lake Creek. An old growth trail above Gibson Creek is currently used by local residents and occasional Elderhostel groups.

A residential group in Deadwood is interested in developing an old growth trail up Buck Creek ridge and into the Elk Creek drainage east of Deadwood Creek. In addition, the BLM has been developing plans for a loop trail to Windy Peak through the Raleigh and Bear Creek drainages.




# Indian/Deadwood Current Land Use

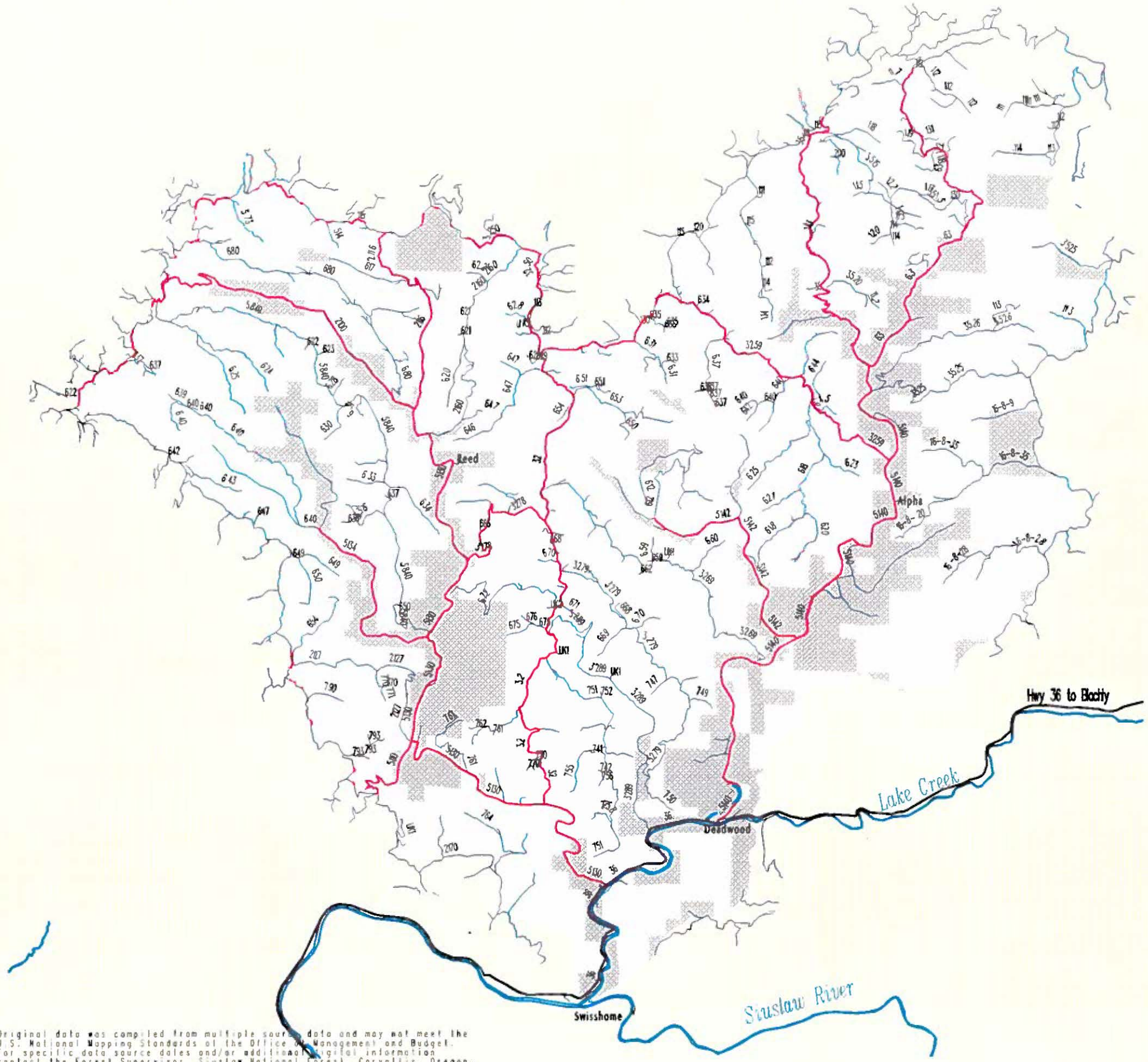
- Class 1,2,3 Streams
- Contours
- ATM Roads
- Proposed Trails
- Recreational Lands
- Grazing
- Farm Lands
- Private Woodlots
- Residential Tracts
- Industrial Forest
- State Lands
- Water Users (1990)
- Campsites

0 1 2 3 4
MILES

RF 1:103605

June 17, 1996

Map 5.8




# Indian/Deadwood Road System

System Roads

ATM Roads

Non Federal Lands

Miles of ATM Roads – approx. 78.5

Miles of System Roads – approx. 285

0 1 2 3 4

MILES

RF 1:103605

June 13, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

Map 5.9

**Hunting and Fishing**

Big game (deer, elk, bear and cougar) are hunted during various regulated hunts. All big game harvest in the Indian/Deadwood watershed is part of the Alsea Unit #18 (1996 Oregon Big Game Regualtions, Oregon Department of Fish and Wildlife, 60pp.). Each species has its specific season and harvest level. The following examples are for the 1995-96 season:

| Species | Hunting Season |
|---|---|
| Deer: | Fall rifle and bow general hunt<br>Fall antlerless controlled hunt with 4,000 tags |
| Elk: | Fall rifle and bow general hunt<br>Fall antlerless contolled hunt west of Deadwood with 20 tags<br>Fall anterless controlled hunt east of Deadwood with 25 tags<br>Fall controlled bow hunt with 1,000 tags |
| Black bear: | Fall general hunt<br>Spring controlled hunt with 100 tags. |
| Cougar: | Fall general hunt |

Activities associated with hunting (camping, increased traffic, shooting, etc.) can be disruptive to the normal use patterns of Indian and Deadwood Creek residents and other year round recreationists accustomed to low activity levels.

Early residents of Indian and Deadwood Creeks recall excellent fishing spots that are no longer available. One resident recalls catching 96 trout in one afternoon along a 1/4 mile stretch of Indian Creek.

Today, recreational fishing for resident and sea-run cutthroat trout and steelhead occurs in the watershed, though the catching may be sporadic. Numerous reports indicate that poaching of chinook, coho and steelhead may be a problem in the upper portions of the watershed, especially in years when escapements are at very low numbers.

**Special Forest Products**

Four areas are currently available on Siuslaw Forest lands for greenery leases, though these areas change periodically. There are three standing-green alder wood cutting areas. Fee permits are issued for various greenery materials for floral use and transplanting. The greenery species include salal, huckleberry, ferns, rhododendron, elderberry and vine maple. Permits are sold primarily for mushrooms, moss, cascara bark, cones of various tree species and firewood. No permits are issued today for cedar due to limited quantities, but this product was in high demand for shakes, boards and rails in earlier times.

## Demographic Characteristics

Table 5.8 displays demographic data, tallied from census reports (US Department of Commerce, 1993) for both the Siuslaw River Basin and for the area around the Indian/Deadwood watershed.

Table 5.8. Demographic Characteristics of the Siuslaw River Basin and Indian/Deadwood watershed

| | Siuslaw River Basin[1/] | Indian/Deadwood Watershed |
|---|---|---|
| Population | 12,141 | 500 (approx.) |
| Median Age | 40 | 34.6 |
| Age 15 and under | 21% | 27% |
| Age 65 and over | 22% | 13% |
| Education: | | |
| H.S. Graduate | 81% | 77% |
| B.A. or higher | 14% | 11% |
| Race: | | |
| White | 97% | 96% |
| All other races | 3% | 4% |
| Employment: | | |
| Farm, Frsty, Fisheries | 9% | 15% |
| Exec, Prof., Technical | 21% | 19% |
| Manufac., Transport. | 25% | 38% |
| Sales, Administration | 29% | 14% |
| Services | 16% | 14% |
| Unemployment | 5.8% | 5.6% |
| Income: | | |
| Family Median | $24,331 | $24,341 |
| Per capita | $10,811 | $9,994 |
| Families below poverty level | 12.7% | 9.3% |
| Housing: | | |
| Owner-occupied | 69% | 71% |
| Median value | $62,550 | $50,300 |

[1/] The City of Florence is not included in these tallies, because as a coastal town with fishing, tourism and retirement dominating the economy, it is significantly different from the rest of the basin.

Based on analysis of 1990 census data (US Department of Commerce 1993) and 1994 tax classification information (Lane County, 1995), the population of Indian/Deadwood, including the community of Swisshome, is estimated at 500 persons (see Table 5.8). Demographically, the Indian/Deadwood area is fairly similar to the entire Siuslaw River Basin, but there are some notable differences:

- The population of Indian/Deadwood is younger in all measures. This suggests a population with a higher percentage of children and a higher percentage in the work force.
- Residents of Indian/Deadwood are employed in relatively more jobs (15% versus 9%) in natural resource related areas (farming, forestry and fisheries), and in manufacturing. Fewer residents (47% versus 66%) work in professional, sales and service type jobs. Relative proximity to the natural resources and relative distance to the EugeneSpringfield area affects employment opportunities.
- Median house value is significantly lower in Indian/Deadwood. This may be due to the more rural nature of the area (i.e., longer commute time to the Eugene/Springfield area).

Notwithstanding the employment differences outlined above, the unemployment rates and family median incomes are quite similar between the two areas. In fact, Indian/Deadwood has relatively fewer families living below the poverty level than the entire basin.

Table 5.9 displays information about location of work and commutes for the residents of Indian/Deadwood. Most of the local workforce (64%) work in rural Lane County (which includes the Indian/Deadwood area along with other parts of Lane County outside of cities). The remaining 36% of workers are employed outside the rural area, in Eugene, Florence, and other cities, or in rural Linn, Benton or Douglas counties.

Those who work at home or walk to work (13% of the local workforce) derive their income from resources in the watershed. In addition, some of those who work in rural Lane County also work in the watershed. However, the mean commuting time of 31.2 minutes suggests a drive of 15-20 miles, which would take workers out of the watershed area. Many of those workers may likely be employed in nearby Mapleton, which is about ten miles down Highway 36 from the southern end of the watershed.

Table 5.9. Location of Employment and Commuting Data

| | |
|---|---|
| Location of Employment: | |
| Rural Lane County | 64% |
| Eugene, Springfield, Cottage Grove Junction City, Corvallis | 18% |
| Florence | 14% |
| Rural Linn, Benton & Douglas Counties | 4% |
| Mean commuting time | 31.2 minutes |
| Work at home | 9% |
| Walk to work | 4% |

Several Deadwood residents derive some income from a variety of "cottage industries" using natural resources from the area. These include mushroom harvesting, twig furniture making, and bark and herb collecting for special crafts. A few artists live and work in the Deadwood community, perhaps to gain creative inspiration from the forest scenery and solitude. There are a few small income-producing farm properties in the Deadwood drainage, but none remain along Indian Creek. A few residents in Indian Creek derive income from their own logging operations, but not nearly as many as prior to the 1950's.

The above data suggest a picture of a rural community which is somewhat, but not entirely, dependent upon local natural resources for economic opportunities. Most families own their own homes, and the median income is enough to support a family. Many workers are in natural resource-based or manufacturing jobs, and most appear to leave the immediate area to work.

Residents of Deadwood have developed a sense of community and connection to the land over the past 15-20 years. Many place a high value on retention of the scenic, rural character of the watershed and assurance that the natural ecosystems will be restored to a healthy and long-term sustainable condition. Residents of Indian Creek desire similar conditions, but perhaps feel the resources can withstand more intensive management for the economic benefits to be gained.

## Trends

Lane County has been experiencing rapid growth over the past five years (Oregon Employment Dept. 1996). In the Eugene/Springfield area, several high-tech manufacturers have recently located new manufacturing facilities or announced plans for expansion. These developments, combined with low interest rates in 1992 and 1993, spurred growth in the construction and real estate industries. Lumber and wood products employment in the county decreased, but because of the increase in construction, the decrease was at a lower rate than was initially expected. State economists project that the growth in the Lane County area will continue for some time, but that it seems unlikely the current rapid growth rate can be sustained into the next century.

As noted earlier, the Indian/Deadwood watershed is not directly comparable to the rest of the Siuslaw River Basin or the rest of Lane County. Because of its distance from the Eugene/Springfield metropolitan area, it is unlikely that the watershed will experience the same rapid growth rate. However, the strong construction and real estate industry may result in steady employment for those in the lumber and wood products industries. Also, the current boom in the retirement industry in Florence bodes well for those who commute to Florence for jobs in service or construction industries. Within the Indian/Deadwood area itself, it is likely that local cottage industries using special forest products will continue, as other uses of the forest become more restricted.

As urban areas such as Eugene/Springfield, Portland, and perhaps even Florence become ever more crowded, there will likely be increasing demand for rural homesites as people seek country lifestyles to escape urban crowding, traffic and crime. The result will be increasing values of residential properties and increasing property taxes, possibly "taxing" some current low-income residents out of the watershed. The area has already seen some gentrification as higher priced homes have been constructed, and as fewer residents are farming on their properties. These trends can be expected to continue through the next decade, resulting in further changes in the resident population.

# Chapter 6 - Landscape Objectives and Management Recommendations

One goal of ecosystem management is to understand natural ecological processes operating in an area, such as a watershed, so that resources can be managed to maintain the health, diversity and productivity of the ecosystem. A second goal is to meet human needs.

This chapter presents the integration of ecological processes and human uses in the Indian/Deadwood watershed and the subsequent development of management recommendations for federal lands. Some of the recommendations are also applicable to non-federal lands, where aquatic habitat restoration may be desired.

## LANDSCAPE OBJECTIVES

The watershed analysis team identified the dominant natural processes and cultural influences in the watershed. These were used to guide development of landscape level objectives and patterns consistent with the Northwest Forest Plan. A synthesis of the natural processes and current conditions in the watershed led to identification of unique areas and areas of similar characteristics. These were delineated as Landscape Blocks with boundaries often following subwatershed boundaries (see Map 6.1). The team then identified some management strategies that could be used to reach the long-term objectives of the Landscape Blocks, given their current conditions.

Because the Forest has limited funds and time to apply to management of the Indian/Deadwood watershed, the Landscape Blocks were prioritized into three categories (low, medium, high) in terms of their importance for meeting the terrestrial and aquatic resource goals (priorities are shown on Map 6.1). In addition, a list of recommended management activities or projects was identified for each Landscape Block. These activities have been broken into two time periods (years 1-3 and years 4-10) to further help prioritize the work. The recommended management activities are listed in Appendix M.

This section summarizes the aquatic management assumptions and principles of conservation biology that were used to select landscape objectives and management strategies for the watershed. It then outlines the factors that drove the design strategies for each Landscape Block..

The main aquatic landscape objectives focus on protecting the highest concentrations of the best remaining aquatic habitat, especially anadromous salmonid habitat, and those areas that could provide good habitat quickly after improvements are conducted. These areas will tend to act as refugia where the habitat would be somewhat more resilient to disturbance than areas outside the refugia, and still be able to support fairly healthy runs of anadromous salmonids through times of disturbance. The areas outside the refugia have more long-term objectives of improving the stream function through management.

Conservation biology integrates the elements of distribution, number, size, configuration and connectivity to understand the function of habitat and species responses to habitat (USDA/USDI 1990). Five key concepts used are:

- Species that are well-distributed across their range are more secure over time than species confined to smaller portions of their range.

- Large blocks of habitat, containing potentially interacting multiple pairs of any species, are superior to small blocks of habitat with fewer individuals.

- Blocks of habitat that are closer together are better than blocks far apart.

- Habitat that occurs in less fragmented blocks (in contiguous blocks) is better than habitat that is more fragmented.

- Habitat between habitat blocks functions better for dispersal/genetic exchange, the more nearly it resembles suitable habitat for the species in question.

None of the above five concepts have been specifically tested on the Siuslaw National Forest, however, they represent concepts developed from numerous studies throughout the world and are believed to apply to species and habitats found in the Coast Range of Oregon.

Identification of the Landscape Blocks was based on the following:

**Landscape Blocks A, B, and C** - currently contain the highest proportions of mature conifer habitat and least fragmented mature conifer (Appendix L, Tables 2 and 3). These areas also contain some of the highest proportions of federal land (Appendix L, Table 1). All federal lands in Block A and C and most of the land in Block B is allocated to Late-Successional Reserve (LSR) under the NFP (Map 2.2). In the short-term, these areas offer the best opportunity to consolidate and enlarge the remaining best habitat in the watershed. In addition, Blocks A and B are part of a larger wildlife security block identified in the Federal Lands Assessment as a place to restore some low open-road density, isolated habitat for wildlife that are adversely affected by human access into secure areas.

Blocks A and C contain the highest concentration of functioning rearing habitat for anadromous salmonids in the watershed. Securing these blocks through road stabilization as quickly as possible will provide the best protection in the short term. These two blocks also have the greatest potential for responding quickly to habitat improvement activities. Blocks A and C are to be regarded as refugia where good production of salmonids from a functioning system can occur and remain relatively constant and more resilient to climatic events. Other creeks are still in the early stages of recovery.

The upper portion of Upper Indian Creek, in Landscape Block B, has the highest production potential in Upper Indian Creek. The ability to meet Block B objectives will be dependent on private landowners that own the majority of land along Upper Indian Creek.

Section 318 Timber Sale Units: Landscape Blocks A and B contain several Sect. 318 units (Mister Rogers units 1-4, Maria Skyline units 1-6 and Indian Hook units 1-5). These units are all within the high priority area for maintaining and enlarging the best existing mature conifer habitat in the watershed. Also, about half of these units are within the Key Watershed.

If these units are harvested, about 500 acres of mature vegetation will be lost, including 236 acres of late-successional seral stage vegetation (Appendix L, Table 2). There appear to be

good replacement volume opportunities in other parts of the watershed, e.g., in the Matrix portions of Landscape Block E and in the upper portion of Landscape Block H4.

**Landscape Block D** - currently contains the largest patch of interior forest and some of the highest proportions of mature conifer. All the federal land is allocated to LSR. It is important as an adjacent area to Block C to the north to improve (enlarge) the size of mature conifer patches. The connectivity to Block C, however, is interrupted by private lands, many of which are managed as industrial forests. Good connectivity between the two blocks is needed on the northeast edge across the federal lands.

Block D provides a good opportunity to expand the aquatic refugia from Block C. The objectives for Elk and Buck Creeks are to improve productive reaches within the stream and work with private owners who may own the most productive areas of the drainages.

**Landscape Blocks E and G** - include lands primarily around the mainstems of Indian and Deadwood Creeks and Lower Lake Creek. The mainstems are dominated by private rural residences, small farms and private woodlots. The land functions as low-gradient mainstem aquatic environments and, therefore, has the best potential for high-quality fish spawning and rearing habitat if these areas could be returned to historial condition.

The main objectives in the mainstems are to work with landowners to develop challenge cost share agreements to improve habitat conditions and to concentrate that work if possible in those areas where the most gains can be made.

A large southern portion of federal lands in Block E is allocated to Matrix. This includes land west of privately owned bottomlands along Indian Creek. The area may offer an opportunity to seek wood commodity production, because it is not in a Key Watershed and does not appear to be an important area for connectivity between LSR lands. Management for wood production will allow this area to provide pockets of early seral vegetation.

One bald eagle management area (MA) is located along Indian Creek (in Block E), surrounded mostly by federal lands allocated to LSR. The adjacent LSR lands could be managed to enhance future nesting opportunities for bald eagles.

Most of the federal land in Block G is allocated to LSR, except the southern portion encompassing Lower Lake Creek. One bald eagle MA is near Lake Creek and is surrounded by Matrix. The lands within the bald eagle MA are administratively withdrawn from timber management.

**Landscape Block F** - contains a high proportion of natural stands, though mostly of younger seral stage vegetation. This is probably due to recent fires in the area. The Block is dissected by private land along the main tributary stream, Bear Creek.. All the federal land is allocated to LSR and is relatively important as a connectivity corridor between the fragmented LSR lands to the east of the watershed and the more consolidated LSR land within and north of the watershed.

BLM administers a large portion of the Bear Creek subwatershed, but most of the lands along the mainstem of Bear Creek are in private lownership. BLM could develop cooperative programs with interested landowners to improve fish habitat in the Bear Creek drainage.

**Landscape Block H** - is in the middle of the watershed, containing the ridges and slopes that separate Indian and Deadwood drainages. The landscape is dominated by rugged steep slopes with few valleys suitable for human settlement, so most of the land is in federal ownership. The forests have been intensively managed and few areas of mature conifer habitat can be found today (Appendix L, Table 2). Some of the most fragmented natural stands are found in this block, limiting travel opportunities (connectivity to other natural stands) for terrestrial species (See Appendix L, Table 4). Because this area has been so intensively managed, it provides an opportunity for designing large-scale (landscape scale) management treatments to promote late-successional condition, while producing a steady supply of wood commodities.

Block H was divided into 6 separate blocks to distinguish different aquatic strategies. Each is identified in Appendix M and on the Landscape Block maps.

Block H2 (Failor) and H5 (West Fork Deadwood) were rated as high priority areas for aquatic habitat restoration. H2 is a rare subwatershed without a road up the riparian area and offers good opportunities for riparian restoration. In addition, the entire subwatershed could be monitored for effectiveness of watershed restoration techniques. H5 is a large subwatershed that would provide an opportunity to expand the refugia from Block C into this potentially very productive subwatershed. H1 (Velvet and Green Creeks) and H4 (Gibson, Taylor, Herman, and part of N. Indian) are rated as moderate priority for aquatic restoration. Initial objectives for Blocks H1 and H4 are to improve large wood supplies through stand manipulation primarily, although site specific improvements to maintain productive areas may be done. Blocks H3 (Misery) and H6 (Panther) are rated as low priority areas due to the large amount of riparian areas that are in private ownership and the lack of identified partnerships in these subwatersheds. Improvements, if made, will be conducted in the upper headwaters of each subwatershed. Development of partnerships is the main objective here and would make these watersheds a higher priority for treatments.

Table 6.3 summarizes the management objectives and terrestrial, aquatic and social management strategies selected for Landscape Block.

## MANAGEMENT OPPORTUNITIES

The Landscape Block management strategies were used to select appropriate management treatments and project opportunities. These are listed in Appendix M, "Priority Management Recommendations by Landscape Block". A general discussion of the management recommendations is provided below.

### Management for Streams and Riparian Areas

The Indian/Deadwood watershed is largely riparian. The recovery strategy includes natural recovery augmented with anadromous fish habitat restoration. Restoration activities are focused to: 1) protect the best habitat by reducing the risk of further degrading existing conditions, 2) remove barriers to natural recovery and 3) work on areas with the highest likelihood of accelerating development of desired conditions.

Analysis of each of the subwatersheds in Indian/Deadwood provides the basis for selection of aquatic objectives and management recommendations outlined in Table 6.3 and Appendix N. Ten criteria

were considered to characterize natural and managed conditions, and potential to influence those conditions:

Subwatershed condition criteria are a combination of inherent characteristics and management legacies:

- Current aquatic habitat condition
- Presence or absence of CWD in stream affected by management practices (buffered clearcuts with and without stream cleanout)
- Riparian condition
- Potential aquatic habitat in moderately confined and unconfined low gradient stream reaches on federal lands
- Percent natural stands in the subwatershed
- Number, condition and location of roads under county and Forest Service management

Ability to influence conditions criteria include:

- Percent federal lands in the subwatershed
- NFP Key Watershed guidelines
- Potential for private landowner cooperation
- Potential for influencing riparian vegetation by thinning/planting

Descriptions of the criteria and ratings for each subwatershed are provided in Appendix N. Five categories of projects were identified and prioritized for each subwatershed which aim to restore watershed processes, riparian vegetation and in-stream conditions. Map 6.2 shows the priorities by subwatershed. Results will be best when all types of watershed projects are implemented.

**1. Road Treatments:** The existing road network poses the greatest threat to the aquatic ecosystem. Road treatments aim to reduce the risk of resource damage through projects that include waterbarring, subsoiling, culvert removal/replacement, and road obliteration. Road treatments vary dependent on resource conditions (proximity to high quality fish habitat, age and construction method, culvert condition, etc.) and management objectives. At a minimum, road treatments should modify the road prism to be self draining with little to no reliance on structural drainage features that require frequent or expensive maintenance. By eliminating the need for road maintenance on non-ATM roads, limited road maintenance funds can be more effectively utilized on preventative expenditures on the ATM road system.

**2. Riparian Vegetation:** Reestablishing vegetation, particularly conifers, in degraded riparian areas is the most effective way to restore stream function and to create high quality fish habitat over the long-term. Projects include establishment of woody riparian vegetation, release of existing conifers in riparian areas, thinning existing stands in or near riparian areas to enhance tree size. Healthy riparian areas are self-sustaining. They provide a continuing source of large woody debris, maintain cool stream temperatures, and promote good quality water to support fish and aquatic life. The benefits of shade and streambank stabilization will occur relatively soon while the benefits of large woody debris in streams resulting from riparian vegetation management will be realized in 50 to 100 years.

**3. In-stream Structures:** In-steam structural improvements, such as placing logs and rocks and excavating side channels, are an effective way to improve fish habitat in many situations. These treatments are particularly effective where an immediate increase in fish habitat is needed or where

the stream system needs a "jump start" to help promote natural recovery processes. Habitat complexity is lacking in many areas throughout the Indian/Deadwood stream network.

**4. Upland Thinning:** The location within the watershed and proximity to streams was used to identify plantations most likely to benefit the aquatic resource from vegetation manipulation (thinning). The objective of thinning in these plantations would be to increase tree growth within the stream influence zone (one-site tree distance in steep, confined streams; somewhat wider as the valley becomes less confined). This long-term strategy would increase tree growth both along streams with fish habitat (individual recruitment) and in source areas for inputs of large wood into intermittent channels which would eventually supply mainstems below.

**5. Develop Partnerships:** State and private landowners will have a large part in determining the future condition of fish habitat in Indian and Deadwood Creeks. Working cooperatively with other agencies (ODFW, County Road Management, ODF), landowners (private and industrial) and interested groups is critical for sharing information, research techniques and to develop adaptive management practices on all lands. Creating working partnerships with other agencies and interested groups has benefits beyond its effect on the streams.

## Management for Late-Successional Forests

According to the Northwest Forest Plan, the intent of management in LSRs is to "maintain natural ecosystem processes, such as gap dynamics, natural regeneration, pathogenic fungal activity, insect herbivory, and low-intensity fire" (USDA/USDI 1994, p. B-1). The use of silvicultural practices to accelerate the development of overstocked young plantations into stands with late successional characteristics and to reduce the risk from severe impacts resulting from large-scale disturbances is encouraged.

Silvicultural treatments, including thinning of forest stands, underplanting with deciduous and late-successional species such as western hemlock and western redcedar, and leaving as much down large wood as feasible, is recommended for most, but not all, of the plantations. Some (perhaps 20-25%) of the plantations should be left unmanaged across a variety of PAGs to serve as comparison sites for the treated stands. None of the existing natural stands are recommended for treatment, though an occassional exception may be justified where a densely-stocked natural stand of young or immature trees would benefit from thinning, i.e., by gaining increased understory diversity. In general, however, the natural stands are assumed to be currently providing the best diversity of habitats for terrestrial species.

This watershed analysis recommends varying the silvicultural treatments to reflect the Landscape Block objectives and PAGs. In general, where the objective is to accelerate growth of plantations into late-successional conditions, heavier thinnings and underplanting extensively with western hemlock and western redcedar is recommended. In the moister environments, red alder should be allowed to occur as a natural stand component. Where the objective is not to accelerate development of late-succession, less emphasis should be given to underplanting with hemlock and western redcedar. Table 6.1 provides a complete summary of the guidelines for silvicultural treatments in Indian/Deadwood.

**Table 6.1. Guidelines For Silvicultural Treatments**

| | LANDSCAPE BLOCKS | | |
|---|---|---|---|
| | **A-D** | **F,H** | **E,G** |
| **Objectives** | Accelerate plantations toward late-succession condition. | Allow for natural succession toward mid-seral conditions, preceding late-seral condition. | Establish woody vegetation along stream mainstems. |
| **Plant Association** | | | |
| **Wet environment:** Western hemlock/ salmonberry (TSHE/RUSP) | Manage overstory to allow 2 or more understories to develop early.<br>Underplant with western hemlock & western red cedar on most of area.<br>Consider underplanting with spruce in some riparian areas, esp. Indian Cr. drainage.<br>Allow for red alder as a natural stand component.<br>In root rot pockets, replace diseased trees with alder, maple and cedar | Manage overstory to allow 2 or more understories to develop.<br>Allow hemlock and cedar to become established by natural regeneration on smaller portion of area.<br>Consider underplanting Douglas-fir in some riparian areas if conditions favorable.<br>Allow for alder to be a large component of stands. | Plant deciduous species along with scattered conifer in riparian zones.<br>Treat upslope areas same as F, H. |
| **Moist environment:** Western hemlock/ swordfern (TSHE/POMU) | Manage overstory to allow 2 or more understories with shade tolerants or maple to develop.<br>Underplant with hemlock, cedar and maple.<br>Allow for alder as a natural stand component.<br>In root rot pockets, replace diseased trees with cedar and hardwoods. | Manage for forest mosaic of multi-storied stands and stands with a single dense Douglas-fir layer.<br>Underplant a few areas with hemlock and fewer with cedar.<br>In root rot pockets, replace diseased trees with cedar. | Plant deciduous species along with scattered conifer in riparian zones.<br>Treat upslope areas same as F, H. |
| **Dry environment:** Western hemlock/ salal (TSHE/GASH) | Maintain dense Douglas-fir overstory.<br>Underplant with hemlock and cedar on some of area.<br>In root rot pockets, replace diseased trees with cedar; maple in larger openings. | Manage for dense Douglas-fir overstory.<br>Underplant a few acres with hemlock and fewer with cedar.<br>In root rot pockets, replace diseased trees with cedar.. | Not applicable. |

Plantations in the LSR can be expected to look more similar to natural stands on similar topographic positions. Plantations in wet environments will have increased tree size and a scattered second story (planted) of western hemlock and western red cedar. It is unknown if within 100 years, underplanting in 30 year old plantations will develop a second story that is distinguishable from the overstory. The understory in fire-regenerated stands did not develop until the overstory was 70 years old.

Plantations treated in moist environments can be expected to have a higher level of understory, than those in wet environments (see specific recommendations for Landscape Management Blocks). Coarse woody debris (CWD) and soil organic matter can be expected to be low relative to natural stand development, especially in wet and moist environments, until stands reach late-successional condition. Some CWD will have been retained during thinning for ecosystem productivity, especially in unthinned pockets used for controls to provide the opportunity to evaluate how well the restoration thinning works.

Dry environments can be expected to have an overstory of dense Douglas-fir with little understory development for many years. Moderate thinning in plantations can be expected to increase the size of the Douglas-fir overstory. Tree density will be such that there will be the possibility of thinning again in dry environments in about 15-20 years with enough trees for snags and logs for CWD and underplanting at that time. However, because of lower conifer stocking, a second thinning at 70 years will be less probable in the wet and moist environments.

**Laminated root rot treatment**

Treatment of root rot should occur where silvicultural management is applied to meet other landscape objectives. The existence of root rot alone is not reason to manage a stand. Some indirect benefits to Late-Successional Reserves are expected to occur within root rot pockets, i.e., creation of snags and subsequent openings as infected trees fall over. Alder typically seeds into openings and is immune to the disease. Creation of small openings is expected to enhance species diversity in general.

**Snags and Coarse Woody Debris**

A desired condition of LSRs is to have natural accumulations of large (>20") down logs and snags. In early stages of succession, coarse (large) woody debris (CWD), left from former late-successional stands, holds nutrients and replenishes capital allowing for the rapid growth of microbes that immobilize nutrients and protect them from loss. As plantations move into mid-succession, plants increasingly depend on the nutrient cycle to supply their nutrient needs. Coarse woody debris has importance in the ecological function of all resources because of its role in the food chain. Today, levels of CWD are deficient in most areas of the watershed..

**Managing CWD For Ecological Function**--Although watershed analysis could provide recommended levels of CWD to leave in managed stands, it may be best at this time to look at the amount of CWD that would occur in these areas if they were developing naturally after a fire and to recognize that CWD in plantations is a mere fraction of what we would expect to see in natural stands of the same age. The figures in Chapter 4 (Figs. 4.3 and 4.4) provide examples of the range of variability expected in natural stands.

In the West and Middle Units one could expect CWD levels remaining from fire input to be about 50 cu. ft/ac. In the East Unit, one could expect levels remaining from fire to be about 50-60 cu. ft/acre based on a smaller pulse. CWD levels remaining after the logging of 10-30 years ago is probably about 0-5 cu. ft/ac.

Coarse woody debris in natural stands in the watershed is currently at a minimum. The CWD will increase considerably over the next 75 years as stands recover from the last fire disturbance. Over time the CWD in the West and Middle Units will be higher than the East Unit. Historically, stands 10-40 years old had about 170 to 275 cu. ft./ acre of CWD. In contrast, managed stands have almost no CWD at the same age. Although the large wood component will not recover for a few more decades, functions associated with woody detritus (organic material) may begin to recover to various levels depending on removal of wood through commercial thinning. The recovery of the woody detritus pool, which is the dominant store of organic matter and carbon, has been shown to be delayed by young stand thinning and salvage by approximately 7 to 12% (Krankina and Harmon, 1995).

In the absence of CWD standards for Riparian Reserve and Late-Successional Reserve allocations, project planning teams should develop prescriptions that meet the intent of CWD needs for the ecosystem described in the ROD. Determination of CWD needs for project sites should be based on the following considerations:

- location and concentration of existing CWD as it relates to position on the slope of the land,
- fire history of the area and fire risk occurrence,
- the needs of wildlife (population and diversity),
- transfer, cycling and retention of nutrients,
- structure and function of CWD in streams,
- existing information, such as ecoplots, VSE and CVS plots,
- land allocation standards that give particular emphasis to the prescriptions.

## Management of Matrix Lands

Under the Northwest Forest Plan, Matrix lands are identified as areas that could be managed for commercial production of wood fiber to meet some of the demand for lumber and other wood products. Most of the remaining mature conifer stands on federal land were allocated to the Late-Successional Reserve, but a few patches are found in Matrix. The acres of seral stages found today in these two NFP allocations are shown in Table 6.2. The largest (35%) proportion in the Matrix is younger conifer and conifer-mix stands, while the largest (49%) proportion in LSR is the mid-late seral stages of mature conifer and mature mixes of deciduous and conifer.

The estimated acres of Matrix in the Indian/Deadwood watershed is 8,577. Because of the high density of streams in the watershed, a large portion (92 %) of the federal land is within Riparian Reserves. When these Reserves are withdrawn from the Matrix allocation, about 452 acres remain. About 41% (186 acres) of those lands are managed stands. The remaining 59% (266 acres) is in natural stands, although only about 209 acres are mature conifer stands.

As explained in the Federal Lands Assessment, the Matrix is highly fragmented and occurs as small patches along ridgelines. Few feasible timber harvest sales could be designed for Matrix lands alone, but would need to be combined with adjacent commercial thinning sales and management of riparian reserves.

Table 6.2. Acres of Current Seral Stages by NFP Allocation (federal land only)

| | Siuslaw NF | | | | BLM | |
|---|---|---|---|---|---|---|
| **Seral Stage** | **LSR** | | **Matrix** | | **LSR** | |
| | **Acres** | **%** | **Acres** | **%** | **Acres** | **%** |
| Grass/forb | 45 | | 10 | | 1 | |
| Very early seral (< 10 years) | 2,738 | | 613 | | 530 | |
| All very early | | 6% | | 9% | | 10% |
| Early seral conifer (11-25 yrs) | 3,561 | | 1,099 | | 52 | |
| Conifer-mix pole | 1,417 | | 268 | | 19 | |
| Deciduous-mix pole | 207 | | 0 | | 0 | |
| All early seral | | 12% | | 19% | | 1% |
| Young deciduous-mix (25-40 yrs) | 746 | | 107 | | 61 | |
| Young conifer | 5,484 | | 1,625 | | 320 | |
| Young conifer-mix | 4,369 | | 811 | | 26 | |
| All young seral | | 23% | | 35% | | 7% |
| Mid-late seral | | | | | | |
| Mature conifer (>45 yrs) | 12,897 | | 1,206 | | 1,347 | |
| Mature conifer-mix | 5,094 | | 271 | | 790 | |
| Mature deciduous-mix | 2,777 | | 324 | | 812 | |
| Multi-late | 1,502 | | 145 | | 281 | |
| All mid-late seral | | 49% | | 27% | | 59% |
| Pure deciduous (all ages) | 4,394 | 10% | 711 | 10% | 1,272 | 23% |
| **TOTAL** | 45,231 | | 7,190 | | 5,511 | |

Note: Data excludes Lower Lake due to different vegetation typing.

Four blocks of Matrix are found in the watershed. General management recommendations for these are described below:

1. Most of the northern portion of Landscape Block H4 is allocated to Matrix though it is expected to contain several marbled murrelet sites. These Matrix lands cannot be expected to provide much mature timber for commodity use because of harvest constraints to meet murrelet habitat needs and Aquatic Conservation Strategy objectives for lands along N. Fork Indian Creek.

2. The headwater portion of Failor Creek (in Landscape Block H2) is allocated to Matrix. Failor Creek is all in federal landownership and offers one of the best opportunities to manage an entire subwatershed for stream restoration objectives. The Matrix lands should be treated with greatest sensitivity to stream restoration needs, i.e., headwall and upper slope stability will be important to stream recovery.

3. The southwest portion of Landscape Block E (Elk Creek and lower Long Creek) is allocated to Matrix. This area is not within the Key Watershed and it is not a critical area for connectivity between Late-Successional Reserve (LSR) lands. In addition, much of the land to the east, along the mainstem Indian Creek, is in private ownership. There may be opportunities to seek commercial wood fiber production in this area, while meeting the Aquatic Conservation Strategy

objectives for Elk and Long Creek subdrainages. (Note: A small portion of LSR land falls in the middle of the Matrix. This needs to be analyzed to determine if it is a mapping error or if it is intended to serve some habitat needs.)

4. The southern end of Landscape Block G (lower Lake Creek and the lower portion of Green Creek) is allocated to Matrix. These lands do not appear to be important for connectivity between LSR lands. There should be some opportunities for wood fiber production while meeting the Aquatic Conservation Strategy objectives for the tributaries into Lake Creek.

## Table 6.3. Landscape Objectives and Management Strategies

**I. LANDSCAPE OBJECTIVES for Blocks A, B, C:**

- Provide large (>1000 acre) patches of contiguous mature and late-seral wildlife habitat.
- Provide high quality, fully-functioning headwaters for Indian and Deadwood Creeks, to serve as aquatic refugia.
- Reduce human presence over time.

| LANDSCAPE BLOCK | DOMINANT ECOLOGICAL PROCESSES | LANDSCAPE FUNCTION (TERRESTRIAL) | LANDSCAPE FUNCTION (AQUATIC) | MANAGEMENT STRATEGY (TERRESTRIAL) |
|---|---|---|---|---|
| **A (Marla, Rogers,Long– upper portion)** | FIRE: Infrequent, stand replacing. LANDFORM: Questaform, low relief. ENVIRONMENT: wet to mesic. PAGs: - Predominantly RUSP & POMU. Small occurrence of GASH. | LANDSCAPE STRUCTURE: large areas move through succession in same seral stage. 1-2 seral stages present at any one time. SERAL PATHWAYS:. Alder has larger role than conifer in early seral stages & remains a large component into mature stages. Conifer regeneration sparse due to salmonberry competition. Old growth structure begins to develop at 120 years. | Function as a headwater source of wood, sediment & high-quality water for low/moderate gradient mainstem with good habitat complexity. Highest short-term potential for "functioning" subwatershed in the Indian Cr. drainage. | • Priority for development of late successional structure. Manage with block of mature forest to north, northwest.<br>• Consolidate mature and managed stands to promote development of large contiguous blocks of mature conifer habitat.<br>• Expand areas around existing mature stands ("biodiversity hotspots") by focusing management activities on adjacent plantations.<br>• Accelerate late-successional structure of plantations by thinning to favor late-successional species, thus shortening the time plantations are in mid-seral conditions.<br>• Manage as part of larger wildlife security block ; reduce human presence by conducting desired management early and closing non-ATM roads. |

**Table 6.3. Landscape Objectives and Management Strategies**

| MANAGEMENT STRATEGY (AQUATIC) | MANAGEMENT STRATEGY (SOCIAL) | SPECIFIC RECOMMENDATIONS | BLOCK PRIORITY |
|---|---|---|---|
| • Key Watershed (tier 1) - highest potential for maintenance and further enhancement of aquatic refugia, in Rogers & Maria subwatersheds.<br>• Maintain refugia by protecting concentrations of existing good habitat, esp. through road stabilization.<br>• Promote connectivity between stream and floodplain with addition of large wood.<br>• Maintain riparian diversity, e.g., keep elderberry thickets.<br>• Increase in-stream habitat complexity and areas of rearing habitat. | • Provide undeveloped recreation opportunity, with limited open-road access.<br>• Work with county to maintain CO. Rd. 5130 and 5134 which are part of ATM system.<br>• Consider removal of FR 5800, given high potential for adverse impacts to resources and high maintenance costs over the long term. | • Maria & Rogers: conduct management activities (road stabilization, in-stream work, riparian veg., & plantation thinnings) during next few years, then stabilize and reduce open road density as projects are completed - to reduce human presence.<br>• W.Fk Indian: Stabilize roads; encourage a partnership with Davidson to assist with stream restoration.<br>• Long Cr.: low potential for short-term restoration. Over long-term, improve riparian vegetation through plantings and release of conifers; stabilize roads. | HIGH - terrestrial<br>HIGH - aquatic |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

| LANDSCAPE BLOCK | DOMINANT ECOLOGICAL PROCESSES | LANDSCAPE FUNCTION (TERRESTRIAL) | LANDSCAPE FUNCTION (AQUATIC) | MANAGEMENT STRATEGY (TERRESTRIAL) |
|---|---|---|---|---|
| **B (Upper Indian, N. Indian– upper portion)** | Same as A | Same as A | Headwater source of wood, sediment & high-quality water for low/moderate gradient mainstem with good habitat complexity. | • Priority for development of late successional structure. Link to mature forest to north/northwest.<br>• Aggregate largest intact mature and late seral stands.<br>• Accelerate late-successional condition (same as Block A).<br>• Improve connectivity for terrestrial species between Upper Indian and N. Indian drainages, i.e., within Riparian Reserves. |
| **C (Upper Deadwood, N.Panther)** | FIRE: Moderately frequent; patchy.<br>LANDFORM: Slightly longer slopes, backbone ridges, more confined valleys<br>ENVIRONMENT: Dry to moist.<br>PAGs: GASH & POMU widely distributed. | LANDSCAPE STRUCTURE: Mod to large patch size from fire; additional patchiness from root rot. High snag occurrence due to root rot and bark beetle. 2-3 seral stages present at one time.<br>SERAL PATHWAYS: Conifer is predominant component in early seral stand and remains a major component into late seral. Regeneration of dense stands with considerable self-thinning (CWD). Greater conifer regeneration down to riparian zone, compared to Blocks A and B. | Headwater source and transport of wood, sediment and high-quality water to upper mainstem of Deadwood Cr., which is moderately confined, has low/moderate gradients and good habitat complexity. | • Priority for development of late successional structure. Provide connectivity with mature stands to north.<br>• Consolidate mature and managed stands to promote development of large contiguous blocks of mature conifer habitat.<br>• Accelerate late-successional condition (same as Block A).<br>• Expand areas around existing biodiversity "hotspots" by focusing management activities on adjacent plantations.<br>• Treat root rot pockets in managed stands during thinning operations, by replacing trees in and adjacent to disease pockets with nonhost species (cedar or hardwoods as appropriate for PAG.) |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

| MANAGEMENT STRATEGY (AQUATIC) | MANAGEMENT STRATEGY (SOCIAL) | SPECIFIC RECOMMENDATIONS | BLOCK PRIORITY |
|---|---|---|---|
| • Promote long-term large wood development in plantations through thinnings-- development of conifer patches on some toeslopes; some willow plantings in floodplain.<br>• Long-term promotion of connectivity between stream and floodplain in N. Indian. | • Maintain FR 3250 and FR 3700 as part of ATM system.<br>• Stabilize FR 2100 (CO. Rd. 5130) and close to thru traffic; use FR 2116 as alternate route.<br>• FR 5800 - same as A. | • In short term: provide slash pile corridors along slope contours of plantation thinning units that connect natural stands. The slash corridors can provide connectivity (hiding and travel corridors) within Riparian Reserves.<br>• N.Indian: stabilize roads; improve riparian vegetation (i.e., with willow plantings, clumpy plantings of conifer and some thinning in plantations), especially along mainstem. | HIGH - terrestrial<br>MOD - aquatic<br>(N.Fk Indian: moderate potential for riparian and upslope wood.)<br>(Upper Indian : low due to private ownership of much of mainstem.) |
| • Upper Deadwood: highest potential for maintenance and further enhancement of aquatic refugia in Deadwood drainage.<br>• Protect concentrations of existing good habitat.<br>• Promote habitat complexity.<br>• Continue partnerships with private landowners for in-stream structures and riparian vegetation restoration. | • Consider decommissioning either FR 3500 or FR 6300. Both will have high maintenance costs over long term due to proximity to important aquatic resources. (FR 6300 is preferred by residents during winter.) | • Upper Deadwood: Enhance potential fish-rearing habitat. (Watershed currently contains areas of good floodplain connectivity.) Stabilize roads, add in-stream structures, plant riparian veg. and do some thinnings in plantations.<br>• N. Panther: Riparian planting and release to promote large woody debris over the long-term. Provide willow plantings to encourage beaver activity. | HIGH - terrestrial<br>HIGH - aquatic |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

**II. LANDSCAPE OBJECTIVES for Block H (H1 - H6):**

- Maintain a large-scale area of relatively similar seral stage vegetation.
- Provide area for continual management of vegetation, designed to promote LSR conditions in the long-term and produce even-flow of wood fiber for several decades.

| LANDSCAPE BLOCK | DOMINANT ECOLOGICAL PROCESSES | LANDSCAPE FUNCTION (TERRESTRIAL) | LANDSCAPE FUNCTION (AQUATIC) | MANAGEMENT STRATEGY (TERRESTRIAL) |
|---|---|---|---|---|
| **H - (Central zone)**<br><br>**H1 - Lower Indian/Green Cr.**<br><br>**H2 - Fallor**<br><br>**H3 - Misery**<br><br>**H4 - Herman (Gibson, Taylor, lower Up.Indian)**<br><br>**H5 - West Fork Deadwood**<br><br>**H6 - Panther** | FIRE: Infrequent, stand replacing.<br>LANDFORM: Backbone, spur ridges, short steep slopes. (transition between west & east sides of watershed.)<br>ENVIRONMENT: Variable; transition from moist to dry sites.<br>PAGs: POMU most dominant. | LANDSCAPE STRUCTURE: Large areas move through succession in same seral stage.<br>SERAL PATHWAY: Alder plays a role in early seral stages in some stands. Conifer dominates later seral stages. | Tributary subwatersheds: source, transport and deposition of wood and sediment on a smaller scale. High-quality habitat in most of tributaries to mainstem Deadwood and Indian Creeks. | • Improve wildlife connectivity opportunity between Indian Cr. and Deadwood Cr. drainages by management of plantations to increase structural diversity especially in Riparian Reserves. In short term, provide slash corridors along contours of plantation thinning areas that connect with natural stands.<br>• Aggregate existing mature stands in northernmost portion of Block to provide connecting corridor between E and W portions of larger LSR RO268.<br>• Provide large-scale area of relatively similar seral stage vegetation. Manage plantations on natural successional timeframe, toward mid-seral conditions to precede late-seral stage.<br>• Apply adaptive management to plantations to study various silvicultural treatments. |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

| MANAGEMENT STRATEGY (AQUATIC) | MANAGEMENT STRATEGY (SOCIAL) | SPECIFIC RECOMMENDATIONS | BLOCK PRIORITY |
|---|---|---|---|
| **H1** - Long-term restoration of large wood supply; reduce risk from road failures; gradually enhance in-stream habitat complexity.<br>**H2** - Maintain and expand good existing habitat; manage whole subwatershed (upslope to in-stream); subwatershed monitoring potential.<br>**H3** - Develop long-term partnerships or acquire land to restore mainstem; thin plantations and stabilize roads in some upslope areas.<br>**H4** - Expand refugia over time through in-stream wood additions, riparian veg. enhancement, thinnings and road stabilization.<br>**H5** - (Forest key watershed) Potential for maintenance and further enhancement of aquatic refugia and expansion from Landscape Block C.<br>**H6** - Over long term, establish and/or release conifers along hardwood dominated riparian areas. | • Provide a steady flow of wood fiber to local timber industry primarily as a by-product of developing late-successional conditions.<br>• Maintain Gibson old growth trail.<br>• Provide opportunities for research on methods to promote late-successional conditions.<br>• Work with county to maintain CO. Rd. 5130 which is part of ATM system.<br>• Maintain FR 2116 and FR 3278 as part of ATM system.<br>• Consider an alternate connector to replace FR 3259 on the ATM system, based on high repair & future maintenance costs.<br>• Maintain FR 3200 (Indian Ridge Rd.) on ATM system only if monies available to cover high maintenance costs that will be needed to prevent adverse impacts to streams. | **H1** - Lower Indian: reduce impacts from recreation sites; encourage partnerships with pvt. landowners & county road maintenance.<br>Green Ck: stabilize roads, plant riparian veg., incl. willows to encourage beavers; thin plantations; protect 'No Impact' Poa site.<br>Velvet: add in-stream LWD from adjacent slopes.<br>**H2** - Pursue long-term restoration of LWD for input into streams. (No valley bottom road; lots of plantations of similar age.) Take advantage of thinning projects to place in-stream structures.<br>**H3** - Stabilize roads early; thin and riparian plant later. (Limited potential for restoration due to private land along mainstem.)<br>H4 - N.Fk.Indian (lower) - enhance riparian veg, i.e., willows and clumpy plantings; maintain in-stream structures (needed early).<br>Herman - add in-stream wood; plant clumps of conifers in riparian areas.<br>Gibson - plant clumps of conifers in riparian areas.<br>Taylor - add in-stream wood from upslope.<br>**H5**: Stabilize roads, thin plantations, add in-stream structures and plant willow (needed early).<br>Exlore opportunities for land aquisition; also for partnerships for in-stream work.<br>**H6** : Upper Panther - plant clumps of conifers in riparian areas; release conifers if needed; develop partnerships on lower end of Panther; limited road work and thinning. | **H1** -<br>MOD- terrestrial<br>MOD - aquatic<br>**H2** -<br>HIGH - terrestrial<br>HIGH - aquatic<br>**H3** -<br>MOD - terrestrial<br>LOW - aquatic<br>**H4** -<br>MOD - terrestrial<br>MOD - aquatic<br>**H5**<br>MOD - terrestrial<br>HIGH - aquatic<br>**H6**<br>LOW - terrestrial<br>LOW - aquatic |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

**III. LANDSCAPE OBJECTIVES for Block D:**

- Provide large (>1000 acre) contiguous blocks of mature conifer habitat connected to Block C.
- Serve as additional refugia for aquatic resource to expand the refugia to the north.

| LANDSCAPE BLOCK | DOMINANT ECOLOGICAL PROCESSES | LANDSCAPE FUNCTION (TERRESTRIAL) | LANDSCAPE FUNCTION (AQUATIC) | MANAGEMENT STRATEGY (TERRESTRIAL) |
|---|---|---|---|---|
| **D (Elk, Buck, Rock3)** | FIRE: Moderately frequent, patchy. LANDFORM: Longer slopes, backbone ridges and more confined valleys. ENVIRONMENT: Dry to moist. PAGs: GASH & POMU predominate. | LANDSCAPE STRUCTURE: Moderate to large patch SERAL PATHWAYS: Conifer is a major component in early seral and remains dominant in late seral stages. See Block C. | Small tributary subwatersheds serving as a source of wood, sediment and high-quality water to mainstem Deadwood Cr.. | • Priority for development of late successional structure.<br>• Consolidate mature and managed stands to promote development of large contiguous blocks of mature conifer habitat.<br>• Manage plantations around existing mature stands (biodiversity hotspots) to expand area of species and structural diversity.<br>• Accelerate late-successional condition (same as Block A). |

**IV. LANDSCAPE OBJECTIVES for Block F:**

- Allow area to move through mid-seral stages prior to late-seral stage..
- Allow for large patches of natural stands, containing a mosaic of deciduous and conifer species of various age classes.
- Serve as additional refugia for aquatic resources over the long term.

| | | | | |
|---|---|---|---|---|
| **F (Bear)** | Same as D. | Same as D. | Same as D. | • Allow natural succession to occur, e.g., no conversion of alder to conifer.<br>• Manage plantations toward mid-seral conditions to precede late-seral stage. |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

| MANAGEMENT STRATEGY (AQUATIC) | MANAGEMENT STRATEGY (SOCIAL) | SPECIFIC RECOMMENDATIONS | BLOCK PRIORITY |
|---|---|---|---|
| • Pursue long-term restoration of large wood supply through riparian planting and release, and thinning upslope plantations.<br>• Reduce risk from road failures.<br>• Gradual enhancement of in-stream structure. | • Provide semi-primitive hiking opportunity to view old growth in Deadwood watershed. | • Plant clumpy patches of conifers in Rock and Buck riparian areas.<br>• Thin plantations to increase tree growth. Obtain LWD for Elk Cr. from adjacent hillslopes.<br>• Develop partnership with Deadwood community group to construct a trail in Elk Cr. watershed to access old growth stands.<br>• Acquire state-owned land in lower portion of Block D to enhance opportunity to manage LSR. (Part of the state property is in Block F also.) | HIGH - terrestrial<br>MOD - aquatic |
| • Enhance riparian vegetation complexity in lower portion of drainage, which is hardwood dominated. | • Continue existing partnerships; pursue partnership potential for in-stream and riparian vegetation projects.<br>• Provide hiking opportunity on old Schoolhouse Trail; evaluate potential for extension of trail to Windy Peak.<br>• Maintain roads for future access. | • Increase conifer component in riparian zone of lower portion of Block.<br>• Conduct precommercial thinning early.<br>• Continue partnerships in lower portion of drainage to assist with stream restoration. | LOW - terrestrial<br>MOD - aquatic |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

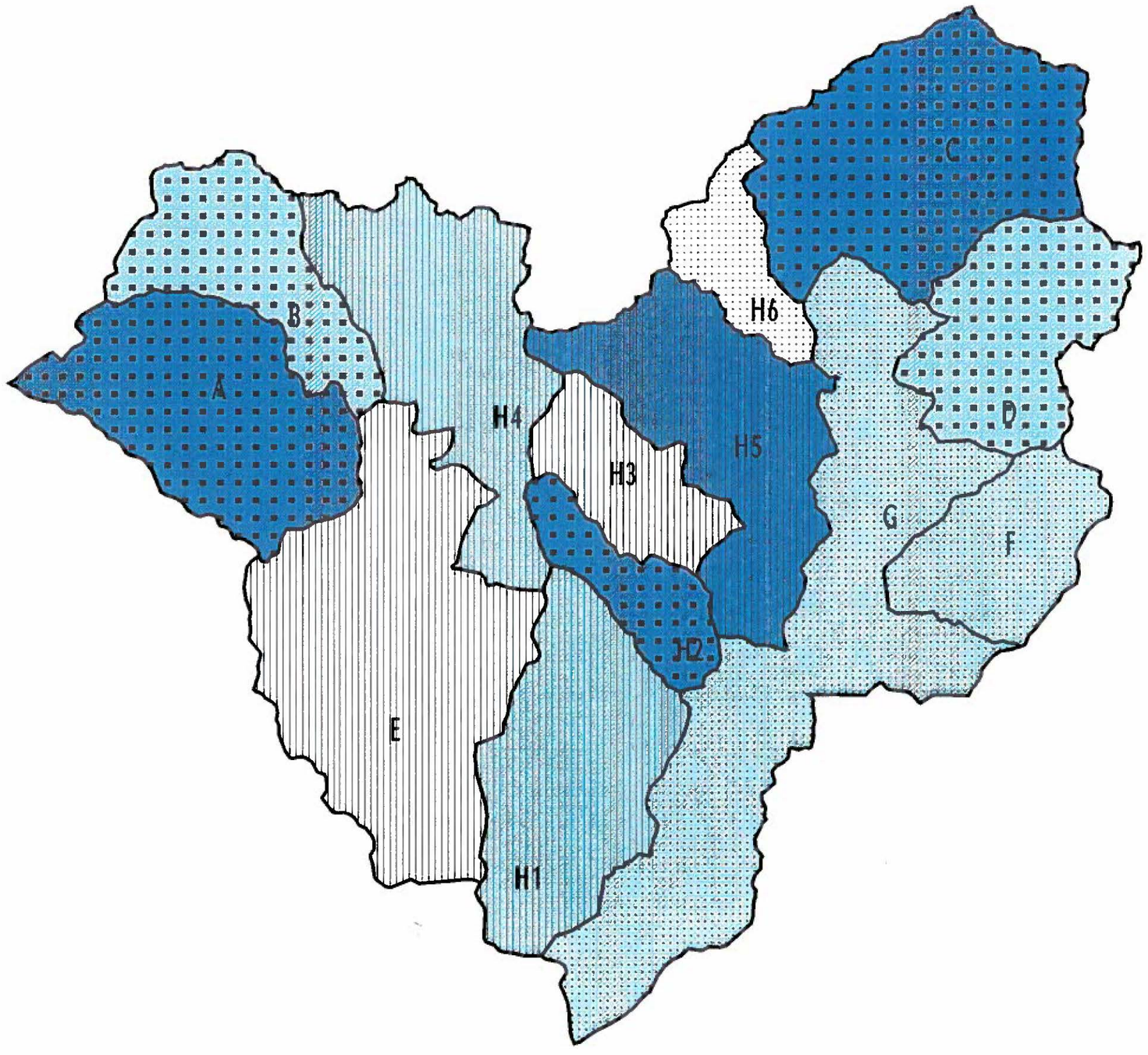
**V. LANDSCAPE OBJECTIVES for Block G and E:**

- Function as a low-gradient mainstem aquatic environment with high-quality fish spawning and rearing habitat.
- Lands are predominately private agricultural and rural residential with potential for landowner participation in stream restoration.

| LANDSCAPE BLOCK | DOMINANT ECOLOGICAL PROCESSES | LANDSCAPE FUNCTION (TERRESTRIAL) | LANDSCAPE FUNCTION (AQUATIC) | MANAGEMENT STRATEGY (TERRESTRIAL) |
|---|---|---|---|---|
| **G: (mainstem Deadwood Cr., Lower Lake)** | FIRE: Transition between Blocks C & H.<br>LANDFORM: Mainstem unconfined valley bottom; Small tributaries from ridges.<br>ENVIRONMENT: Dry to wet.<br>PAGs: GASH & RUSP are widely distributed. | LANDSCAPE STRUCTURE: Mosaic of alder and conifer. 2-3 seral stages present at any one time.<br>SERAL PATHWAYS: Conifer has large role in early seral and remains dominant in late seral. Greater conifer regeneration down to riparian zone, compared to Blocks E. | Areas of complex habitat associated with wood accumulations and high flow side channels & alcoves. | • Provide high-quality bald eagle nesting and roosting habitat near Lake Creek.<br>• Thin plantations around existing mature stands within eagle nesting habitat.<br>• Restore connectivity to natural stands within federal lands, i.e., by improving structural diversity of vegetation through Riparian Reserves.<br>• Manage plantations on natural successional timeframe, toward mid-seral conditions to precede late-seral stage. |
| **E: (mainstem Indian Cr., incl. Elk2, Long-lower, Herman-lower)** | FIRE: Infrequent, stand replacing<br>LANDFORM: Mainstem , moderately unconfined valley bottom; Small tributaries from ridges.<br>ENVIRONMENT: Wet.<br>PAGs: High occurrence of RUSP. | LANDSCAPE STRUCTURE: Mosaic of alder and conifer. 1-2 seral stages present at any one time<br>SERAL PATHWAYS: Alder has a larger role than conifer in early seral stages and remains a large component into young and mature stages. | Same as G. | Same as G. |

**Table 6.3. Cont. Landscape Objectives and Management Strategies**

| MANAGEMENT STRATEGY (AQUATIC) | MANAGEMENT STRATEGY (SOCIAL) | SPECIFIC RECOMMENDATIONS | BLOCK PRIORITY |
|---|---|---|---|
| • Reduce stream temperatures along stretches of bedrock dominated channel by increasing riparian vegetation.<br>• Pursue or continue development of private partnerships for aquatic restoration projects, e.g., riparian plantings, in-stream structures. Private landowner cooperation is essential to meet goals.<br>• Develop a cooperative relationship with county road maintenance department to seek ways to maintain CO. Road 5140 compatible with stream function. | • Continue involvement with Deadwood CRMP to further stream restoration work on private lands.<br>• Work with county to maintain CO. Rd. 5140 as part of ATM system. | • Participate with Deadwood residents on stream structure projects planned for 1996.<br>• Cooperate with county road maintenance efforts to maintain culverts on tributaries.<br>• Maintain existing Chinook spawning sites.<br>• Work with county on fish passage problems with culverts.<br>• Assist landowners with scattered conifer plantings, willows and other hardwoods. | LOW - terrestrial<br>MOD - aquatic |
| Same as G, except:<br>• Seek ways to maintain CO. Road. 5130 compatible with stream function. | • Develop partnerships over long-term to assist with stream restoration.<br>• Maintain lower portion of FR 2500 and work with county to maintain CO. Rd. 5130 as part of ATM system. | • Elk Cr. off of mainstem Indian: enhance deep pools through LWD additions; stabilize roads; riparian planting.<br>• Work with county on fish passage problems with culverts.<br>• Maintain existing Chinook spawning sites. | MOD - terrestrial<br>LOW - aquatic |




# Indian/Deadwood Landscape Block Priorities

- Landscape Blocks
- High Priority Aquatic
- Med Priority Aquatic
- Low Priority Aquatic
- High Priority Terrestrial
- Med Priority Terrestrial
- Low Priority Terrestrial

0 1 2 3 4
MILES

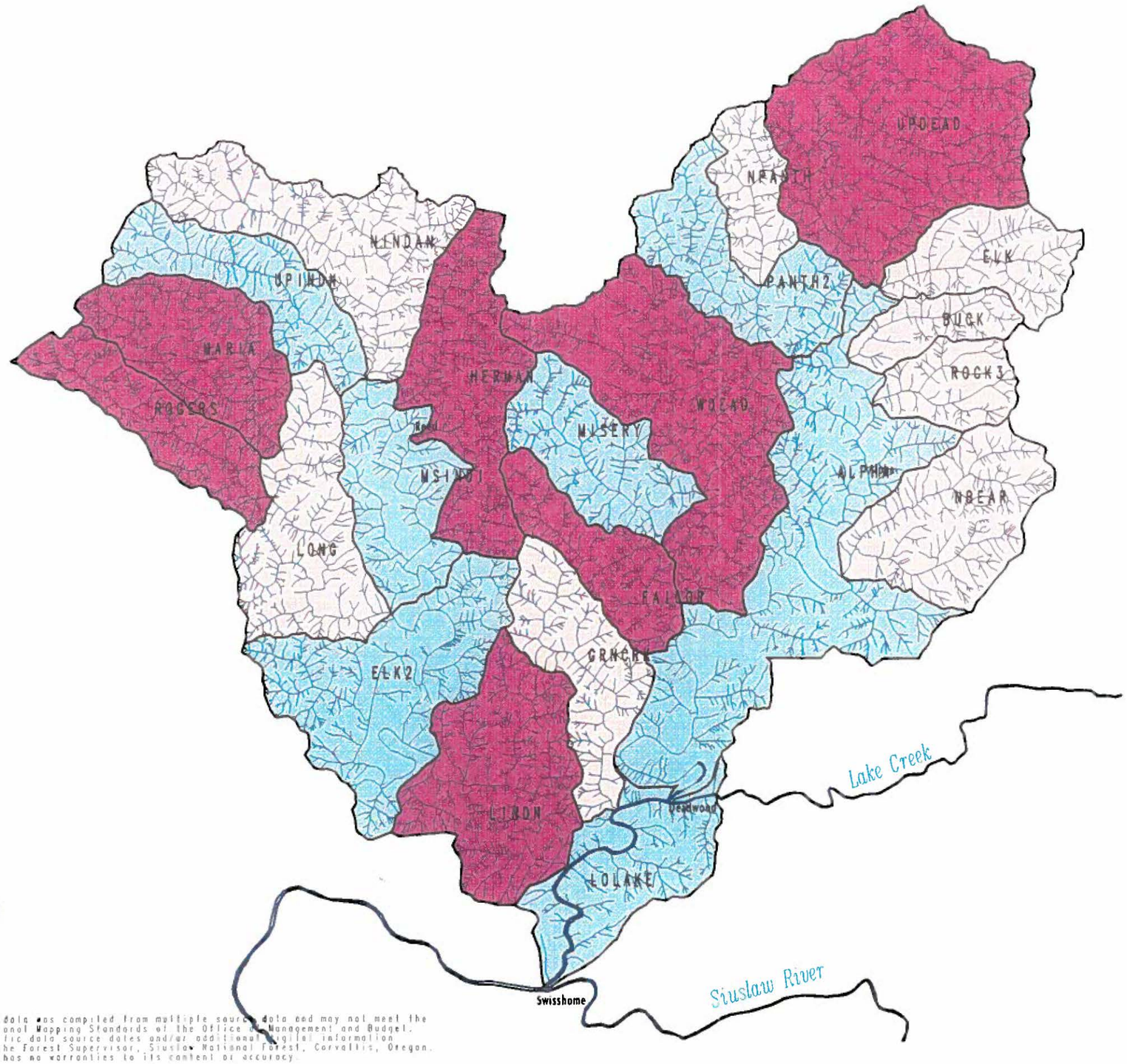
RF 1:103605

N

June 12, 1996

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy

Map 6.1




Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

## Indian/Deadwood Aquatic Priority

- Low Priority
- Medium Priority
- High Priority

0 1 2 3 4

MILES

RF 1:103605

June 11, 1996

Map 6.2

# Chapter 7 - Monitoring and Adaptive Management

Three topics are suggested for a monitoring and adaptive management effort in the Indian/Deadwood watershed. All three offer opportunities to improve our knowledge of how to manage forest ecosystems to promote improved aquatic habitats and old-growth structure. The proposed methods could be adopted by the Mapleton Ranger District to illustrate some adaptive management designs at a watershed scale, or the methods could be adopted as part of a larger scale monitoring effort, e.g., at the river basin or province scale. The proposed topics are expected to meet some of the monitoring requirements identified in the Northwest Forest Plan.

## 1. PUBLIC PARTICIPATION

BACKGROUND:

During the watershed analysis, team members had several contacts with residents of the watershed, including open meetings and a workshop. One outcome of the meetings was our increased awareness of the residents' desires to improve habitat along streams crossing their property and a better understanding of their efforts to initiate cooperation and secure funds to do stream enhancement on their own property. Such efforts are occurring as a group in the Deadwood community. Since the beginning of the watershed analysis, the fish biologist and hydrologists have been working with residents on stream enhancement projects and sharing information about aquatic conditions.

GOAL:

Our objective for public participation revolves around the mutual concern we have with residents in the watershed about declining fish populations, particularly salmon. Our goal is to increase aquatic and riparian diversity by promoting land use practices along streams on private and public land that are compatible with healthy stream ecosystems. Good communication and cooperative agreements with the residents in these watershed are key to addressing this mutual concern.

WHAT do we want to learn?

Over the next several years, the following questions could be monitored:

1.) Does increased Forest Service involvement with residents in the Indian and Deadwood watersheds affect landowners' use of and attitudes about land in riparian areas?
2.) How do residents in the watershed view restoration?

WHO will be responsible for conducting the work?

Monitoring should be a combined effort of state agencies, conservation districts and the federal land management agencies, i.e., Forest Service and Bureau of Land Management. It would be necessary to provide information to interested residents, continue to provide residents with assistance (consultation) on project design, and assist with stream structure placement on private land.

HOW will we measure our results?

Over the next several years, the watershed restoration efforts will be considered successful if there have been positive changes in:

1). Stream temperatures (i.e., reduced temperatures due to increased shade in riparian zone).
2.) Number of riparian and in-stream restoration projects (i.e., a predetermined number of projects per year and target number for a given year that we would like to increase in each watershed on private land).
3.) Reduced stream bank erosion due to fewer cattle in the stream (e.g., increased linear feet of fencing in and along the creeks such that placement of fences allow cattle to only enter the creek for watering at specific locations).
4.) Increased successful plantings of large riparian vegetation (i.e., numbers of willows, alder, conifer) on private land within 10 feet of the creek.
5.) Increased numbers of telephone and personal contacts per year between district and residents discussing stream diversity and habitat.
6.) Is there more dialogue among residents?
7.) Challenge cost share agreements--not just private land, e.g., being able to get funds from GWEB, watershed council involvement).
8.) Have we been involved enough to get these projects off the ground? Do we still interact with people on projects? Are they still inviting us to their meetings?
9.) Send out a written survey every five years asking how the residents perceive what the Forest Service is doing.

WHEN will activities and measurement occur?

Year 1: Assist with fish projects in Deadwood Watershed.

Determine response to the watershed analysis and develop rapport with Indian and Deadwood community.

Determine extent of interest by individuals to put up fences, install fish projects, do riparian planting on private land.

Year 2-3: Continue assisting residents and actively making contacts.

Year 5: Survey elements listed under "HOW" with cooperation.

Year 10: Survey elements listed under HOW to determine lasting effects of our efforts.

## 2. THINNING PLANTATIONS TO DEVELOP OLD-GROWTH STRUCTURE ON LARGE SCALE IN BLOCK H (30,000 ACRE BLOCK)

BACKGROUND:

Block H (see Landscape Management Design) is a large, fairly contiguous block (30,000 acres) in which most of the federal land (and 50% of the total acres) is in plantations 10-40 years old, which we want to keep in similar seral condition because it offers an opportunity to study changes in seral condition over a large scale. We want to maintain it as large patch so we can monitor wildlife and wildlife habitat for species that require large patches. There are many unanswered questions about the development of old-growth structure and forest succession. Within this large block a special opportunity exists because there is variation with regard to species composition and structure, due to the Plant Association Groups (PAGs). This setting will allow us to compare successional stage development simultaneously in three PAGs on one large block.

Block H has unique value to monitoring because it is primarily in federal ownership, and is a contiguous large block of plantations. This would allow us to examine silvicultural treatments on a large scale which provides opportunity for wildlife monitoring. In addition, the large block provides for many replicates of each treatment in several stands.

GOAL:

The goal is to examine silvicultural treatments used to develop old-growth structure in relation to environmental differences in the planning area, by testing the vegetation and wildlife response to three or four treatments and a control within large blocks among three environments (wet, moist and dry as represented by the plant association groups). Because of the size of Block H, treatment block sizes could be as large as 5000 acres and treatments would cover large areas so that each environment type would receive 4 or 5 treatments, and trends could be monitored across the environments (as mapped by PAGs). The treatments would be similar to thinning prescriptions frequently implemented over the past two years on thinning projects, although many of the acres would be untreated because they are mature stands or steep ground, unsuitable for cutting.

WHAT do we want to learn?

We would like verification of the generalized successional pathways of PAGs (i.e., species composition at various stand ages) as outlined in Chapter 4 (Generalized Successional Pathways). These are assumptions we recommend guide our treatment of plantations. However, they should be tested through monitoring and adaptive management.

1.) What is the structural development (size of trees, understory, rate of succession/development ) of stands in the three different environments to 4 or 5 different thinning regimes?
2.) What is the habitat change (long term--over 50 years) due to these treatments for guild species that require large patches?
3.) What is the response (decay rate and function) of coarse woody debris under the microclimates (thinning densities) as stands develop?
4.) What is the economic cost and benefit of each of these thinning regimes at each entry?

WHO will be responsible for completing the work?

The district could implement this by guiding project ID Teams toward it with a proposed action and encouraging ID Teams to develop this as an alternative. In identifying significant issues, design alternatives to address these monitoring goals. Include an economic analysis and schedule logging systems and road treatments to meet the goals. For the greatest learning to occur, the ID Team must document the vegetative response they anticipate for each environment to the treatment prescriptions. This will clarify the rationale for the treatments and be easier to monitor over the next several decades by those attempting to follow our tracks. Design prescriptions to meet the objectives including a prescription that is a control (i.e. no thinning of a substantial number of fully stocked plantation acres) so it can be determined if changes are due to the treatment or would have occurred anyway. As in North Fork Thin or Big Blue Thin on Waldport, other treatments might be a light thinning, a heavy thinning and underplanting, or some type of random marking to ensure non-evenly spaced trees. To ensure implementation of the design, it will be necessary to loosely schedule all of Block H for treatment and designated controls over the next 30 years of entries.

HOW will we measure our results?

Over the next several years, we will measure and consider implementation successful if we do a variety of treatments across the PAGs by treatment blocks and maintain a database of results. A possible scenario for treatment would be:

1.) For each of the four or five treatments across subwatersheds (approximately 5000 acres per treatment), measure tree size, CWD by decay class, understory development (if underplanting is one of the prescriptions) and other appropriate structural components.
2.) Measure the response of similar treatments applied over large blocks across PAGs.
3.) Measure the same components on control units to determine if the changes are due to treatments or if they would have occurred anyway. (To be able to make that distinction with any certainty, untreated blocks the same size as treatments must be maintained).
4.) Track the cost of treatments and compare economic viability (timber revenue) of treatments for the large area.

WHEN will activities and measurement occur?

Year 1: First project planned and EA written that includes one or more adaptive management scenarios as alternatives in the EA. At this time the entire block should be mapped out and plantations scheduled for treatment.
Year 2-3: Layout sale and logging of first set of treatments (timbersale). Take post-treatment measurements immediately after logging so subsequent growth can be compared. Small permanent plots or low-level flights could be used. May want to digitize and put in GIS.
Year 15: Differences in structural development or differences in succession may be evident. Measurements of structure and composition.
Year 30: Additional entries may be part of the prescription.

**3. RIPARIAN THINNING FOR IMPROVED ECOLOGICAL RIPARIAN FUNCTION IN BLOCK H (30,000 ACRES).**

BACKGROUND:

Block H is a large, contiguous block of plantations 10-40 years old which have young conifer and alder along the streams because few riparian buffers were implemented as part of past logging plans in the area. This large length of stream provides an opportunity to monitor the response of riparian vegetation in conjunction with thinning the adjacent plantations. It is a unique opportunity to monitor vegetation response along the stream continuum at a landscape scale.

The long term strategy of this block is to develop stream conditions and riparian vegetation capable of prime fish (salmon) habitat. Over the past two years current riparian treatments (to meet the Aquatic Conservation Strategy) have recommended thinning existing vegetation to increase the size of conifers, and (along short stream reaches) to create openings in the riparian canopy and plant conifers (usually red cedar or hemlock) for long term future CWD input into the streams and riparian zones. There is a concern (short term) that our efforts to develop large conifers in riparian areas creates some risk to aquatic species by removing shade and increasing summer stream temperatures. However, we don't know how great a risk these treatments may be creating.

GOAL:

The goal is to determine the actual risk (short term concern) of thinning trees adjacent to streams by monitoring the effects of various thinning treatments on stream conditions and riparian vegetation. We would achieve this by measuring differences in stream temperature associated with the three thinning treatments and control described in Question 2. These results could then be compared to the conifer growth so the benefits and risks could be weighed.

WHAT do we want to learn?

Over the next several years, the following questions could be monitored:

1.) What is the short-term risk of removing vegetation (shade) at various densities to develop large conifers trees in riparian area? What level can we thin to for large tree development before we limit our options for CWD (after blowdown and after regeneration mortality and natural mortality from bank channel cutting)?
2.) Our analysis assumes that Douglas-fir regenerate more densely and grow more successfully on toeslopes than on gentle or flat lower slopes because conditions are drier and Douglas fir are more able to compete with alder than they do on wetter sites (non toeslopes). This assumption is based on the information that stocking levels in riparian zone (RUSP PAG) are low. Modeling of PAGs suggests toeslopes have a more narrow band of RUSP than gentle slopes. We would like these assumptions to be tested
3.) Do we see differences in temperature.
4.) Do stands of given treatments remove most of the in-stream structure during high flow? For example, does removal of alder result in unacceptable loss of streamside vegetation? What is the effect of removal on brush competition?
5.) Cumulative effects. We may need to compare to industrial forest land.
6.) Costs/benefits of treatment (even if benefits are hard to measure, an accounting of costs would be enlightening).

WHO will be responsible for completing the work?

This could be accomplished by guiding ID Teams in an environmental analysis that proposes development of this as an alternative, and by giving the presale team direction to implement these priorities as part of their job. Prescriptions would be written similar to the previous monitoring design.

HOW will we measure our results?

1.) Stream temperatures correlated with the range of stand treatments including the control.
2.) Stream roughness.

WHEN (When will activities and measurement occur?):

Years 1-3: Project planning, layout, timber sale and logging.
Year 2: Stream temperatures should be taken before logging (pre-treatment data is vital to being able to compare post treatment effects) and immediately after treatment.
Year 3-10: To make this economically viable, stream temperatures should be taken in conjunction with plantation monitoring.

# References


Agee, James K. 1993. Fire Ecology of Pacific Northwest Forests. Island Press, Covela, CA.

Austin, Karen. 1996. Analysis of terrestrial vertebrate guild habitats on federal lands in the northern Oregon Coast Range. Siuslaw/Willamette National Forests, Unpub. report, Feb. 1996.

Ellingson, Pearl Beers (ed.). 1978. The Story of Indian Creek. The Siuslaw Pioneer. Siuslaw Pioneer Assoc.

Ellingson, Pearl Beers (ed.). 1980. The Story of Deadwood Creek. The Siuslaw Pioneer. Siuslaw Pioneer Assoc.

Farnell, J.E. 1979. Siuslaw River navigability study. pp. 26-31.

Franklin, J.F. and C.T.Dyrness. 1988. Natural vegetation of Oregon and Washington. Oregon State University, Corvallis, OR.

Goheen, D.J., A.M. Kanaskie and S.J. Frankel. 1983. Forest pest surveys, Deadwood area, Alsea Ranger District, Siuslaw National Forest. USDA Forest Service, PNW, Forest Pest Management Report, Portland, OR, 23 pp.

Goheen, D.J., S.J. Frankel and E.Michaels. 1984. Root disease survyes of Douglas-fir plantations, Alsea Ranger district, Siuslaw National Forest. USDA Forest Service, PNW, Forest Pest Management Report, Portland, OR, 11pp.

Goheen, D.J., E.M. Goheen, D.F. Cobb, J. Kalafarskie, and C.L. Schmitt. 1986. Root disease surveys 1984-85, Alsea Ranger District, Siuslaw National Forest. USDA Forest Service, PNW, Forest Pest Management Report, Portland, OR, 37pp.

Hadfield, J.S. 1985. Laminated root rot, a guide for reducing and preventing losses in Oregon and Washington forests. USDA Forest Service, PNW, Forest Pest Management Report, Portland, OR, 13 pp.

Harmon, M.E. , Franklin,J.F., Swanson, F.J., P.Sollins, S.V. Gregory, J.D. Lattin, N.H. Anderson, S.P. Cline, N.G. Augmen, J.R. Sedell, G.W.Lienkaemper, K. Cromack, JR., and K.W. Cummins. 1986. Ecology of coarse woody debris in temperate ecosystems. Advances in Ecological Research, 15: 133-302.

Hemstrom M.A, and S.E. Logan. 1986. Plant association and management guide, Siuslaw National Forest. USDA Forest Service, PNW, R6-Ecol. 220-1986a, Portland, OR, 121 pp.

Heyerdahl E.K., F.J. Swanson and J.K. Agee. 1993. Fire history database of the western United States: Preliminary report covering Oregon and Washington. Interagency agreement EPA, USDA Forest Service and Univ. of Washington. 39 pp.

Impara, Peter. 1995. Preliminary results of unpublished PhD dissertation. OSU Forest Science Dept. Corvallis, OR.

Jones, J.A. and G.E. Grant. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research, 32(4):959-974.

Kastner, W.W., D.J. Goheen and R.L. Edmonds. 1994. Relationship between occurrence of laminated root rot and site characteristics in Douglas-fir forests of the northern Oregon Coast Range. Western Journal of Applied Forestry, 9:17- .

Krankina, O.N. and M.E. Harmon. 1995. Dynamics of the dead wood carbon pool in Northwestern Russian boreal forest. Water, Air and Soil Pollution. 82:227-238.

Long, C.J. 1995. Fire history of the central coast range, Oregon: A ca. 9000 year record from Little Lake. MS Thesis, University of Oregon, eugene, OR 147 pp.

Lower Umpqua Flycasters. 1995. "Sea-run cutthroat trout: Biology, management and future conservation symposium", Reedsport, OR, October 1995.

Montgomery, D.R. and J.M. Buffington. 1993. Channel classification, prediction of channel response and assessment of channel condition. Washington Dept. of Natural Resources Report TFW-SH10-93-002, Olympia, WA. 86 pp.

NCASI (National Council of the Paper Industry for Air and Stream Improvement). 1985. Catalog of landslide inventories for the northwest. Technical Bulletin No. 456.

National Marine Fisheries Service and OSU Hatfield Marine Science Center. 1996. "Estuarine and ocean survival of northeastern Pacific salmon symposium", Newport, OR, March 1996.

Oregon Department of Fish and Wildlife. 1995. Draft Siuslaw River Basin fish management plan, Prepared by Will Beidler, George Westfall and Mary Jo Wevers, ODFW, Oct. 19, 1995.

Oregon Department of Fish and Wildlife. 1996. 1996 Oregon Big Game Regulations. Portland, Oregon: Oregon Department of Fish and Wildlife, 60 pp.

Oregon Division of State Lands. 1979. Siuslaw River navigability study, Salem, OR, March 1979.

Oregon Employment Department. 1996. Regional Economic Profile, Region 5, Lane County, OR, 50 pp.

Regional Ecosystem Office. 1995. Ecosystem analysis at the watershed scale: Federal guide for watershed analysis, Rev. August 1995, Ver 2.2, Portland, OR. 26 pp.

Schwartz, E.A. 1991. "Sick Hearts: Indian Removal on the Oregon Coast, 1875-1881". Oregon Historical Quarterly, Fall 1991: 229-264.

Shaw, S.C. and D.H. Johnson. 1995. Slope morphology derived from digital elevation data. In: Proceedings, 1995 NW ArcInfo Users Conference, Coeur d"Alene, ID, October 23-25, 1995.

Spies, T.A. and S.P.Cline. 1988. Coarse woody debris in forests and plantations of coastal Oregon. In: Maser, C. et al. (eds.) From the forest to the sea: A story of fallen trees. USDA Forest Service Gen. Tech. Rep. PNW-GTR-229, Portland, OR.

Spies, T.A., J.F. Franklin, and T.B. Thomas. 1988. Coarse woody debris in Douglas-fir forests of western Oregon and Washington. Ecology, 69(6): 1689-1702.

Steinhauer, D.R. 1974. Lower Lake Creek, The Deadwood-Triangle Lake Area of Lane County. Unpub. manuscript.

Teensma, Peter D.A., John T. Rienstra and Mark A. Yeiter. 1991. Preliminary reconstruction and analysis of change in forest stand age classes of the Oregon Coast Range from 1850 to 1940. USDI, Bureau of Land Management, Tech. Note OR-9, Portland, OR.

USDA Forest Service. 1993. Watershed protection and restoration in the mid-Oregon Coast Range. Unpub. report. Siuslaw National Forest, August 18, 1993, 18 pp.

USDA Forest Service. 1994a. North Fork Siuslaw watershed analysis. Unpub. report. Siuslaw National Forest, 100 pp.

USDA Forest Service. 1995a. Cummins/Tenmile watershed analysis. Unpub. report. Siuslaw National Forest, 113 pp.

USDA Forest Service. 1995b. Assessment report of federal lands in and adjacent to Oregon coast province. Unpub. report. Siuslaw National Forest, Corvallis, OR. 2 vols.

USDA Forest Service. 1996. Plant association group model. Preliminary report, Siuslaw National Forest, Corvallis, OR.

USDA Forest Service/USDI Bureau of Land Management. 1990. A Conservation Strategy for the Northern Spotted Owl: Report prepared by an Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl. Portland, Oregon.

USDA, U.S. Department of Commerce, USDI, Environmental Protection Agency. 1993. Forest ecosystem management: an ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team, Portland, OR: USDA Forest Service, US Dept. of Commerce, National Oceanic and Atmospheric Admin., National Marine Fisheries Service; USDI, Bureau of Land Managment, Fish and Wildlife Service, National Park Service; Environmental Protection Agency. 1033 pp.

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

US Department of Commerce. 1993. 1990 Census of Population and Housing; Population and Housing Characteristics for Census Tracts and Block Numbering Areas, Eugene/Springfield, OR MSA. Economics & Statistics Administration, Bureau of the Census.

USDI Bureau of Land Management. 1995. Lake Creek watershed analysis. Unpub. report. BLM-Eugene District, Eugene, OR.

US Fish and Wildlife Service. 1986. Recovery Plan for the Pacific Bald Eagle. USFWS, Portland, OR. 160 pp.

Wade, J.E. and R.J. Wittrup. 1987. Analysis of Extreme Winds at Pacific Northwest Wind Energy Survey Sites. Bonneville Power Administration, Portland, OR. BPA 87-24: 131-137.

Washington Dept. of Natural Resources. 1993. Standard methodology for conducting watershed analysis. Ver. 2.0, Washington Forest Practices Board, Olympia, WA. 85 pp.

Wright, P. (In progress). Effect of fire regime on coarse woody debris. MS thesis, Oregon State University, Corvallis, OR.

# ACRONYMS

| | |
|---|---|
| ALRU | red alder |
| ATM | Access and Travel Management |
| BLM | Bureau of Land Management |
| CWD | Coarse woody debris |
| FS | Forest Service |
| FWS | US Fish and Wildlife Service |
| GASH | Salal |
| GWEB | Governor's Watershed Enhancement Board |
| HABSCAPES | Habitat suitability model |
| LSR | Late-Successional Reserve |
| LTA | Landtype association |
| LWD | Large woody debris |
| NMFS | National Marine Fisheries Service |
| ODF | Oregon Department of Forestry |
| ODFW | Oregon Department of Fish and Wildlife |
| PA | Plant association |
| PAG | Plant Association Group |
| POMU | swordfern |
| PSME | Douglas-fir |
| RHMA | rhododendron |
| RUSP | salmonberry |
| THPL | western redcedar |
| TSHE | western hemlock |

# APPENDICES


A Public Involvement
B Soil Moisture Levels and Patterns
C Analysis Methods
D Seral Stages for 1990's Vegetation Layer
E Characteristics of Ecological Units
F Early Sawmills of Indian/Deadwood
G Wildlife Resource Data
H Regional Forester's Sensitive Species List
I Road Inventory
J Subwatershed Summaries
K Stream Habitat Condition Ratings
L Landscape Block Data
M Priority Management Recommendations by Landscape Block
N Subwatershed Priorities for Restoration

## Appendix A. Public Involvement

The Indian/Deadwood watershed analysis provided a unique public involvement opportunity. Residents of the Deadwood watershed have a strong interest in analyzing their local landscape. They have an active Coordinated Resource Management Program for the Deadwood Creek area and received Economic Initiative funding to begin riparian and in-stream restoration projects on private land. They were aware of the watershed analysis before it began and expressed a strong desire to participate. Areas where Deadwood residents specifically expressed an interest included:

1. Identifying current community restoration projects.
2. Providing continuity between restoration efforts on Federal and private lands.
3. Assisting with both historical and current perspectives of human activity in the watershed.

Residents of the Indian Creek community have also been aware of watershed analysis. Many have a strong interest in the process and have concerns that the Forest Service might be developing a plan to place more restrictions on private land uses. Residents of Indian Creek have a long history in the watershed. Many are descendants of original homesteaders, making their knowledge of and connection to the watershed invaluable. Areas where Indian Creek residents specifically expressed an interest in the watershed included:

1. Assisting with both historical and current perspectives of human activity in the watershed.
2. Discussing a Forest Service perception that residents have not managed their lands appropriately.
3. Identifying concerns about reducing access on Forest Service roads.

### Objectives for Public Involvement

The watershed analysis team identified the following objectives for public involvement:

- Clearly identify the purpose for the analysis and how people can be involved in it.
- Develop an inclusive process that identifies key contacts, stakeholders and others.
- Ensure that all interested publics understand how their participation will be used in the analysis.
- Help initiate and support dialogue between the two watersheds.
- Create forums for clear communication between team members and the public. Allow controversies to be surfaced and encourage open discussion of all points of view.
- Maintain contact and continue working with residents throughout the analysis process and during project design that might occur as a result of the analysis.
- Paint a long-term vision and explain changes that may begin to take place in order to meet vision.

To help determine how to meet those goals, the Public Affairs team member created a communications plan. The plan served as a guide for the public involvement process.

**Activities**

Table I identifies the actual public involvement events that occurred during the Indian/Deadwood watershed analysis process.

Table 1. Public Involvement Events

| Date | Event | Participants | Comments |
|---|---|---|---|
| Ongoing | Personal Contacts | About 60 | Team members began making personal contacts with residents and other interested individuals early in the watershed process. These contacts have been by phone or in person and are continuing. |
| Aug. 31, 1995 | Newsletter #1 | 184 Sent<br>30 Responded | This newsletter described the watershed, outlined tentative dates for the analysis completion and asked people who were interested in the analysis to respond. See Attachment B. |
| Sept. 6, 1995 | Open Meeting | 11 Attended | The meeting was a good opportunity to begin dialogue with residents. People from both watersheds attended. |
| Oct. 3, 1995 | Open Meeting | 1 | The team had not expected participants at this meeting because it had not been publicized. |
| Oct. 24, 1995 | Newsletter #2 | 291 Sent<br>20 Responded | This newsletter went to all who responded to the initial letter and to most property owners in the Indian and Deadwood watersheds. It updated some information from the first newsletter and included the Issues and Key Questions that would be addressed during analysis. See Attachment C. |
| Oct. 27, 1995 | Meeting at Deadwood Community Center with Coordinated Resource Management Planning Group and other interested people. | 18 Attended | The WA team gave aquatic and terrestrial overviews about the watersheds and requested information from participants. |
| Dec. 8, 1995 | Open House | 8 Attended | The open house was an opportunity for people to generally become more familiar with the watershed analysis process. |
| Dec. 9, 1995 | Workshop | 16 Attended | The workshop was designed so that participants would work with team to identify landscape level sorts of opportunities. |

WHAT DID PEOPLE SAY?

**Salmon Decline**: Of all the concerns identified in the Indian/Deadwood watershed, the one which stood out the most was a need to improve the numbers of anadromous fish. People from both watersheds voiced this concern, however people had different opinions about what was truly causing fish declines. Some recognized that improving in-stream habitat is critical to slowing the decline in fish populations while others felt the main problem revolved around forces not controllable within the watershed like ocean fishing or a higher population of sea lions. Others believe that in-stream work currently being done within the watershed is more detrimental than helpful to the fish.

Deadwood community residents expressed an interest in working with the Forest Service to improve stream habitat. Through an Economic Initiative Funding grant, they have begun salmon restoration work. They are using the monies to purchase large wood to place in streams, fencing to keep livestock from streams, and trees to plant in riparian areas. Prior to receiving this funding, the "Hire a Fisherman" program through the Oregon Department of Fish & Wildlife allowed their watershed council to conduct 20 miles of in-depth surveys beginning at the mouth of Deadwood Creek. They are currently doing spawning surveys using this program.

Other suggestions included:

1) Nature will restore stream habitat. Do not continue throwing money in this direction.
2) Recommend re-evaluating fish structures. They are not creating habitat and in some cases are destroying it as sediment washes around the structure.
3) Private land owners need to have some financial incentive to maintain trees along riparian areas. Many of these trees were planted for harvest purposes, not to buffer streams.

**Timber Harvest** Suggestions included:

1) Include recommendations for harvesting timber.
2) Recognized that halting timber harvest has left lots of dead and dying trees in the area and will lead to increased insect-killed stands and fuel build-up for fire.
3) Plantations are becoming a fire hazard.
4) Recommend lighter thinning prescriptions so that trees can self-prune and create better quality wood.
5) Recommend salvaging dead and dying wood.

**Roads** Suggestions included:

1) Recommend closing most roads, but leaving some corridor roads open.
2) Include an assessment of county roads, state roads and bridges in the analysis.
3) Describe the impact of roads and the potential impact from unmaintained roads on streams.
4) Recommend discontinuing water barring practices.
5) Assess how road changes will impact the management of industrial forest lands, including access, road maintenance and closures of road systems for access to private property and hauling of forest products.
6) Recommend considering the investment already made to roads before allowing them to close.

**Hunting**

Address concern that deer populations are declining while the number of hunts and the lengths of the seasons are increasing.

**Peoples' Voices**

1) Listen...the social component is the key to making changes to terrestrial and aquatic habitats viable.

2) Pay closer attention to what the long time local people have to say.

3) Do not let the analysis affect private lands.

**A Sample of Voices from the Watershed:**

Some participants chose to write to the team. The following are pieces of their letters, with a few direct quotes from conversations, to present the diversity of opinions that exist in the watershed.

Indian Creek Property Owner

"I bought the property (without) the standing timber so I have a long-term commitment to the site. Reforestation and conversion from farm land to a forest plantation will be my primary focus."

Deadwood Property Owner

"I have a piece of the Siuslaw National Forest -- 80 acres. I own 1 mile of the Deadwood Stream which I renamed the Salmon Creek stream. I have worked with the game commission group in Oregon about this stream since 1975. This area is mine. I have not allowed tree cutting on and along this stream. Between about the Salmon and the Beaver, things are right now."

Indian Creek Resident:

"I bought this property in 1969 (when the fishing was still good) and started building in 1982. I have seen this area continue to decline. You don't have to be a hydrologist or biologist to see the problem: excessive logging and road building. Both subsidized by taxpayers. Cattle grazing in the stream beds doesn't help the situation. With the political power the logging companies have, I doubt we will ever see any improvemen."

Deadwood Creek Resident:

"Almost 20 years ago, (a person from) Blachly described to me how as a teenager, he helped log the area 10 miles up Deadwood Creek and participated in the dynamiting of the dam to drive the logs downstream."

Indian Resident:

"I was born and raised on Indian Creek, and my Grandfather homesteaded there around the turn of the century, about 1900. Most of the trees along the steam side were removed to provide cleared areas for farming some timbering. This provided a home and environment for a family of 13 to be raised. The stream band were mostly bare for the entire length of Indian Creek, some 10 miles or so, but there were plenty of fish and lots of game. There were mill ponds across the main stream with logs, bark, debris, and any other debris that today would be considered terrible, but yet every year hundreds of salmon returned to spawn. This activity continued until the late forty's's and into the early 50's. At this time, all dams were gone all stream side logging was done, and the property was completely logged, yet there was still lots of Chinook salmon, silver salmon, jack's, steel head, and native trout.

I can remember when one had to scare the salmon say from the logging tractors so they wouldn't get run over. The fish were in abundance. The logging completely stopped by 1952, and the fish still kept coming back every year for twenty some years thereafter. Keep in mind that the stream banks

were not allowed to grow ack to their natural state and the river bottom and sides were no long disturbed. The stream bottom was cleared of all debris, but he fish kept spawning for 20 years."

Deadwood Resident:
"The most striking physical characteristic of that watershed what the thousands of white barkless snags. Early European settlers named the area "Deadwood" because of it."

Deadwood Resident:
"There were more than 16 crossings on the creek in the early 1900s. Dead had the highest instances of splash dam logging. The Creek was bedrock, bedrock, bedrock because of splash dams and efforts to straighten the creek out."

Deadwood Resident:
"Alpha Farm is the identity of the community. The community is primarily an older population with no real population change. The landscape weeds people out. Few can really sustain themselves there."

Indian Creek Property Owner
*"The analysis takes the approach that a watershed problem exists and as I stated to you earlier, there is no merit to this approach. To come out and blatantly allocate the federal lands to a (LSR) late successional reserve, to me simply means to make the whole area a park.... Mature coniferous forests do just what your goals and objectives indicate. They mature and die. Now isn't this a great way to handle a natural resource that is one of the very few that will provide jobs and commerce in perpetuity."*
*"You have analyzed the stream conditions with a very narrow focal point. You have taken all of the negatives and combined all of the stream conditions so that the end results will be poor, that is for the written watershed analysis.... The West Fork of Indian Creek is a prime example. The fish commission has been taking fish from this area for years and, as far as I know, has yet to replant. Are the runs dying?"*

<u>In response to Key Question concerning streams:</u>
*"Water quality conditions have to be given, not just a one day snapshot, but at least long enough period so that outside conditions aren't analyzed as the norm for the area. Natural sedimentation is needed to maintain a good stream bed for spawning, if not, the stream will naturally erode to bed rock because of the great variation of stream flows. The large amount of rain that occurs in the coast range does not lend to putting silly things in any of the streams."*

Deadwood Resident
*"If one car a day drives on that road (Forest Service Road 63), it is a traffic jam."*

WHERE DO WE GO FROM HERE?

The team expects to work with both the district and interested publics to explain the findings and recommendations outlined in the watershed analysis. The District will use the watershed analysis as a basis for identifying watershed restoration projects and will continue public involvement efforts within the watersheds. The team expects to distribute a third newsletter letting people know the analysis is complete and highlighting key points. Team members will continue to be available to

share information with anyone or group interested in learning more about the watershed or watershed analysis.

## WHAT WILL WE DO WITH EVERTHING WE'VE HEARD?

Public involvment is a relationship-building process. While not every comment has been reflected in this analysis, all input has helped the team shape their thoughts and increase their understanding of the watershed. Many concerns cannot be addressed in this analysis because the document is not intended to make decisions about future projects in the watershed. Rather it documents the ecological processes and current conditions within the watershed, assembling information that will be used in future decisions. People now have an opportunity to get involved in the decisions which the District will make based on information provided in this analysis.

•The following people either expressed an interest in or provided information for the Indian Deadwood Watershed Analysis: (Note: This list does not represent the full mailing list developed for the analysis.)

| Name | Affiliation | Name | Affiliation |
|---|---|---|---|
| Bob Almasie | (Don) | Ray Kinney | |
| Kathy Barry | US Fish & Wildlife | Sam Konnie | NW Steelheaders |
| Jerry Beatty | USFS Regional Office | Jennifer Knight | |
| Barb Beers | Indian Creek Resident | Curt Loop | Regional Ecosystem Off. |
| Dick Beers | Indian Creek Landowner | Skip Lovell | Lane Cnty Public Works |
| Elaine Beers | Indian Creek Resident | Allen Makinson | NRCS |
| Larry Beers | Indian Creek Resident | Roy Maschkie | (don) |
| Marian Beers | Indian Creek Resident | Art McCoy | Oregon Dept of Forestry |
| Thane Beers | Indian Creek Resident | Mark McNutt | Deadwood Creek Resident |
| Walt Beers | Indian Creek Resident | Steve Merwin | Watershed Landowner |
| Richard Benedict | Deadwood Creek | Saundra Miles | BLM |
| Landowner | | Jack Monroe | (Don) |
| Scott Bonci | Deadwood Creek Resident | Ivan Norris | Indian Creek Resident |
| Michael Boyd | Rosboro Lumber | Greg Norton | Confederated Tribes |
| Lisa Brown | Coast Range Association | George Oldershaw | Deadwood Creek Resident |
| LeRoy Bryant | Indian Creek Resident | Maggie Oldershaw | Deadwood Creek Resident |
| Gerry Burnett | Deadwood Creek Resident | Kathleen Opheim | SWCD |
| Earl Calkins | (Don) | Honore Pasdral | Deadwood Creek Resident |
| Don Carlton | Deadwood Creek Resident | Howard Pasdral | Deadwood Creek Resident |
| C'alista Cates | KCST | Jesse Pattison | Deadwood Creek Resident |
| Ian Chisholm | Watershed Landowner | Elaine Pattison | Deadwood Creek Resident |
| David Cramsey | Campbell Group | Stan Poe | Indian Creek Resident |
| Jean Nelson Dean | Eugene BLM | Dick Ralls | Indian Creek Resident |
| Ellie Dumdi | Lane Cnty Commissioner | Dick Rohl | Swanson Superior |
| Caroline Estes | Deadwood Creek Resident | John Rollins | Davidson's Industries |
| Eric Fetters | Siuslaw News | Mary Beth Schmidt | NRCS |
| Carl Finseth | (Don) | Stan Scott | Indian Creek Resident |
| LeRoy Fish | SSOC | Erla Scott | Indian Creek Resident |
| John Gabrielson | EPA | Tom Shafer | Salmon Outreach |
| Earl Gillmore | Indian Creek Resident | Toby Shappell | Indian Creek Landowner |
| Richard Gross | Deadwood Creek Resident | Alice Shapiro | Interested in Watershed |
| Steve Hagar | Deadwood Creek Resident | Sally Snyder | Deadwood Creek Resident |
| Neil Harwood | (Don) | Tom Spies | PNW Forest & Range |
| Rachel Harwood | (Don) | Exper. Sta. | |
| Curtis Hendricks | Deadwood Creek Owner | Steven Stanford | Interested in Watershed |
| Allen Herring | Watershed Landowner | Julie Stangell | Weyerhauser |
| Mary Herring | Watershed Landowner | Jack Stillwell | |
| Bob Hirsch | Deadwood Creek Resident | Rex Storm | Associated Oregon Loggers |
| Gary Hoppe | Eugene BLM | Johnny Sundstrom | Deadwood Creek Resident |
| Robert Jacobs | Deadwood Creek Resident | Tim Sweet | Rye Tree Service |
| Carol Jeffries | Florence Resident | John Thomas | |
| Paul Jeske | Salem BLM | Mary Upchurch | Deadwood Creek Resident |
| Wayne Johnson | (Don) | Vicky Wade | Deadwood Creek Resident |
| John Kelly | Indian Creek Resident | Velma Wells | (Don) |
| Steve Kinkade | Watershed Landowner | Don Whereat | Confederated Tribes |

| | |
|---|---|
| Ron Whitburn | West Mountaineers |
| Bob Wideman | Deadwood Creek Resident |
| Oliver Wilcut | (Don) |
| Harry Wilkinson | Indian Creek Resident |
| Betty Wilkinson | (Don) |
| Joanne Wu | Nat. Marine Fisheries Svc. |

## Appendix B. Soil Moisture Levels and Patterns

Coarse scale, available soil moisture classes ranging from 1 to 3, wet to dry, were developed for the Federal Lands Assessment (1995). These are relative ratings that compare seasonal available soil moisture within an eco zone that generally has much higher available soil moisture levels during all seasons than virtually any place in the west. Differences in available soil moisture in the central Coast Range vary only during short periods of low rainfall in mid to late summer. All soils are not limited in their potential for plant growth by soil moisture during the rest of the year. Although the Indian/ Deadwood area is dominated by class 3, dry soils, (87%) except in the valley bottoms where soils derived from alluvial deposits occur and steep slopes (56% = 30-60 % slopes, 14% =60+% slopes), a closer look at soil characteristics and slope classes better describe the "dry to wet" environments that strongly influence the plant communities.

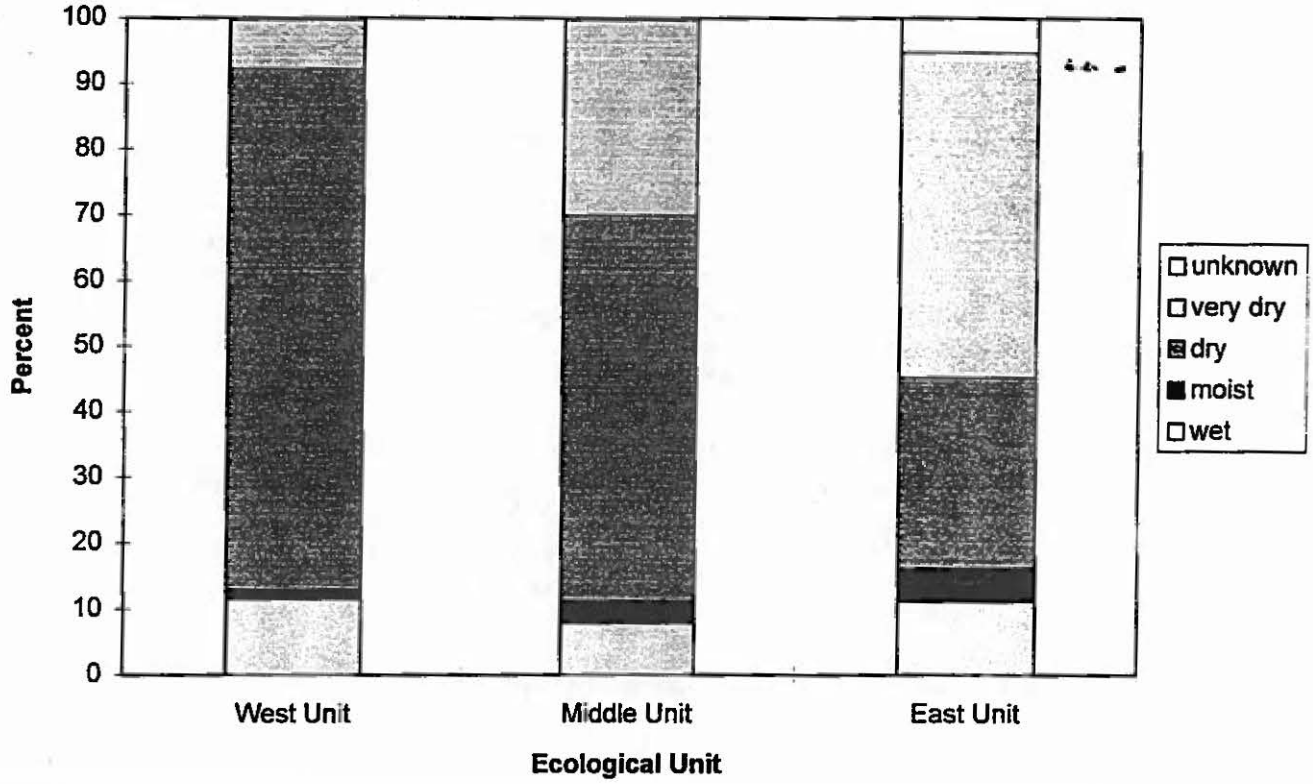
Slope classes were determined from the DEMs and the soil characteristics from the SCS Soil Survey of Lane County, OR. Slope classes (0-35, 35-60, 60+), texture (clays in both surface and subsurface horizons to no clays, soil profile dominated by gravels and cobbles) and thickness of the soil profile (0-20", 20-50" 50+), as well as verification with George Bush (Forest Soil Scientist with 20 years of experience with these soils) further refined the broad classes.

The following table summarizes the dominant soil types, acreages and soil moisture classes in Indian/Deadwood:

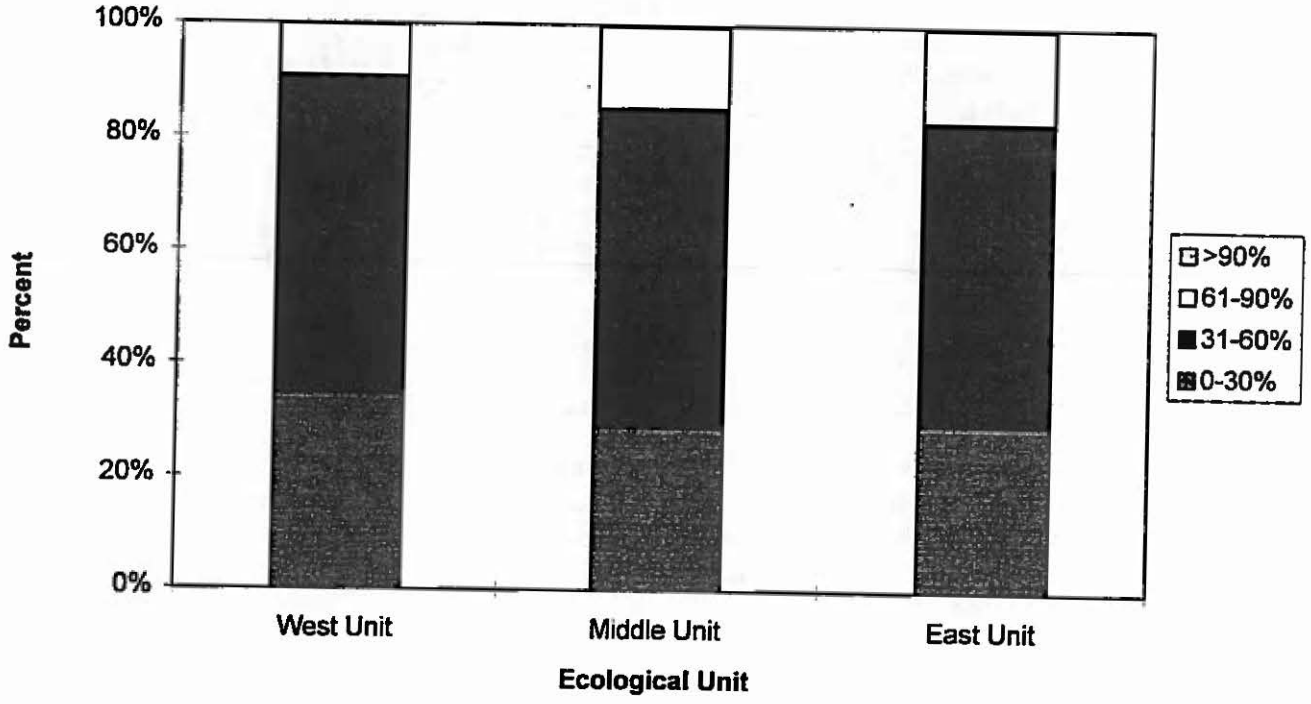
| Soil Type | Slope Class | Acres | Soil Moisture |
|---|---|---|---|
| Meda L | 2-12 | 3370 | 1, wet |
| Preacher L | 0-30 | 599 | 2, moist |
| Preacher L | 30-50 | 1876 | 2, moist |
| Bohannon GRL | 0-30 | 4694 | 3, dry |
| Bohannon GRL | 30-50 | 3685 | 3+, very dry |
| Bohannon GRL | 50-90 | 11741 | 3+, very dry |
| Preacher/Bohannon CX | 60-90 | 34363 | 3, dry |
| Digger GRL | 10-30 | 7 | 3, dry |
| Digger GRL | 30-50 | 1017 | 3+, very dry |
| Digger/Rock Outcrop CX | 50-85 | 5762 | 3+, very dry |
| Kilchis VCOBL | 60-90 | 34 | 3+, very dry |
| Salander SIL | 60-75 | 246 | 3, dry |
| Blachly SICL | 5-30 | 2842 | 1, wet |
| Blachly SICL | 30-50 | 907 | 1, wet |
| Honeygrove SICL | 30-60 | 18 | 1, wet |

The distribution of these wet to dry environments follows the Ecological Units with the proportions of the driest soils and steepest slopes in the East Unit and higher proportions of wetter soils and more gentle slopes are in the West Unit. The following charts verify the relatively wet to dry environments across the watershed and the plant communities that are influenced by this physical environment.

## Soil Moisture Conditions by Ecological Unit




## Summary of Slope Classes by Ecological Unit



## Appendix C. Methods of Analysis

### I. Synthesis:

Synthesis was a two-step process that included an ecological synthesis, and the application of the ecological synthesis to produce a landscape management design to help guide project planning and implementation. We began the synthesis process early by identifying the dominant physical character of the watershed (climate, soil, landform), the dominant disturbance processes and biological response (vegetation, wildlife, and aquatic organisms)to these.

Examining Processes at Three Scales

We recognized processes at more than one scale. Figure C.1 illustrates the components of analysis at three scales. The components of Figure C.1 are describe below.

#### Coarse Scale

At the coarse scale (20,000-50,000 acres), we examined broadly classified soil-climate zones identified in the Federal Lands Assessment. Soil-climate zones were mapped by combining soil types and land type associations. Using maps of shaded relief, soils, and aspect generated in GIS, we characterized the gradation in landform features from east to west. Specific soil characteristics that influence soil moisture conditions were analyzed to describe the gradation of soil moisture conditions. We overlaid this physical environment with the plant association group (PAG) map to describe the potential vegetation. This relationship is somewhat circular, because topography and moisture are two of the elements of the PAG model.

We gave consideration to the fire regime blocks proposed in the Federal Lands Assessment, but since only one or two fire history studies have been completed in the Coast Range (Heyderdahl et al 1993), we used Agee's (1993) description of fire history of the Coast Range prior to the 1850s and relied heavily on a fire history study currently underway (Impara 1995) which added considerably to our knowledge of fire in the watershed because the field transacts crisscross the Indian-Deadwood watersheds. We used this data and analysis to characterize the fire regimes on the east side and west sides of Deadwood Creek and estimates of fire freqency east of the watershed (Long, 1995) to characterize the fire regimes for the watershed.

#### Intermediate Scale

We examined subwatersheds and land type associations by examining stream densities and patterns (trellis in the NW corner and dendritic in east), valley confinement and gradient distributions, and riparian vegetation. We characterized subwatersheds in tems of inherent physical characteristics and management history. We investigated riparian vegetation patterns and the delivery and routing of sediment and wood through stream systems (by confinement and gradientsettings). We investigated riparian vegetation patterns correlated with land type associations, and the distribution of the plant association groups (PAGs) across the watershed. This was one piece of the riparian and aquatic strategy to manage for stream protection and "restoration" through time.

The subwatersheds do not nest within LTAs, soil zones, or fire regime blocks. The awkwardness of bridging terrestrial and aquatic processes was apparent in developing the landscape management

design (Chapter 6). When setting priority areas for restoration projects, in only a few instances did the highest priority areas for thinning (stands)for terrestrial objectives and stream rehabilitation overlap.

**Finer Scale**

We subdivided the LTAs by topographic position (ridge, slope and valley) to look for finer scale vegetation patterns. We overlaid the plant association groups (PAG) on top of the landforms and predicted a range of stand structure and composition for the PAGs. We proposed successional pathways for the environments and tested those with the vegetation layer, which identified primary species for two to three canopy layers.

In the field, we examined species composition and structure and adjusted the PAG model to better represent the ecological zones for the analysis area. Using GIS, we examined the PAG distribution across the watershed for a gradation from east to west which correlated with the ecological unit boundaries.

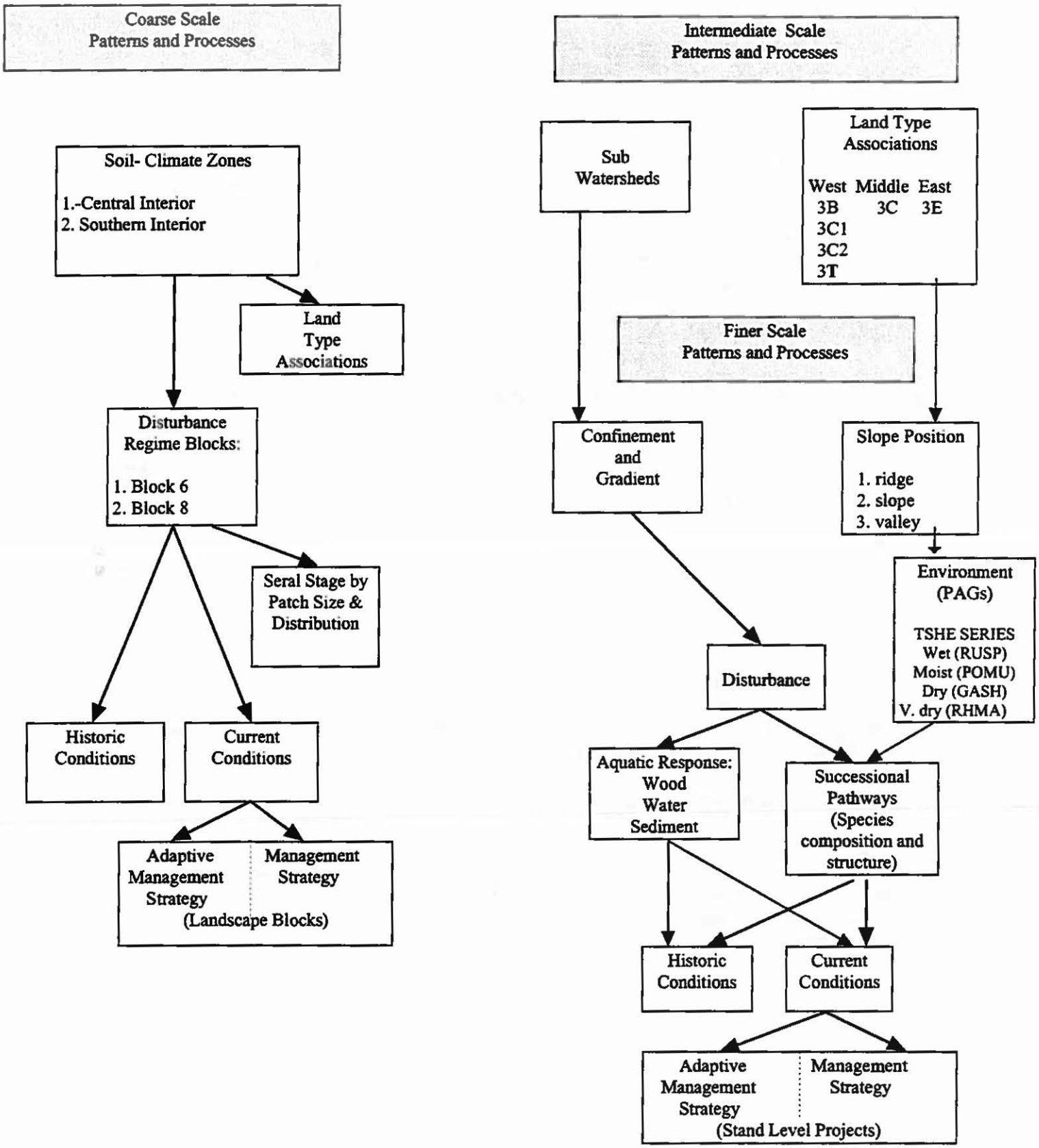
Riparian

For riparian areas, we used the PAGs to estimate the distribution of conifer vs. alder dominated riparian areas for the stream influence zone to predict potential CWD recruitment to streams and riparian areas, then compared the model output to current vegetation layer. We verified the proposed successional pathways in mature stands and plantations, assessed the amount of disturbance in the riparian zones, and considered the sources and movements of wood, water, sediment.

This was the basis of the Management Strategy (Stand Level Projects) used in Chapter 6 for the thinning projects and was a part of the Aquatic Restoration Strategy (Appendix N).

After examining aerial photos, initial field excursions, soil moisture levels, fire regime blocks, and LTAs, we stratified the watershed into three ecological units. This was helpful for synthesizing the analysis of vegetation, hydrology, fisheries and wildlife.

Figure C.1 Scales of Analysis for Indian/Deadwood Watershed Analysis



## II. Aquatics

### GIS Streams Layer

The original GIS streams layer derived from the forest streams coverage was found to be deficient for analysis at the watershed scale particulary in the private land holdings. Updating of this streams layer involved the use of 1989 aerial photographs and District TRI cards that overlay orthoquad maps. Streams were classed based on information from the TRI cards, and additions to the streams layer were predominately in the class 4 category. Accuracy in terms of stream density and exact location may vary across the landscape based on landform, photographic coverage and seral stage of vegetation impeding small scale topographic relief. First-order intermittent and perennial channels are especially illusive, but the stream network is estimated to be about 75% accurate which provides enough of a picture to analyze hydrologic function and potential Riparian Reserves. During the updating of this streams layer, a forest protocol was developed for future updates and will be used in subsequent watershed analyses.

### Confinement and Gradient

Methodology for the determination of confinement and gradient is described in detail in Washington Timber Fish and Wildlife's Watershed Analysis Manual (Washington DNR 1993). As prescribed in the manual, aerial photography was used to determine confinement by stream segment. Stream segments with valley width less than two times the channel width were identified as "confined", those with valley width between two and four times the channel width were identified as "moderately confined", and those with valley widths greater than four times the channel width were identified as "unconfined". Channel widths from Level II stream survey records were used to calibrate widths. Subsequent field visits to various locations in the drainage allowed verification of what had been identified using aerial photography. Confinement information was drawn on base maps and digitized into GIS.

USGS 7.5-minute topographic maps were used to determine gradient for all segments of the stream network. To provide a minimum segment length, gradient breaks had to be consistent for at least three consecutive contours. As described by the TFW Watershed Analysis Manual, six gradient ranges, when coupled with confinement, generally correspond to distinct transport capacities and they include the following: 0-1%, 1-2%, 2-4%, 4-8%, 8-20% and >20%. As with the confinement data, gradient information was drawn on base maps and digitized into GIS.

### Assignment of Priority Road Work

Appendix I lists all Forest Service and County roads included in Indian/Deadwood. Each road was rated for its potential to adversely impact aquatic resources (from 1 to 5, low to high, respectively) based on slope position, slope stability, whether or not the road was sidecast built, risk to known quality fish habitat, presence of known problems and ATM. These criteria were used collectively to make a decision about the rating for each road. For more discussion about how data sources were derived see Appendix I.

**Slope Stability Prediction**

Rating of high, moderate and low hazard areas was based upon relationships between slope form (convex, planar and concave forms in both plan view and profile) and slope gradient (percent). Analysis was done by applying standard ArcInfo GRID functions to a USGS 7.5-minute DEM lattice for the Indian/Deadwood watershed, following protocol outlined in *Slope Morphology Model Derived From Digital Elevation Data* (Shaw and Johnson, 1995). The following table shows the breakdown of high, moderate and low hazard ratings based on slope form and gradient.

| Slope form | Slope gradient | | |
|---|---|---|---|
| | A (<35%) | B (35-65%) | C (>65%) |
| convex | low | low | moderate |
| planar | low | moderate | high |
| concave | moderate | high | high |

**Culvert Analysis**

The working file for this document contains a culvert analysis done for selected areas of Indian/Deadwood. The road assessment only documented the size and condition of culverts that drained perennial streams and culverts associated with significant fills. As such, the culvert analysis dealt with only a portion of the culverts in Indian/Deadwood. Areas representing culvert sheds were estimated using 30-meter resolution digital elevation models and results were mapped on GIS. (The accuracy of some of these culvert sheds derived from the DEM was questionable and warranted verification on a topographic map.) Peak flow from these culvert sheds for a 100-year event were obtained using Campbell's (1982) equations for the Oregon coast range and actual required diameter given these predicted flows was derived from equations developed by the California Division of Highways. Final comparison of required and actual culvert diameters helped to locate some areas where culverts are undersized and this information was factored into priority ranking for road work in the watershed.

## III. TERRESTRIAL

**Vegetation Map Verification and Examination of Old Growth Structure**

We field checked the accuracy of the new vegetation layer (made from magnified aerial photo interpretation) by examining stands in size and species composition classifications (pole, mature conifer, pure hardwood, etc.). Then we compared the layer to the remotely sensed vegetation layer (CLAMS) to verify vegetation on private property and areas managed by BLM, which we didn't verifiy on the ground. The vegetation layer was comparable to field checks and the CLAMS layer. Consequently, we used the vegetation layer as evidence to check various assumptions about our vegetation analysis such as proposed successional pathways, old-growth structure, etc.

We examined the structure of all the stands in the analysis (20-30) classified as "multilayered-late successional" for stand structure and intermediate disturbance (wind, underburns, laminated root rot). We tried to correlate structure with PAGs and LTA's, and correlate disturbance with fire regime blocks. The correlations were somewhat evident and the basis for stratifying the watershed into three

ecological units. We verified the PAG mapping, made recommendations for changes to the PAG model, and used the new PAG maps for final terrestrial and riparian vegetation analysis.

**Development of Proposed Successional Pathways**

Proposed successional pathways are presented in Chapter 4, "Generalized Forest Succession". The current vegetation map was compared to the PAG map to view the viability of the proposed pathways by examining species composition in mature and young stands for three PAGs. If the proposed pathways are to be used to guide presciptions, they need to be tested to see if the available evidence confirms or refutes what's been proposed. This preliminary method was chosen because both data sets focus on the proportion of conifer/deciduous species mix and the vegetation map includes a large sample area (about 70,000 acres). The current seral vegetation map (GIS layer) identifies patches based on proportions of conifer/deciduous species at 20, 50, 80 and 100 percent, and the patch sizes for the two maps are similar.

Comparing the proposed pathways to the current seral vegetation map indicated the following:

For dry environments-- conifer plays a large role, but conifer /deciduous mix plays an equal role in the early seral (12%) stage. The low percentage of pure deciduous stands in the current vegetation layer (5% in natural and 1% in plantations) concur with the proposed successional pathways.

For moist environments-- conifer/deciduous mix (16%) persists longer into the mature seral stage than we expected. The natural mature pure alder (10%) may indicate more recent disturbance than we would expect naturally in the areas (usually mid-slope) in this PAG.

For wet environments-- there is considerably more pure deciduous (25%) natural mature stands and conifer/deciduous mix (19%) extend later into succession than we expected. Species composition in plantations indicates that conifer regeneration has been quite successful in RUSP areas and does not appear to be responsible for high levels of deciduous trees on the landscape and understocked plantations. We suggest alder may be more a component of the natural mature vegetation than we thought or that O&C lands that were logged and not regenerated are skewing the data. It is still unknown to what extent roadbuilding and subsequent landsliding have had on increasing upslope alder.

All "multi-layered" stands identified in the vegetation layer were examined in the field to interpret stand development. All these stands had considerable evidence of intermediate disturbance (wind, root rot and underburns), which accelerated stand development toward late seral conditions (Franklin and Spies, 1991).

**Riparian Vegetation**

There are many questions of interest about management of riparian vegetation. For this analysis area, we attempted preliminary estimates of the following: What are the natural levels of alder in the riparian areas? What are the natural levels of conifer available for woody debris recruitment, and how do those vary by stream type? Has management altered the distribution of alder in riparian areas? Where should we focus our efforts to establish conifers along streams?

To address these questions we explored the stand conditions for the wet, moist, and dry environments, as explained in Chapter 4, "Plant Association Groups", and the distribution of those environments across confined, moderately confined, and unconfined stream segments. We also placed the riparian vegetation in the context of the watershed by comparing riparian vegetation to the terrestrial vegetation of the watershed.

Three pieces of information were used in the analysis: 1) **confinement,** which identifies stream segments as woody debris source, transport or deposition zones, 2) **PAGs,** which are an indicator of environment and species composition, and 3) **seral stage distribution in riparian and upslope areas,** i.e. the current vegetation.

Extent of riparian vegetation in dry, wet and moist environments by confinement class

We estimated the size of the stream influence zone (from now referred to as riparian) by classifying confinement and gradient and examining the riparian vegetation within that area (Table C.1). The total riparian zone includes 42,427 acres in the waterhshed, and most of the riparian acres are in confined (81%) stream segments. The distribution of environments in the riparian zone is 15,143 acres (36%) in wet, 21,807 acres (51%) in moist, 3878 acres (9%) in dry, and 1600 acres untyped. The wet environment has a predominant role in unconfined (84%) and moderately confined (71%) stream segments. The moist environment has a predominant role in confined (59%) stream segments. The dry environment is almost entirely within the confined stream segments.

Table C.1. Distribution of environment by confinement class (acres).

| Environment | Unconfined | Moderately Confined | Confined | Total |
|---|---|---|---|---|
| Dry | 1 | 13 | 3864 | 3878 |
| Moist | 391 | 1198 | 20,218 | 21,807 |
| Wet | 2428 | 3618 | 9097 | 15,143 |
| Total | 2879 | 5123 | 34,424 | 42,427 |

Table C.2 shows the distribution of conifer, mixed, and deciduous stands across environments. Each environment has two rows of information--the top row portrays the natural stands and the lower row portrays plantations. The data shows the percent of vegetation type (conifer, mixed, and deciduous) by environment for each confinement class. Dry environments are shown only for confined stream segments because others had too few acres.

Table C.2. Seral stage vegetation by environment for confinement classes (percent).

| | UNCONFINED (620') | | | MODERATELY CONFINED (570') | | | CONFINED (520') | | |
|---|---|---|---|---|---|---|---|---|---|
| Environs (% /acres) total watershed | Pure Conif | Mixed Conif/ Decid | Pure Decid | Pure Conif | Mixed Conif/ Decid | Pure Decid | Pure conif | Mixed Conif/ Decid | Pure Decid |
| Dry (9%) | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 17 | 6 |
| 3,878 ac | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 10 | 1 |
| Moist (51%) | 8 | 25 | 44 | 20 | 16 | 30 | 26 | 18 | 13 |
| 21,807 ac | 4 | 13 | <1 | 9 | 13 | 1 | 12 | 14 | 1 |
| Wet (36%) | 3 | 16 | 42 | 10 | 22 | 43 | 15 | 22 | 30 |
| 15,143 ac | 2 | 10 | <1 | 5 | 8 | 1 | 9 | 12 | 1 |

Expected Range of Species Composition:

The analysis indicates that natural stands in moist and dry environments have a larger deciduous component than we expected from the proposed successional pathways, which predicted only a small deciduous component in mature and late successional stages for all environments, except for a small portion of the watershed. Although the differences could be due to error in vegetation typing and/or in the PAG model this seems unlikely, because the deciduous component is not limited to the natural stands; it is also a strong component in plantations.

The TSHE/RUSP successional pathway, where alder may be climax (Hemstrom and Logan, 1986, p. 25), may be common in the riparian areas. However, the evidence suggests most commonly riparian areas have a mix of species with conifer scattered throughout. Conifer are especially concentrated in drier portions of the riparian area, and there is a gradation toward fewer conifers from confined to less confined stream segments.

Given the stand conditions, i.e., species composition and successional pathways, for each of the three environments, we examined the expected range of species composition over time. For all three types of stream segments, the vegetation layer revealed a larger deciduous component in natural mature and late successional stands than was predicted from the proposed successional pathways described in Chapter 4.

In unconfined stream segments, we expected conifer/deciduous mix to dominate with considerable pure deciduous related to disturbance and the wet environments. However, the analysis shows more pure deciduous than we expected. This may be because of the difficulty of photo typing natural vs. older harvested hardwood stands. Some of the pure hardwood stands could be old homesteads that have gone back to alder.

In moderately confined stream segments, we expected predominantly conifer and expected pure hardwood to be minimal except low in riparian areas or areas of slides. However, again, deciduous acres are numerous, although there are considerable conifer/deciduous mix acres. Older riparian stands have a mix of Douglas-fir, western hemlock and western red cedar, and are not dominated by hemlock.

In confined stream segments, we expected predominantly pure conifer and conifer/deciduous mix but few pure deciduous acres, because the total buffer width is large enough (520 feet) to include upslope vegetation. However, the current seral vegetation layer indicates considerable pure deciduous acres, i.e., 2730 acres (30%) of the wet, confined acres, and 2630 acres (13%) of the moist, confined acres.

Management Influences on Species Composition:

To examine possible changes in the distribution of species composition for the moist and wet environments by our silvicultural planting treatments, we examined three assumptions voiced by managers/silviculturalists about species composition in plantations. The first assumption is that the moist environments have been the sites of our greatest regeneration success and probably have the majority of the "monoculture" Douglas-fir plantations that will require thinning to restore species diversity. However, in the moist environments a comparison of species composition in natural vs. plantations indicates the distribution of pure conifer and conifer/deciduous mix are about equal.

Second, we examined the assumption that the wet environments have been the sites of many of our regeneration failures. The rationale for that assumption is that alder competes better than conifer on wet sites due to high soil moisture and possibly because the units received hot slash burns after logging in the past. Although many of these older plantations were probably sprayed with herbicides and replanted, regeneration of conifer was often not as successful as desired. We anticipated the wet environments would embody the majority of the understocked plantations where commercial thinning is not required or feasible. However, regeneration of conifer on upper slopes in the wet environments has been more successful than we assumed. Plantation acres regenerated in pure conifer (2-12%) and conifer/deciduous mix (16-22%) are much higher than pure deciduous acres for plantations (1%). However, the pure deciduous in natural stands is a much larger percent (30-42%) of the total stands for each confinement class.

Unexpectedly, management practices appear to have obscured, rather than accentuated, the differences in species composition across the wet and moist environments. Past management resulted in a somewhat larger deciduous component in the plantations than desirable for timber management, however the current deciduous component is well within the natural range for the wet and moist environments in the early seral stages of succession.

Comparison of Riparian and Upland Vegetation

There are more deciduous overall than expected, though not as evident in plantations as in natural stands (Table C.3). One way to determine if these preliminary results are true is to do a similar analysis in natural riparian areas. The wilderness area in the Drift Creek of the Alsea in unconfined reaches of Franklin, Wasson, and Harvey Creeks would provide one piece of the range of conditions that would be valuable (but a drier environment).

Table C.3. Total Vegetation Acres: Distribution of Environments by Seral Stage (percent)

| Environment | Pure Conifer | Conifer/ Deciduous Mix | Pure Deciduous |
|---|---|---|---|
| Dry | 37 | 13 | 5 |
| 16% | 14 | 12 | 1 |
| | | | |
| Moist | 28 | 17 | 11 |
| 57% | 13 | 15 | 1 |
| | | | |
| Wet | 16 | 21 | 28 |
| 24% | 9 | 11 | <1 |

**Terrestrial Landscape Management Design**

The terrestrial landscape management strategy developed from a combination of ecological processes and current conditions. However, the pattern present on the landscape today--a highly fragmented forest with a dense road network--strongly influenced the design because of "pattern inertia", which means the landscape pattern would be difficult to change quickly so it will remain the dominant pattern for the next few decades.

**Modeling Coarse Woody Debris**

To model CWD for the watershed, we used a simulation model developed to examine the effect of fire history (frequency and severity), fire mortality, decay rates, and mortality rate in the new stand on CWD levels. The model will be described in Wright's thesis (in progress). Sources of fire frequency and severity were from ongoing and recently completed fire history studies within the analysis area (Impara, personnel communication) and adjacent to the area (Long 1995). The CWD model is based on a system developed by Harmon et al. (1986).

CWD was modeled as mass to maintain accuracy (since CWD decomposes at an exponential rate while volume changes little unless fragmented). Levels of CWD were then converted to volume since most silviculture prescriptions use volume or basal area.

| Type of Info | Contact | Source | Media | Resolution | Range | Availa | Integrity | Comments |
|---|---|---|---|---|---|---|---|---|
| **Vegetation** | | | | | | | | |
| Vegetation Condition | P.Wright | Aerial Photos | 9X9 photos | 1:10-1:12,000 | Forest wide | High | Good integrity | Photos for 1976,1982, 1990. Resolution varies from 1:10 - 1:12,000 |
| Vegetation Condition | P.Wright | Magnified Aerial photo interp'd | ARC/ Info | | Indian-Deadw | High | Good integrity | 3 canopy layers of canopy cover includes major tree and shrub ssp. |
| Vegetation Age/Structure | W. Cohen | Remote Sensing | ARC/Info | 25x25 meters | Western OR | High | Coverage is good. Warren and Tom say it is 80% accurate. | Doesn't differentiate pat 200 years in age. Doesn't differentiate young alder from pasture. |
| Plant Association Groups | C. McCain | Modeling | ARC/Info | | Forest wide | High | Moderate integrity. | Integrity unknown. Needs field verification. |
| Vegetation (ecoplots) | Area Ecolog | Field plots | Database /GIS | 500 sq. meter | Forest wide | High | Data is good, some plot locations are only in the neighborhood. | Floppy disks of all data has been made for each district. See Cindy McCain. |
| Vegetation (VSE) | C. Wetstein | Stand Exams (natural stands) | Database /GIS | | Forest wide | Mod | High integrity. | Quantitative info. Non random sampling. Stratified on land allocations. |
| Vegetation (MSS) | C. Wetstein | Stand Exams (managed stands | Database /GIS | | Forest wide | Mod | High integrity. | Plantations only. |
| Vegetation (CVS) | M.Bowdon (at WNF) | Field exams (ong | Database /GIS | | Region wide | High | High integrity. Unstratified, systematic sampling so can be use for most purposes. | 93 plots on Siuslaw 1994; 200 more to be examined in summer 1996. |
| **Historic Vegetation** | | | | | | | | |
| 1930s Historic Vegetation | J.Kwait | Aerial Photos | 9X9 oblique | | Forest wide | Mod | Good integrity | Originals at U. of O. Map Library Xerox copies (dark) at Siuslaw S.O. |
| 1940s Historic Vegetation | GIS network | County maps (PacMeridian Inc. | ARC/Info | | Forest wide | High | Moderate integrity. | Useful as one point in historic veg condition. |
| **Fire Events** | | | | | | | | |
| Fire Events | Wright/Kerti | Ph.D Dissertation | paper | | Forest wide | Low | Moderate integrity. Some fire boundaries field mapped. | OSU Library microfische. Juday (see ref.) |
| 1830-1940 fires | Wright/Kerti | BLM publication | paper | | Forest wide | Mod | Moderate. | Mapped fire magnitude. P. Teensma (see refs.) |
| Fires Central Coast | Wright/Kerti | Ph. D Dissertatio | paper/ARC | | Central Coast Valley-ocean | High | Good integrity. Field verified and statistical analysis of error. | Good documentation of methodology. and data. Peter Impara (see refs.) |
| Fire Regime Blocks | J.Kertis | Fed Lands Asses | paper/ARC | | Coast Range | High | Unknown. Needs to be verified. | Uses climate, fire behavior, topography, 1940s vegetation. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Soil and Water** | | | | | | | | |
| Soil, Bedrock & Landform | G.Bush<br>B.J. Ellis | Forest SRI | ARC/Info | Photo Recon | Forest wide | High | Data is good for broad scale forest level assessments, not suitable for analysis level efforts. | |
| Soils Mapping | C.Cloyd | Aerial photos | ARC/Info | 1:12,000 | Indian-Deadw | High | SCS mapping with physical features. | |
| Landforms (LTAs) | B.J. Ellis | Aerial photos | ARC/Info | | Forest wide | High | Integrity not known, needs to be field verified. | Geomorphology at broad scale, barely suitable for analysis level efforts. |
| Soil-Climate Zones | GIS network | | ARC/Info | | Forest wide | High | Good. Verified by Geo. Bush field experience. | Made from groupings of LTAs (see below). |
| State Basin Reports | McConnell | | paper | | | | | |
| Stream Temperature | McConnell | | | | varies | | | |
| Stream class | McConnell | Aerial photos/ field surveys. | ARC/Info | 4"/ mile | Indian Deadw | High | Forest layer verified. | |
| Fish Distribution | P.Burns | Surveys | PC data | | varies | | ID of species good, however only game species (trout & salmon) covered. | Gaps in space and time. |
| **Human Uses** | | | | | | | | |
| Historic millsites | D. Large | Local residents | ARC/Info | 1:24,000 | Indi-Dead | High | Locations are approximate | |
| Grazing allotments | Frounfelker | | paper, maps | | | | | |
| Grazing SUP | D. Large | Distirct | paper | | Distirct | High | Good integrity | |
| Land use -- private | ARC/Info | Lane County | paper | | Indi/Dead | Mod | Good integrity | Tax record data was mapped on GIS to approximate areas of residential, farm woodlot and industrial forestry. |
| Demographic Data | B. Daniels | Census reports | reports & CD | | Siu. River Bas | Mod | Good integrity | |
| Roads -- historic | | District data | ARC/Info | 1:24,000 | Forest wide | High | | See refs. |
| Roads -- current | | District | ARC/Info | | Forest | High | Needs updating. | |
| Recreation sites | D. Large | District maps | | | | | Streamside dispersed camping sites not mapped. | |
| Special Forest Products | L.Bernhardt | Local knowledge | paper, map | | Mapleton | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Botanical** | | | | | | | | |
| Special Habitat Data | L.Bernhardt | Misc. | paper, map | | Project areas | | | |
| Botanical Surveys | K.Grenier | | | | | | | |
| Sensitive Plants | K.Grenier | | Database | | Forest wide | | | |
| Noxious weeds | G. Miller | OR Dept of Agric | paper map | | | | | |
| Bryophytes, non vascular | L.Geiser | Some CVS plots surveyed | Database | | Region wide | | | |
| Native Grasses | K.Grenier | | | | | | | |
| Carex Database | K.Grenier | | | | | | | |
| **Wildlife** | | | | | | | | |
| T & E Database | Frounfelker | | | | Forest wide | High | | |
| Spotted owl surveys | L.Bernhardt | mylar overlay maps | Database/GIS | | Mapleton | Mod | Meets Regional Protocal Standards | Shows areas by year which were surveyed to regional protocal standards. |
| Spotted owl habitat | L.Bernhardt | | ARC/Info | | Forest wide | High | Accuracy is good. | Consists of nesting, foraging, and typical nesting habitat. |
| Bald Eagle Management A | Frounfelker | Siu. Forest Plan | ARC/Info | | Forest wide | High | | About 125 acre areas established during Forest Plan as high quality habitat. |
| Habitat Guilds (HABSCAPES) | Frounfelker | Karen Austin ran 4 guilds for WA. | ARC/Info | | Indian Deadw | High | Good. Much better vegetation layer than available for Forest wide HABSCAPES run. | HABSCAPES was run on habitat from new magnified aerial photo interp w/ buffer for area outside watershed boundary. |
| Critical Habitat for Murrelet | | USFWS | ARC/Info | | | High | Excellent | |
| Critical Habitat for Owls | | USFWS | ARC/Info | | | High | Excellent | |
| Marten, Pileated, Owl Habi | | Forest Info | ARC/Info | | | High | Good | |
| Wildlife sightings | Bernhardt | District Info | Paper | | | Mod | Good | |
| Snag Habitat Levels | | NWFP | | | | Mod | Fair/ Poor | |
| Big Game Habitat Effective | | ODFW / FS | ARC/Info | | | High | Good | |
| Bald Eagle Sightings | | District Info | ARC/Info | | | High | Good | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spotted Owl Locations | | Forest Info | ARC/Info | | | High | Excellent | |
| Murrelet Sites | | Forest Info | ARC/Info | | | High | Excellent | |
| **Other Data** | | | | | | | | |
| NF Plan Allocations | GIS network | Regional Plan | ARC/Info | | Region 6 | High | Good | |
| Land Uses | GIS network | | ARC/Info | | Region 6 | High | Good | |
| REAP Data | J.Martin | Area Ecol from R6 | paper | | Region 6 | High | Moderate | Data completed by teams of specialists from each forest. Timelines tight and it combined many data sources. |
| District Project Input | D.Karnes | Timber sales, Fish projects. | District Files | Varies | District | Mod | | Project input ranges from very general to site specific |
| Elevation (topo relief) | GIS network | | ARC/Info | 80' intervals | Forest wide | High | Good. | |
| Orthophoto quads | GIS network | | paper/ARC | 4"/mile | Forest wide | High | Good | GIS layer, acetate and paper. |

## Appendix D. Classifications for Seral Stages, 1990 Vegetation Layer

| Graph Legend | Seral Stage | Species, Composition and Size Class |
|---|---|---|
| 1 | Grass/Forb | Pasture (usually grazing land) |
| 2 | Very Early Seral | Brush, seedlings (<1.0" dbh, at least 6' tall) and/or saplings (1-4.0" dbh) |
| 3 | Early Seral Conifer | Conifer (>80%) saplings and poles, or poles, 5.0-8.9" dbh |
| 4 | Conifer-Mix Pole | Conifer/deciduous mix (between 50% and 80% conifer) pole, 5.0-8.9"dbh |
| | and Deciduous-Mix Pole | Deciduous/conifer mix (between 50% and 80% deciduous) poles, 5-9"dbh |
| 5 | Young Conifer | Conifer (>80%) poles or small trees, 9.0-20.9"dbh |
| 6 | Young Conifer-Mix | Conifer/deciduous mix (between 50% and 80% conifer) poles or small trees, 9-20.9"dbh |
| 7 | Young Deciduous-Mix | Deciduous/conifer mix (between 50% and 80% deciduous) poles or small trees, 9.0-20.9" dbh |
| | and Mature Deciduous-Mix | Deciduous/conifer mix (between 50% and 80% deciduous) trees, 21.0-31.9" dbh |
| 8 | Mature Conifer | Conifer trees (>80%), 21.0-31.9"dbh |
| 9 | Mature Conifer-Mix | Conifer/deciduous mix (between 50% and 80% conifer) trees 21.0-31.9"dbh |
| 10 | Pure Deciduous | Deciduous trees (>80%), 4.9-31.9"dbh |
| 11 | Multi-storied/Late Seral | Overstory conifer (>32"dbh) with understory (>5'tall), conifer or conifer-mix |

Classification of seral stages for 1940's vegetation map:

See Federal Lands Assessment, Appendix D.1 (Development of Federal Lands Assessment North Coast Province Seral Stage Classification) (USDA 1995b) for a description of the seral stage classes used for the prelogging (1940's) vegetation data.

## Appendix E. Characteristics of Ecological Units

### WEST ECOLOGICAL UNIT

| Topo. Position | Physical Characteristics | Biological Response |
|---|---|---|
| **Overall** | • High percentage of questaform (asymmetrical) lands. Low relief.<br>• Highly dissected slopes have relatively wet soil conditions with relatively deeper soils. | • Wet to moist environment. The wettest PAG* has a wide distribution (41% of the watershed) and the driest PAG has a low distribution (23% of the watershed).<br>• Alder is large component of the vegetation on the landscape.<br>• Patch sizes are large due to infrequent, stand replacing fires. |
| **Ridges** | • Ridge shape is generally sharp rather than rounded. | • POMU and GASH occur on upper slopes and ridges.<br>• GASH occurs in small stringers on ridgetops. |
| **Slope** | Highly dissected slopes:<br>• Wettest conditions typically on N slopes.<br><br>Long, gentle slopes<br>• Drier soil conditions on S slopes. | Higly dissected slopes:<br>• RUSP (a wet PAG often associated with riparian areas) occurs on mid and upper slopes because of high soil moisture.<br>• Conifers widely spaced, old growth characteristics beginning in stands 100-120 years old (ie. large but fewer Douglas-fir with large limbs and wide crowns, clumps of pole to young red cedar in 2nd story, hemlock saplings in 2nd story.<br>• Remnants from 1850s fire are absent or few.<br><br>Long, gentle slopes:<br>• Relatively homogeneous micro environment slopes are drier than highly dissected slopes due to soil conditions and solar heating (S slopes).<br>• POMU is the most widely distributed PAG.<br>• Stand structure is single-story Douglas-fir, but age and size structure more variable than Ecological Unit East. Stump ring counts indicate Douglas-fir are 90-140 years, and manys sites have suppresed Douglas-fir 8" DBH and 15 ft. tall.<br>• 2-storied stands develop in headwall areas where trees that established early grew rapidly and have taken on the appearance of remnants (many have seed tree tags).<br>• Old-growth structure seems to always have resulted from an intermediate disturbance (underburn, wind mortality, or insects/disease). |
| **Valley** | • Potential for stream meandering in less confined valleys..<br>• Some trellis drainage patterns, especially in NW corner of watershed. | • Conifer regeneration (hemlock and red cedar usually occurs on down logs, or on old terraces/parts of the floodplain that have been abandoned.<br>• Alder is dominant in stands over a wide buffer in riparian areas and high on N slope, therefore, we expect lower natural levels of CWD in streams. |

*See Chapter 4, Table 4.4 for Plant Associations included in the Plant Association Groups (PAGs)

## MIDDLE ECOLOGICAL UNIT

| Topo. Posi-tion | Physical Characteristics | Biological Response |
|---|---|---|
| Over-all | .The central portion of the watershed.<br>.A transition zone between the east and west ecological units. It has characteristics of both.<br>.Steep short slopes are common, but relief is highly variable, with little pattern that can be generalized to the whole area. | .Moderate to moist environment. The various PAGs are more evenly distributed than East or West Unit with equal proportions of the wettest and driest PAGs.<br>.Patch sizes are large. Landscape is probably in 1 or 2 seral stages for prolonged periods, due to infrequent, stand replacing fires. |
| Ridge | .Ridge shape varies from sharp and narrow to rounded and wide. | .POMU and GASH are about equally common on upperslopes and ridges. |
| Slope | .Soils generally have moderate water holding capacity. | .Has characteristics of both East and West Unit vegetation.<br>.Contains some of the most productive conifer stands in the watershed (and consequently has been most intensively harvested).<br>.Has a lower compnent of alder than East or West Units. |
| Valley | | .Riparian vegetation is highly variable, but closely related to confinement and gradient setting.<br>.Riparian vegetation is related to relief, which is a complex, heterogeneous mosaic in this ecological unit. |

## EAST ECOLOGICAL UNIT

| Topo. Posi tion | Physical Characteristics | Biological Response |
|---|---|---|
| Over all | Landforms are large and broad relative to the East and Middle Units.<br>Generally low potential for input of hard gravels, except in Rock Cr. which comes of Windy Peak.<br>Most of this Unit is managed by the BLM and owned by private land owners. | Dry to moist environment. The driest PAG has the widest distrbution (36%) and the wettest PAG has the smallest distriibution ( 25%). The wet PAG (RUSP) confined to riparian zones.<br>Conifer is a large vegetative component of the landscape, and stands generally have high conifer density<br>Alder is a considerable component of the landscape, but for different reasons than the West Ecol. Unit--the probable cause is laminated root rot and a series of reburns from 1850s to 1930s.<br>High occurrence of snags (source: 1930s photos and current field work and airflight). |
| Ridge | Ridges are broad relative to the East and Middle Units. Ridge shape varies from sharp and narrow to rounded and wide.<br>Steepest, most unstable slopes are on the middle to upper portions of the spur ridge systems, and soils are often thin. | Ridges are dry as indicated by frequent occurrence of huckleberry, chinquapin and rhododendron.<br>Soils are seasonally droughty with low productivity. |
| Slope | Long, steep slopes. South aspects are seasonally droughty.<br>Soils have low to mod water holding capacity. | Patch size is small to moderate, probably from a combination of repeated fires (above) and high occurrence of laminated root rot.<br>On a wide scale, stand structure and composition are more complex than the Middle East Units.<br>Remnants from 1930s fire event are numerous in this ecol. unit (as indicated in 1930s oblique photos and current vegetation coverage).<br>Considerable self-thinning and laminated root rot results in high input of CWD throughout succession -- early to late seral stages |
| Valley | Narrow streams and confined valleys except mainstem streams.<br>Dendritic drainage pattern common. | The wet PAG is confined to small areas adjacent to drainage networks. We suspect high numbers of confiers in riparian areas relative to West and Middle unit because of high confinement and dry PAGs. |

**Appendix F. Early Sawmills of Indian/Deadwood**

The data for Indian Creek mills was compiled by Walt Beers and Larry Beers with Don Large on November 28, 1995. Data for Deadwood Creek mills was compiled by Carl Finseth with Don Large on November 27, 1995. Mills are indicated by blue (pre 1945) and green (post 1945) dots on Map 4.9. Locations and dates of operation are approximate.

**Indian Creek**

1. On Indian Creek, one half mile south of mouth of Elk Creek. Small mill; owned by Leep. Operated beginning in 1938 and ran intermittently for 5 years.

2. On Elk Creek at mouth of Indian Creek. Large mill; owned by Orval Phelps. Operated from early 1940's until 1947.

3. On Indian Creek across from mouth of West Fork Indian Creek. Small mill, owner unknown, operated for about one year in the late 1940's. This was also the site of the Kirby Brothers logging camp in the early 1900's.

4. On Smoot Creek. Sawmill, owned by Haskins, operated from 1953 to 1960. Lower Smoot Creek was dammed for log pond.

5. On Indian Creek across from mouth of Smoot Creek. Planing mill and particle board plant, owned by Haskins. Operated from 1958 to 1960.

6. On Indian Creek across from mouth of Gibson Creek. Sawmill, owned by Leep, operated from 1947 for 2 to 3 years.

7. One half mile up Taylor Creek. Sawmill, owned by Orval Phelps, operated from about 1935 to 1945. There was a plank road along Taydlor Creek to the mill.

8. On Indian Creek, one half mile upstream from mouth of N. Fork Indian Creek. Small mill, owned by David and Charley Beers. Operated periodically from 1889 to 1920's. The mill was set up in 1889 to cut lumber for the original house, barn, outbuildings and fences.

9. On Indian Creek, one half mile upstream from mouth of N. Fork Indian Cr. Sawmill, owned by Orval Phelps, operated in the late 1930's for a few years. The mill burned and was moved to Elk Creek (site #2) location.

10. On Indian Creek, one half mile upstream from mouth of N. Fork Indian Cr. Sawmill, owned by Harold and Buck Church, operated around 1938 for 1-2 years. Owners couldn't pay the bills or the help.

11. On a tributary of Indian Creek, one mile upstream from mouth of N. Fork Indian Cr. Sawmill, owned by Leep, operated from 1948-1949. Dammed creek for log pond.

12. On upper Indian Creek, two miles upstream from mouth of N. Fork Indian Cr. Tie mill, operated from 1945-1947.

13. On upper Indian Creek, two and one half miles upstream from mouth of N. Fork Indian Cr. Sawmill, owned by Leep, operated from 1944-1946. The mill had a dam and spillway on the creek.

14. About one and one half miles up N. Fork Indian Creek. Sawmill, owned by Alfred Mann, operated intermittently from 1889-1920.

15. On a tributary of N. Fork Indian Creek about 2 miles from the mouth of North Fork. Sawmill owned by Haskins, operated from 1946-1953. The creek was dammed for a log pond and logs were yarded downhill to the mill.

16 - 18. Three mills located upslope of site #15, also owned by Haskins and operated during the same time as site #15.

**Deadwood Creek**

1. On Johnson Creek near its confluence with Lake Creek (about one mile outside the watershed boundary). Sawmill, used to cut railroad ties, operated from 1940-1950. Residual material made a 200' high slab pile. The slabs and sawdust were pushed into Johnson Creek drainage.

2. Above Deadwood Creek about 1 mile from the mouth. Sawmill, operated in late 1950's and early 1960's.

3. On Deadwood Creek about one mile upstream from the mouth. Steam powered sawmill, operated in the late 1930's. A log boom was placed across Deadwood Creek to create a mill pond.

4. Four miles up Deadwood Creek. Sawmill operated for a couple years in the early 1960's.

5. About 1/4 mile up Failor Creek. Sawmill operated about 10 - 12 years beginning in the late 1930's.

6. On Deadwood Creek at mouth of Buck Creek. Steam powered sawmill operated from about 1930 - 1945. Deadwood Creek was used for the mill pond.

7. One half mile up Elk Creek. Large diesel-powered sawmill with edger and resaw, operated about 10 years beginning in 1938.

8. and 9. Two tie mills on Deadwood Creek about two miles above the mouth of Panther Creek. The mills were built on steep slopes so the residual material could be pushed over the hill.

10. One half mile up a north tributary of Panther Creek. Sawmill operated seasonally for 4-5 years during the late 1930's.

11. About four miles up Panther Creek. Large sawmill operated for 5-8 years in the late 1930's.

12. One mile up West Fork Deadwood Creek. Sawmill, operated 1-2 years in 1940's.

13. Two miles up Misery Creek. Sawmill operated intermittently for about 10 years beginning in the mid 1970's.

14. Four and one half miles up Deadwood Creek. Steam powered sawmill, operated intermittently for 10 years during the 1930's. The creek was blocked up to create a mill pond.

In addition to the sites listed above, numerous "tie" mills were in operation throughout the drainage during World War II to provide railroad ties for the high demand coming from large scale railroad construction. The mills were quick to set up and take down and were moved to new locations as timber became available. The mills typically operated for one to two months. Large amounts of residual material (unused 'sidecut') was produced by these mills and discarded near the sites.

## Appendix G. Wildlife Resource Data

Table 1. Acres of Existing Owl Habitat and Percent of Median Home Range for 29 Owl Activity Centers on Federal Lands in Indian/Deadwood

| Owl Pair Area Number | Habitat within Median Home Range of Each Activity Center | |
|---|---|---|
| | Acres | Percent |
| 7 | 1,471 | 33 |
| 21 | 1,317 | 29 |
| 22 | 1,588 | 35 |
| 24 | 1,968 | 44 |
| 35 | 2,256 | 50 |
| 37 | 771 | 17 |
| 38 | 1,936 | 43 |
| 44 | 1,697 | 38 |
| 45 | 1,245 | 28 |
| 47 | 1,724 | 38 |
| 50 | 2,068 | 46 |
| 53 | 1,598 | 36 |
| 62 | 2,438 | 54 |
| 71 | 368 | 8 |
| 72 | 1,480 | 33 |
| 73 | 1,703 | 38 |
| 84 | 1,216 | 27 |
| 91 | 2,425 | 54 |
| 94 | 1,784 | 40 |
| 99 | 1,336 | 30 |
| 102 | 432 | 10 |
| 110 | 1,636 | 36 |
| 112 | 921 | 20 |
| 113 | 1,457 | 32 |
| 82137 | 1,181 | 26 |
| 82721 | 1,249 | 28 |
| 83553 | 790 | 18 |
| 83913 | 1,224 | 27 |
| 84247 | 702 | 16 |

Refer to Chapter 4, "Wildlife Species and Habitats-Spotted Owls", for an explanation of median home range.

Table 2. Interior Mature Conifer Forest (> 500' from edge) by Landscape Block[1/] in Indian/Deadwood

| Landscape Block | Interior mature conifer (acres) | % of mature in interior |
|---|---|---|
| A | 367 | 12% |
| B | 148 | 10 |
| C | 282 | 9 |
| D | 442 | 22 |
| E | 360 | 10 |
| F | 4 | <1 |
| G | 58 [2/] | 2 |
| H1 | 215 | 11 |
| H2 | 31 | 8 |
| H3 | 31 | 4 |
| H4 | 415 | 21 |
| H5 | 179 | 8 |
| H6 | - | - |

[1/] Landscape Blocks are defined in Chapter 6.
[2/] Based on 9,090 total acres in Landscape Block G, which excludes Lower Lake.

Purpose of selecting interior forest: Forest areas that are greater than 500 feet from an edge are home to a subset of the species that reside in mature conifer forests. Interior forest habitats become more and more scarce as mature conifer harvest continues, until eventually it is lost. Knowing how much of this habitat and where is crucial to restoring this habitat on the landscape.

The following categories of vegetation were selected to assess current acres of interior mature conifer forest:

1. Stands of single-storied or multi-storied mature conifer or conifer-mix (at least 50% conifer) with and without remnants.

2. Stands > 80 years old or > 18" diameter at breast height.

3. Habitats > 500' from stand edge.

Map 1 in this appendix displays current areas of mature conifer forest and the portions of those areas that contain "interior" forest.

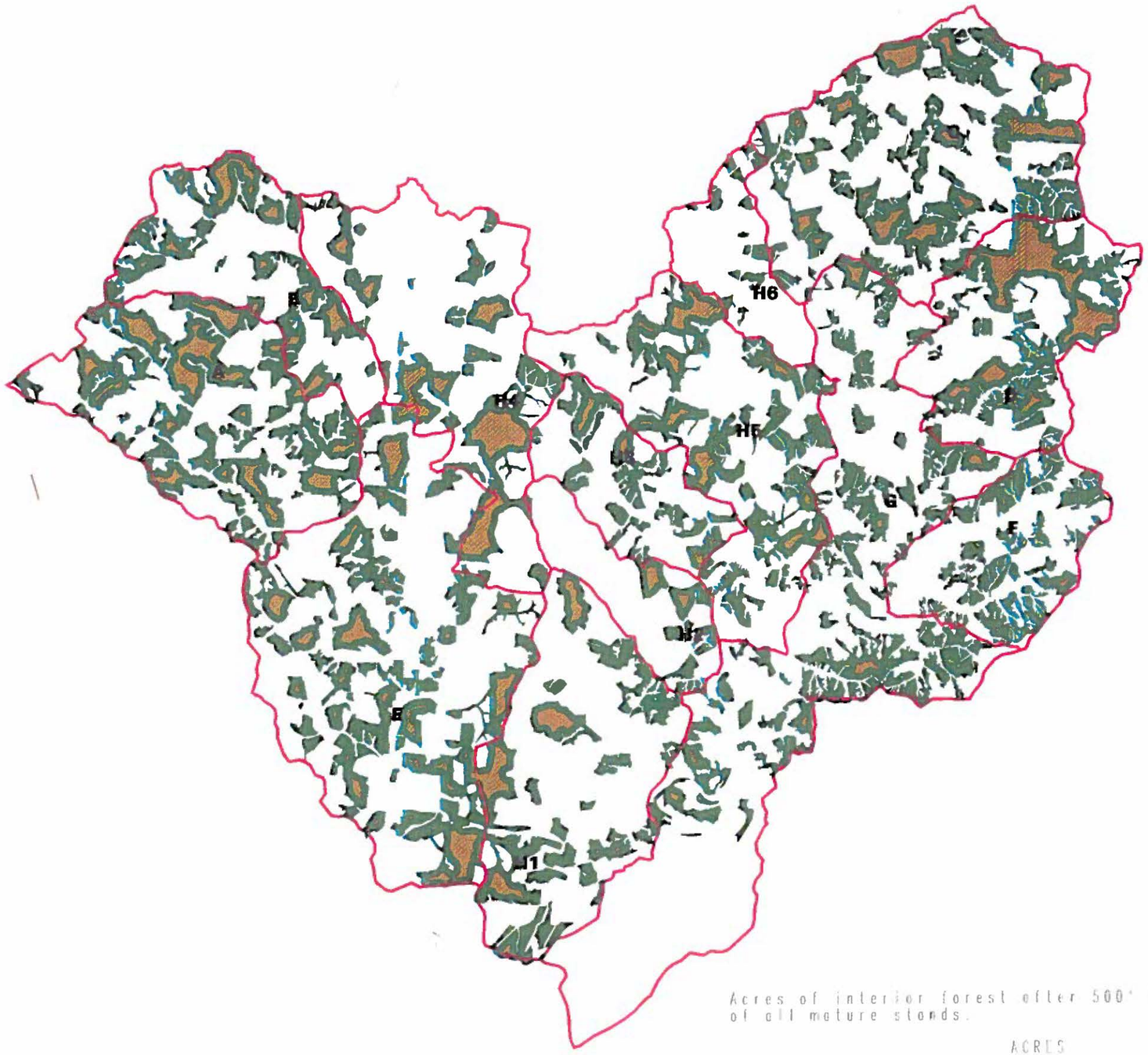
Table 3. Acres of Suitable Murrelet Habitat as a Percent of Murrelet Reserve Area for 27 Murrelet Reserves on Federal Lands, Indian Deadwood Watershed

| Murrelet Reserve Area Number | Habitat within the Reserve Area Around Each Occupied Site | |
|---|---|---|
| | Acres | Percent |
| 2001 | 136 | 27% |
| 2002 | 238 | 48 |
| 2003 | 155 | 31 |
| 2005 | 267 | 53 |
| 2006 | 263 | 52 |
| 2007 | 256 | 51 |
| 2008 | 208 | 42 |
| 2009 | 161 | 32 |
| 2010 | 37 | 16 |
| 2011 | 119 | 24 |
| 2013 | 252 | 50 |
| 2014 | 246 | 49 |
| 2015 | 234 | 47 |
| 2016 | 221 | 44 |
| 2017 | 243 | 49 |
| 2018 | 113 | 23 |
| 2019 | 161 | 32 |
| 2020 | 102 | 20 |
| 2022 | 149 | 30 |
| 2021 | 56 | 11 |
| 2060 | 103 | 21 |
| 2061 | 64 | 13 |
| 2108 | 289 | 58 |
| 3015 | 169 | 34 |
| 3016 | 112 | 22 |
| 3017 | 161 | 32 |
| 5058 | 382 | 76 |

Table 4. Epiphytic macrolichens documented in the Indian Deadwood watershed.

| Species | Common Name |
|---|---|
| Alectoria vancouverensis | Hanging hair lichen |
| Bryoria capillaris | Horsehair lichen |
| Cavernularia hultenii | Powdered saguaro |
| C.lophyrea | Eyed saguaro |
| Centraria chlorophylla | Shadow ruffle |
| C.orbata | Variable ruffle |
| Hypogymnia appinata | Beaded bone |
| H.inactiva | Forking bone |
| Parmelia sulcata | Powdered shield |
| Platismatia herrei | Tattered rag |
| Pseudocyphellaria anomola | Netted specklebelly* |
| P.anthraspis | Dimpled specklebelly* |
| P.crocata | Yellow specklebelly* |
| Ramalina farinacea | Hanging leaf lichen |
| Sphaerophorus globosus | Common Christmas tree |
| Sticta fuliginosa | Peppered moon* |
| S.limbata | Powdered moon* |

*-These are Survey and Manage Species, Strategy 4 from ROD, Table 3-C, p. C-49 (USDA/USDI 1994)




# Indian/Deadwood

500 foot buffers on Mature Stands

All Mature Stands and Interior Habitat

Landscape Blocks

Interior Habitat

Mature Stands

0 1 2 3 4

MILES

RF 1:103605

June 03, 1996

Acres of interior forest after 500' buffer of all mature stands.

| | ACRES |
|---|---|
| MAT CONF MX | 758 |
| MATURE CONIFER | 1,604 |
| MULTI/LATE | 173 |

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.

Map 1

## Appendix H. Regional Forester's Sensitive Species List

### For Siuslaw National Forest - Threatened, Endangered And Sensitive Species List

Updated June 13, 1996

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | HABITAT INFORMATION |
|---|---|---|
| RF = Regional Forester's List; Fed = Federal; State = Oregon; ONHP = Oregon Natural Heritage Program, D = Documented on Forest (all others suspected) | | |
| **BIRDS** | | |
| Gavia immer<br>Common loon | S/-/-/2/D | Winters along the coast; nests on large lakes. |
| Pelecanus erythrorhynchos<br>American white pelican | S/-/V/2/D | Large bodies of water; usually found east of the Cascades. |
| P. occidentalis californicus<br>California brown pelican | S/E/E/2/D | Forages along coastlines and bays. |
| Branta canadensis leucopareia<br>Aleutian Canada goose | S/T/E/1/D | Winter resident; forages in open pastures and marshes. |
| Haliaeetus leucocephalus<br>Northern bald eagle | S/T/T/1/D<br>Recovery Plan | Nests and roosts in mature and old growth conifers near large bodies of water. |
| Falco peregrinus anatum<br>American peregrine falcon | S/E/E/1/D<br>Recovery Plan | Nests and perches near cliffs near coasts and where prey is abundant. |
| Charadrius alexandrinus nivosus<br>Western snowy plover | S/T/T/2/D | Nests on sandy beaches and in dunes. |
| Numenius americanus<br>Long-billed curlew | S/**/-/4/D | Winters on mudflats and shore-lines; breeds in grasslands. |
| Brachyramphus marmoratus<br>Marbled murrelet | S/T/C/2/D<br>Proposed Critical Habitat | Nests in old growth conifers within 50 miles of the coast. |
| Strix occidentalis caurina<br>Northern spotted owl | S/T/T/1/D<br>Designated Critical Habitat | Nests in mature coniferous forests with old growth component and characteristics. |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | HABITAT INFORMATION |
|---|---|---|
| **MAMMALS** | | |
| Arborimus albipes<br>White-footed vole | S/**/P/3/D | Small permanent drainages dominated by red alder with dense deciduous understory. |
| Gulo gulo luteus<br>California wolverine | S/**/T/2/- | Remote areas, especially along timberline in mountains. |
| Plecotus townsendii townsendii<br>Townsend's big-eared bat | S/**/C/2/D | Found in caves, rock crevices, mines, under bridges and in abandoned buildings. |
| **REPTILES AND AMPHIBIANS** | | |
| Clemmys marmorata marmorata<br>Northwestern pond turtle | S/**/C/2/D | Ponds, slow-moving streams and rivers, marshes. |
| Rana aurora<br>Red-legged frog | S/**/U/4/D | Quiet streams, marshes, ponds, and moist forests. |
| **INVERTEBRATES** | | |
| Ochrotrichia alsea<br>Alsea micro caddisfly | S/ /-/3/D | Large streams and rivers with stable substrate of boulders and logs and moderate current. |
| Rhyacophila haddocki<br>Haddock's micro caddisfly | S/**/-/3/D | High elevation creeks and seeps. |
| Speyeria zerene hippolyta<br>Oregon silverspot butterfly | S/T/-/1/D | Open inland and coastal meadow habitat. |
| **FISH** | | |
| Oncorhynchus clarki<br>Umpqua River cuttroat trout | S/PE/-/-/D | Umpqua River watershed rivers and tributaries. |
| Oncorhynchus kisutch<br>Coho | S/PT/-/-/D | |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS** | | | |
| Abronia umbellata spp breviflora<br>Pink sandverbena | S/**/E/1/D | May-Oct | Beaches and foredunes; open sand. |
| Anemone oregana var felix<br>Oregon bog anemone | S/-/-/2/D | Mar-Jun | Coastal marshes and spagnum bogs. |
| Bensoniella oregana<br>Bensonia | S/**/-/-/- | | Intermittent streams or meadow edges in mixed evergreen forests; upper slopes, ridgetop saddles with north aspect. |
| Cardamine pattersonii<br>Saddle mountain bittercress | S/**/C/1/D | May-Jun | Bogs, wet areas, moist cliffs and edges. |
| Carex macrochaeta<br>Large-awn sedge. | S/-/-/2/- | Jun-Aug | Moist openings, usually close to beaches. |
| Carex pluriflora<br>Several-flowered sedge | S/-/-/2/- | Jun-Jul | Sphagnum bogs, brackish water near the coast. |
| Cimicifuga elata<br>Tall bugbane | S/**/C/1/- | Jun-Jul | Moist forest, along edges and roadsides; often north slopes with bigleaf maple. |
| Cordylanthus maritimus ssp. palustris<br>Salt-marsh bird's beak | S/**/C/1/D | Jun-Aug | Coastal salt marshes,fringes of lakes and bogs. |
| Dodecatheon austrofrigidu<br>Fridgid shooting star | S/**/-/1/- | May-Jun | On rocks below the high water line on rivers; mostly at higher elevation. |
| Dryopteris filix-mas<br>Male fern | S/-/-/2/- | May-Aug | Along streams; dense shade |
| Erigeron peregrinus peregrinus var peregrinus<br>Wandering daisy | S/-/-/2/- | Jun-Jul | Moist, grassy, open and rocky meadows in coastal mountains. |
| Erythronium elegans<br>Elegant fawn-lily | S/**/C/1/D | May | High elevation meadows; bogs & rock cliffs; open conifer forests. |
| Filipendula occidentalis<br>Queen-of-the-forest | S/**/C/1/D | May-Aug | Moist headwalls, seeps, wet rocks above high water along streams. |

Updated 06/13/96

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS**, con't. | | | |
| Fritillaria camshatcensis<br>Black lily | S/-/-/2/- | May-July | Bogs and marshes. |
| Geum triglorum<br>var campanulatum<br>Western red avens | S/-/-/2/- | May-Jun | Exposed grassy and dry areas at high elevations. |
| Hydrocotyle verticillata<br>Water pennywort | S/-/-/2/D | Jul-Aug | Dune deflation plains; bog edges, marshes and ponds. |
| Isopyrum stipitatum<br>Dwarf rue-anemone | S/-/-/3/- | Feb-May | Bare, wet ground in deciduous woodlands, often along streams; lawns. |
| Lewisia columbiana<br>var rupicola<br>Rosy lewisia | S/-/-/2/- | Jun-Jul | Exposed gravelly and rocky slopes at higher elevation |
| Lilium occidentale | S/T/LE/1/- | | Occurs in forest or brushy openings on poorly drained soils often along margins of ephemeral ponds/small channels under shrubs, potential habitat in south area of Oregon Dunes NRA. |
| Limbella fryei<br>Frye's limbella moss | S/**/C/1/- ??? | | Sphagnum bogs; grows at base of willows and crabapples. |
| Lycopodium inundatum<br>Northern bog club moss, | S/-/-/2/D | Jul-Oct | Dune deflation plains; coastal bogs, lake margins |
| Ophioglossum vulgatum<br>Adder's tongue | S/-/-/2/D | Jul-Aug | Edges of lakes, ponds, dune deflation plains. |
| Plantago macrocarpa<br>North Pacific plantain. | S/-/-/2/- | May-Aug | Sphagnum bogs; along lake shores. |
| Poa kellogii<br>Kellogg's bluegrass. | S/-/-/2/- | Jun-Jul | Along edges of ponds, marshes and seeps. |
| Poa laxiflora<br>Loose-flowered bluegrass | S/-/-/4/D | May-July | Forests on moist seeps, benches, stream edges. |
| Pohlia sphagnicola<br>Pohlia moss | S/-/-/2/D | Year-round | Sphagnum hummocks in bogs near the coast. |
| Saxifraga hitchcockiana<br>Saddle Mtn saxifrage | S/**/C/1/- | Apr-Aug | Grassy, rocky, or gravelly areas at higher elevations. |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS**, con't. | | | |
| Scirpus cyperinus<br>Wool-grass | S/-/-/2/- | Jul-Aug | Wet, low ground. |
| Senecio flettii<br>Flett's groundse. | S/-/-/2/- | Jun-Jul | Open, rocky and tallus slopes. |
| Sidalcea hirtipes<br>Hairy-stemed checker mallow. | S/-/C/1/D | Jun-Jul | Grassy meadows, coastal bluffs. |
| Silene douglasii<br>var oraria<br>Cascade Head catchfly | S/**/C/1/- | May-Jul | Grassy coastal bluffs. |
| Utricularia gibba<br>Humped bladderwort. | S/-/-/2/- | Jul-Sep | Standing or slow-moving water, sloughs. |
| Utricularia minor<br>Lesser bladderwort. | S/-/-/2/- | | Standing or slow-moving water, sloughs. |
| Wolffia columbiana<br>Columbia watermeal. | S/-/-/2/- | | Ponds, floating below the surface. |
| Wolffia punctata<br>Dotted watermeal | S/-/-/2/- | | Ponds; free-floating. |

## STATUS CODES

**FEDERAL:**

**Endangered (E) =** Any species in danger of extinction throughout all or a significant portion of its range
**Threatened (T) =** Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
**Proposed (P) =** Proposed to be listed as threatened or endangered.
**Category 1 Candidate (C1) =** Taxa for which the US Fish and Wildlife Service has sufficient information to support a proposal to list the species as endangered or threatened.
**Category 2 Candidate (**) =** This federal status was eliminated in 1995. Species with a ** in the Federal status column were listed as Category 2 at the time the status was dropped.
**Category 3A =** Taxa for which the Service has persuasive evidence of extinction.
**Category 3B =** Names that on the basis of current taxonomic understanding do not represent taxa meeting the Endangered Species Act's definition of "species."
**Category 3C =** Taxa that have been proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

**STATE**

**Endangered (E) =** Native species determined to be in danger of extinction throughout all or any significant portion of its range or those listed as endangered on the Federal list
**Threatened (T) =** Native species likely to become endangered within the foreseeable future throughout all or a significant portion of its range or those listed as threatened on the Federal list.
**Critical (C) =** Native species for which listing as threatened or endangered is pending.
**Vulnerable (V) =** Native species for which listing is not believed to be imminent and can be avoided with adequate protective measures.
**Peripheral or Naturally Rare (P) =** Peripheral species refer to those whose populations are on the edge of their range. Naturally rare species are those whith historically low numbers due to naturally limiting factors.
**Undetermined Status (U) =** Species for which status is unclear and requires further scientific data.

**OREGON NATURAL HERITAGE PROGRAM (ONHP):**

**List 1 =** Taxa that are threatened with extinction throughout their entire range, or which are presumed extinct.
**List 2 =** Taxa that are threatened with extirpation or presumed extirpated from Oregon, but are more common or stable elsewhere
**List 3 =** Taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
**List 4 =** Taxa of concern which are not currently threatened or endangered. Includes taxa which are very rare but currently secure, as well as taxa which are declining in numbers but are still too common to be proposed as threatened or endangered.

**FOREST:**

D = Documented on Forest. (All others suspected only).

## REFERENCES


Federal Register Vol. 57, No. 10, January 15, 1992. Final Rule--Critical Habitat for the Northern Spotted Owl.

Federal Register Vol. 59, No. 18, January 27, 1994. Proposed Rule--Designation of Critical Habitat for the Marbled Murrelet.

Natural Heritage Advisory Council to the State Land Board. 1993. Oregon Natural Heritage Plan. State Land Board, Salem, OR. 158pp.

Regional Forester's Sensitive Species List. Region 6, USDA Forest Service. Latest revision June 10, 1991 (for plants; last updated 1989 for vertebrates).

Oregon Department of Fish and Wildlife. 1993. Oregon Wildlife Diversity Plan. Second Edition.

U.S. Department of Interior, Fish and Wildlife Service, August 23, 1993, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.

## Appendix I. Road Inventory for Indian/Deadwood Watershed Analysis

Appendix I lists all Forest Service and county roads included in Indian/Deadwood. Each road was rated for its potential to adversely impact aquatic resources (from 1 to 5, low to high, respectively). The following discussion describes how data sources were derived:

**Slope position** - from 7.5-minute USGS topographic maps, roads were identified as ridgetop, midslope or valley bottom. In general, it was assumed that ridgetop roads are more stable and less likely to impact aquatic resources, whereas, midslope and valley bottom roads would be more likely to deter proper riparian and instream function (i.e. interception and rerouting of subsurface flow, slides during intense storm events, stream crossings that may hinder fish passage or disruption of connectivity between the hill slope and valley bottom).

**Slope stability** - roads in the watershed were overlaid on a map showing soil type and slope mapped by the Soil Conservation Service. Past work by George Bush, Forest soils scientist, rated each soil/slope class as high, moderate or low for landslide and surface erosion potential based on specific soil characteristics and personal experience with these soil types and where on the landscape each type existed. If a particular road crossed an area dominated by a soil type that had high potential for landslides, the road was considered to have higher potential to negatively impact aquatic resources.

**Roads that were sidecast built** - using past road records and the knowledge of district personnel, a map was developed to show where sidecast and non-sidecast constructed roads exist in the watershed. Sidecast roads are considered higher risk to aquatic resources because overhanging fill material can become saturated during intense storm events and is more likely to fail, especially where midslope roads cross steep headwalls. Construction of this map was based almost entirely on memory of district personnel, when combined with other information, it was helpful in assigning an overall rating for each road.

**Risk to known quality fish habitat** - Paul Burns, the district fish biologist, constructed a map of existing fish habitat quality based on stream survey information and District knowledge. This was limited to streams with completed stream surveys. Stream survey components that were most influential to habitat quality included percent pools, number of deep pools, number of complex pools and amount of large wood present. Using this map showing location of quality habitat, roads that had potential to influence high quality fish habitat were identified. An example of "potential to influence" would include a midslope road, sidecast built in a slide prone area with several stream crossings above known high quality fish habitat. Roads that showed high risk to quality habitat coupled with high risk of instability were given a "5" rating in every case.

**Presence of known problems** - a full roads assessment was done for Indian/Deadwood by the Forest Engineering and Road Maintenance group which identified culvert drainage problems, road slumps, cutbank failures, sidecast pullback needs and any other road problems that were observed. Where any of these problems caused increased sedimentation or potential for mass movement, these roads were given a higher overall rating.

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to[2] | Stability[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM[1] | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 2100000 | 5.07 | USFS/CO | U. Indian | B | | 1924/65 | | | 30 | 70 | | H |
| 2100639 | 0.31 | USFS | Rogers | A | | 1968 | N | 80 | 20 | | H | H |
| 2100640 | 4.03 | USFS | Maria/Rogers | A | | by 1965 | 80% | 50 | 50 | | L | H |
| 2116000 | 3.53 | USFS | N.Indian | B/H4 | S2 | by73/64/10 | Y | 20 | 5 | 75 | H | L |
| 2116617 | 1.3 | USFS | N.Indian | B/H4 | | by 1965 | Y | | 60 | 40 | M | M |
| 2116618 | 0.63 | USFS | N.Indian | H4 | | 1964 | Y | 30 | 70 | | H | H |
| 2127000 | 3.61 | USFS | Long/Elk2 | E | | by 1965 | Y | 55 | 10 | 35 | M | L |
| 2127770 | 0.41 | USFS | Elk2 | E | | 1984 | N | 100 | | | L | L |
| 2127771 | 0.24 | USFS | Elk2 | E | | 1984 | N | 100 | | | L | L |
| 2160000 | 4.32 | USFS | Herman/N.Indian | H4 | | by 1965 | Y | 40 | 60 | | H | M |
| 2160620 | 1.02 | USFS | N.Indian | H4 | | 1970 | Y | 100 | | | M | L |
| 2160621 | 0.12 | USFS | N.Indian | H4 | | 1958 | Y | 100 | | | M | L |
| 2160622 | 0.37 | USFS | N.Indian | H4 | | 1964 | Y | 100 | | | M | L |
| 2170000 | est. 1.8 | USFS | Elk2/L.Indian | E/H1 | | by 1965 | Y | 100? | | | | L |
| 2170UK1 | est. .25 | USFS | Elk2 | E | | 1964 | Y | ? | | | | H |
| 2170759 | est. .15 | USFS | Elk2 | E | | 1958 | Y | 100 | | | | H |
| 2170763 | 0.82 | USFS | L.Indian | E/H1 | | 1960 | Y | 100 | | | | M |
| 2170764 | 1.05 | USFS | L.Indian | H1 | | 1973 | 50% | 100 | | | | L |
| 2170765 | 1.12 | USFS | L.Indian | H1 | | 1973 | 80% | 100 | | | | L |
| 2500A | est. 1.7 | USFS | Elk2/L.Ind | E | S1 | | Y | 100 | | | | |
| 2500B | est. 2.6 | USFS | Long/Rogers | A | | | Y | 100 | | | H | H |
| 2500643 | 1.02 | USFS | Rogers | A | | 1958/75 | Y | 100 | | | L | L |
| 2500649 | 0.87 | USFS | Long | E | | by 1965 | Y | 100 | | | L | L |
| 2500650 | 0.42 | USFS | Long | E | | 1958 | Y | 100 | | | L | H |
| 2500654 | 1.52 | USFS | Long | E | | 1957 | Y | 100 | | | L | H |
| 2500790 | 0.71 | USFS | Elk2 | E | | 1975 | N | 100 | | | L | L |
| 2500793 | 0.86 | USFS | Elk2 | E | | 1960 | Y | 100 | | | L | L |
| 3200000 | 10.3 | USFS | Various-I&D | H1-5/E | S1 | by 1965 | Y | 75 | 25 | | M | H |
| 3200UK5 | est. .50 | USFS | Herman | H4 | | 1973 | Y | 100 | | | M | L |
| 3200628 | 0.43 | USFS | Herman | H4 | | | Y | | | | M | H |
| 3200629 | 0.31 | USFS | Herman | H4 | | 1971 | Y | 100 | | | M | L |
| 3200UK4 | est. .20 | USFS | W.Fk.Dead | H5 | | 1970 | Y | | 100 | | | H |
| 3200646 | 1.95 | USFS | Herman | H4 | | 1965 | Y | 90 | 10 | | M | M |
| 3200647 | 0.3 | USFS | Herman | H4 | | by 1973 | Y | 100 | | | H | H |
| 3200650 | 1.65 | USFS | W.Dead/Misery | H3/H5 | | 1964 | Y | 25 | 75 | | | M |
| 3200651 | 0.32 | USFS | W.Fk.Dead | H5 | | 1974 | N | 100 | | | L | M |
| 3200653 | 0.75 | USFS | W.Fk.Dead | H5 | | by 1973 | Y | | 100 | | M | H |
| 3200654 | 0.34 | USFS | Herman | H4 | | 1974 | Y | 100 | | | L | H |
| 3200UK3 | est. .10 | USFS | Herman | H4 | | 1978 | Y | 100 | | | L | L |
| 3200670 | 0.34 | USFS | Herman | H4 | | 1982 | N | 100 | | | M | L |
| 3200671 | 0.43 | USFS | Green Ck. | H1 | | 1975 | Y | 100 | | | | L |
| 3200672 | 2.98 | USFS | Elk2/Herman | E/H4 | | 1954 | N | | 100 | | | H |
| 3200672U | est. .10 | USFS | Elk2 | H4 | | 1973 | N | | 100 | | | H |
| 3200UK2 | est. .10 | USFS | Elk2 | E | | 1973 | Y | 100 | | | | L |
| 3200675 | 0.68 | USFS | Elk2 | E | | 1965 | N | 100 | | | | L |
| 3200676 | 0.24 | USFS | Elk2 | E | | 1972 | Y | 100 | | | | L |
| 3200678 | est. .20 | USFS | Green Ck. | H1 | | 1965 | Y | 100 | | | L | L |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential[4] Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| Y | 5 mod-large slides, 2 cutbank failures, 1 blocked culvert - rd reopened but repairs needed | 4 |
| | | 4 |
| | Major slump and sidecast failure below slump @ 2 mi. - rd reopened | 3 |
| | | 2 |
| Y | 4 bad culverts; rd. washed out in 2 places where culverts are blocked - to be closed in '96 | 5 |
| | | 4 |
| | 1 large slump, 3 small slides, 1 sidecast pullback - rd open | 2 |
| | | 1 |
| | | 1 |
| Y | 4 sidecast pullbacks (pre-flood), 1-185' slump, 2 large slides - rd closed (1997 ERFO project) | 5 |
| | | 1 |
| | | 2 |
| | | 1 |
| | 1-20 cy slide and 1-150 cy slide - rd closed | 1 |
| Y | Unknown spur, NE1/4, S30; s.c. pullback, waterbar | 4 |
| | | 2 |
| | | 2 |
| Y | 1 sidecast pullback area, end 50% not sidecast built | 4 |
| | 20% of rd. not sidecast built at end | 2 |
| Y | ATM portion of 25 closed after flood due to large cutbank fail., now reopened | 3 |
| Y | non-ATM portion, various sidecast and slump problems (major repairs scheduled for '96, 97') | 5 |
| | | 2 |
| | | 2 |
| | | 3 |
| | | 3 |
| | | 1 |
| | rock slide blocking road @ .3 miles | 1 |
| Y | 6 major rd. bed slumps, 2 cutbank fail., 2 sidecast p.b.'s - rd open (ERFO '96) | 4 |
| | unknown spur above 3200628 | 3 |
| | | 3 |
| | | 3 |
| | unknown spur just beneath 646 down to 35-acre unit | 4 |
| Y | Huge slide at top blocks any access, sidecast pullback needed near spur 3200647 | 4 |
| Y | sidecast pullback needed throughout | 5 |
| | spur next to 651in very bad shape, major sidecast fail. @ .2 mi - waterbar and close | 4 |
| | | 2 |
| | | 3 |
| | | 3 |
| | waterbar landing spur; in-unit slide below | 2 |
| | | 2 |
| | | 2 |
| | 20-cy rock slide, shoulder failure - rd. passable | 3 |
| | unknown spur to 3200672 (sec. 30) | 3 |
| | between 3200675 and 3200672 | 2 |
| | | 1 |
| | | 2 |
| | | 2 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3200740 | 0.28 | USFS | L.Indian | H1 | | 1980 | N | 100 | | | M | L |
| 3200741 | 0.2 | USFS | L.Indian | H1 | | 1980 | N | 100 | | | | H |
| 3200742 | 0.09 | USFS | L.Indian | H1 | | 1978 | N | | 100 | | | H |
| 3200UK1 | est. .3 | USFS | Green Ck. | H1 | | 1969 | N | 100 | | | | H |
| 3200751 | 4.21 | USFS | GrnCk/L.Ind | H1 | | 1969 | 50% | 100 | | | M | L |
| 3200752 | 0.07 | USFS | Green Ck | H1 | | 1975 | N | 100 | | | | L |
| 3200754 | 0.58 | USFS | Green Ck. | H1 | | 1964/75 | Y | 100 | | | | L |
| 3200755 | 1.45 | USFS | L. Indian | H1 | | 1980 | N | 100 | | | M | L |
| 3200756 | 0.28 | USFS | L.Indian | H1 | | 1972 | N | 100 | | | | L |
| 3200757 | est. .25 | USFS | Green Ck. | H1 | | 1969 | | 100 | | | | H |
| 3200758 | 0.46 | USFS | L.Indian | H1 | | 1969 | N | 100 | | | | L |
| 3200759 | 0.66 | USFS | Elk2 | E/H1 | | 1968 | Y | 100 | | | | H |
| 3200760 | 0.35 | USFS | L. Indian | H1 | | 1979 | N | 100 | | | M | M |
| 3200770 | 0.74 | USFS | L. Indian | H1 | | 1989 | N | 100 | | | | L |
| 3200771 | 0.16 | USFS | L. Indian | H1 | | 1989 | N | 100 | | | | L |
| 3250000 | est. 2.6 | USFS | Herman/N.Indian | H4/B | S2 | by 1965 | Y | 100 | | | L | L |
| 3250514 | 0.44 | USFS | N.Indian | B | | 1964/75 | Y/N | 100 | | | L | L |
| 3259000 | 7.79 | USFS | Alph/WDd/Pan2 | H5,6/G | S2 | by 1965 | Y | 60 | 40 | | | M-H |
| 3259618 | 3.81 | USFS | WFDead/Alpha | H5/G | | by 1965 | Y | 80 | 20 | | M | M |
| 3259620 | 1.14 | USFS | WFDead/Alpha | H5/G | | by 1973 | Y | 100 | | | | M |
| 3259621 | 0.72 | USFS | WFDead | H5 | | 1965/89 | 50% | 100 | | | | M |
| 3259623 | 0.73 | USFS | Alpha | G | | 1960 | Y | 100 | | | | M |
| 3259625 | 1.09 | USFS | WFDead | H5 | | 1960/89 | 30% | 90 | 10 | | | M |
| 3259631 | 0.91 | USFS | WFDead | H5 | | 1966/68 | Y | 50 | 50 | | L | H |
| 3259632 | 0.46 | USFS | WFDead | H5 | | 1966 | Y | | 100 | | M | H |
| 3259633 | 0.35 | USFS | WFDead | H5 | | 1968 | N | | 100 | | L | H |
| 3259634 | 0.11 | USFS | Pan2 | H6 | | 1983 | N | 100 | | | L | M |
| 3259635 | 0.39 | USFS | WFDead | H5 | | 1968 | Y | 100 | | | L | H |
| 3259636 | est. .10 | USFS | WFDead | H5 | | 1968 | Y | ? | | | L | H |
| 3259637 | 1.25 | USFS | WFDead | H5 | | 1964/67 | 75% | 100 | | | L | M-H |
| 3259638 | 0.23 | USFS | WFDead | H5 | | 1964 | Y | 100 | | | M | M |
| 3259640 | 1.13 | USFS | WFDead | H5 | | 72/78/89 | 75% | 50 | 50 | | L | M |
| 3259641 | 0.53 | USFS | WFDead | H5 | | 1975 | N | 100 | | | L | M |
| 3259642 | 0.3 | USFS | WFDead | H5 | | 1979 | N | 100 | | | L | H |
| 3259643 | 1.44 | USFS | Pan2 | H6 | | 64/69/89 | 90% | 100 | | | L | M-H |
| 3259644 | 0.78 | USFS | Pan2 | H6 | | 1957/69 | Y | 100 | | | L | M |
| 3259645 | 0.46 | USFS | Alpha | G | | 1958 | Y | 40 | 60 | | | M-H |
| 3269000 | 5.78 | USFS | Fail/Mis/WDead | H2,3,5/G | | by 1965/73 | 65% | 95 | 5 | | L | H |
| 3269659 | 0.45 | USFS | Misery | H3 | | 1977 | N | 100 | | | | H |
| 3269UK1 | est. .30 | USFS | Misery | H3 | | | Y | | 100? | | | H |
| 3269660 | 0.75 | USFS | Misery/W.Dead | H3,5 | | by 1973 | Y | 100 | | | | H |
| 3269662 | 0.11 | USFS | Failor | H2 | | 1977 | Y | 100 | | | M | H |
| 3278000 | 2.59 | USFS | Herman | H4/E | S2 | by 1973/65 | Y | 25 | 50 | 25 | | L |
| 3278663 | 0.88 | USFS | Herman | H4/E | | | Y | 50 | 50 | | H | H |
| 3278665 | 0.59 | USFS | Herman | E | | 1971 | N | 100 | | | | L |
| 3278666 | 0.15 | USFS | Herman | E | | 1981 | Y | | 100 | | | H |
| 3279000 | 5.6 | USFS | GrnCk/Failor | H1,2/G | | by1973/65 | Y | 90 | 10 | | M | M |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| | | 1 |
| | | 2 |
| | | 3 |
| | unknown spur above 3200751 | 1 |
| Y | 4 slides (1=500cy) and 1-150x25x10 slump @ 1 mi. - road closed | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 2 |
| | | 1 |
| Y | includes 761 & 762 | 4 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | 4 major slumps, 1 cutbank failure & 1 sidecast p.b. - road closed (ERFO '97) | 3 |
| Y | 90'x1000' sidecast fail. to Cr; 100cy cutbank fail - both passable | 3 |
| | | 3 |
| | | 3 |
| | | 2 |
| | 2/3 built in 1980; 30 cy slide, culvert blocked .3 miles from jct. with 618 - rd. closed | 2 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 1 |
| | | 3 |
| | | 3 |
| Y | 400' rd. slump and major slide below - road permanently closed | 4 |
| | | 3 |
| Y | 1 small cutbank fail. blocking rd., ditch and culvert @ .1; sidecast pullback needed | 4 |
| | | 2 |
| | | 3 |
| | last 1/4 = high slide risk | 2 |
| | | 2 |
| | | 3 |
| | 3 major failures of rd. bed @ .4, 2.8 & 4.6 mi. - closed; lower 1/3 not sidecast built | 3 |
| | at top of 3269 near 3200 | 2 |
| Y | unknown spur near 3269659 - oblit. candidate | 4 |
| | | 3 |
| | | 3 |
| Y | 1 small see rd. assessment | 4 |
| Y | sidecast pullback throughout; oblit.- no access needed | 5 |
| | | 1 |
| | | 4 |
| Y | lower portion built in 1973; 2 small slides at 1.7 and 4.8 miles - open; system priority to waterbar | 4 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3279667 | 0.38 | USFS | Failor | H2 | | | Y | 100 | | | M | L |
| 3279668 | 0.35 | USFS | Failor | H2 | | 1956 | Y | 100 | | | M | H |
| 3279669 | 0.61 | USFS | Green Ck. | H1 | | 1974 | Y | 100 | | | | M |
| 3279670 | 0.47 | USFS | Failor | H2 | | 1960 | Y | 100 | | | M | M |
| 3279747 | 0.38 | USFS | Green Ck. | H1 | | 1975 | Y | 100 | | | | H |
| 3279748 | 0.31 | USFS | Failor | H2/G | | 1973 | Y | 100 | | | | H |
| 3279749 | 0.42 | USFS | Failor | G | | 1973 | Y | 100 | | | | L |
| 3279750 | 0.63 | USFS | GmCk/LLake | G | | 1978 | Y | 50 | 50 | | | H |
| 3289000 | 5.57 | USFS | Green Ck. | H1 | | by 1954/65 | Y | | 10 | 90 | | M |
| 3289UK1 | est. .3 | USFS | Green Ck. | H1 | | 1968 | Y | | | 100 | | H |
| 3315000 | 0.03 | USFS | Up.Dead | C | | | Y | 100 | | | L | M |
| 3315111 | 0.65 | USFS | Up.Dead | C | | | Y | 100 | | | L | H |
| 3315112 | 0.21 | USFS | Up.Dead | C | | | Y | 100 | | | | H |
| 3500000 | est. 2.6 | USFS | NPan/UpDead | H6/C | Prim. | by 1965 | Y | 90 | 10 | | L | M |
| 3500111 | est. .25 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | M | M |
| 3500112 | est. .30 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | L | L |
| 3500114 | est. .5 | USFS | Pan2 | C | | 1964 | Y | 100 | | | M | M |
| 3500115 | est. .2 | USFS | Pan2 | C | | 1964 | Y | 100 | | | M | M-H |
| 3500612 | 2.6 | USFS | Misery/WFDead | H3,5 | | by 1965/73 | 67% | 40 | 30 | 30 | M | M-H |
| 3500615 | 0.98 | USFS | Misery/WFDead | H3,5 | | by 1973 | Y | 100 | | | | M |
| 3500616 | 0.07 | USFS | Misery | H3 | | by 1973 | Y | 100 | | | | M |
| 3510000 | est. 2.1 | USFS | an2/NPan/UpDe | H6/C | | 1967 | Y | 100 | | | M | M |
| 3510622 | 0.72 | USFS | Pan2 | H6 | | 1978 | Y | 100 | | | | L |
| 3511000 | 2.16 | USFS | Pan2/NPan | H6/C | | by 1965/73 | Y | 100 | | | M | L/H |
| 3511111 | 0.19 | USFS | Up.Dead | C | | | Y | 100 | | | L | L |
| 3511112 | 0.15 | USFS | NPan | C | | | Y | 100 | | | M | H |
| 3511113 | est. .10 | USFS | NPan | C | | | Y | 100 | | | M | H |
| 3511114 | 0.77 | USFS | Pan2/NPan | H6 | | by 1973 | Y | 100 | | | | H |
| 3515000 | 4.04 | USFS | Up.Dead | C | | by 1965 | Y | 35 | 65 | | H | M |
| 3515113 | 0.83 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | | L |
| 3515114 | 0.79 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | M | L |
| 3515115 | 0.25 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | M | H |
| 3515116 | 1.09 | USFS | Up.Dead | C | | | Y | 100 | | | M | M |
| 3515117 | 0.32 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | L |
| 3515118 | 0.77 | USFS | Up.Dead | C | | | Y | 40 | 60 | | H | M-H |
| 3515119 | 0.51 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | | L |
| 3515122 | 0.21 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | M |
| 3515126 | 0.36 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | M | H |
| 3515127 | est. .5 | USFS | Up.Dead | C | | | Y | | 100 | | | M |
| 3515130 | 0.08 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | M | L |
| 3515200 | 0.11 | USFS | Up.Dead | C | | | Y | 100 | | | M | H |
| 3520000 | 1.07 | USFS | Pan2/UpDead | H6/C | | by 1965 | Y | 100 | | | M | M |
| 3525000 | 5.13 | USFS | Rock3/Buck | C/D | | by 1965 | Y | 70 | 20 | 10 | L | H/L |
| 3525113 | 0.74 | USFS | Elk | D | | | Y | 100 | | | | M |
| 3525125 | 0.24 | USFS | Buck | D | | | Y | 100 | | | L | H |
| 3526000 | 3.35 | USFS | Buck/Elk | D | | by 1965 | Y | 90 | 10 | | L | M |
| 3526113 | 0.9 | USFS | Elk | D | | | Y | | 100 | | M | M-H |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 3 |
| | | 3 |
| | | 2 |
| | | 3 |
| Y | 1 slump, 2 small cutbanks, 1 sleused channel in rd - all passable | 4 |
| | unknown riparian spur to 3289 (NW corner of sec. 4) | 3 |
| | | 2 |
| | | 3 |
| | | 3 |
| Y | 2 sidecast pbs, part. plugged culv. @ 4.6, midslope slide risk = high; 1-350cy slide after flood | 4 |
| | | 3 |
| | | 2 |
| | stability varies (H,M&L) | 2 |
| | | 2 |
| Y | Post-flood - 2 huge slides, 1 slump & many sidecast and culvert problems - closed @ .6 | 4 |
| | | 3 |
| | | 3 |
| Y | slide @ .1 = plugged culvert; stability varies (L,M&H) | 4 |
| | | 1 |
| Y | massive slump @ 2.1; stability varies (L&H) | 3 |
| | | 2 |
| | slump @ .4 | 3 |
| | | 2 |
| | | 2 |
| | stability varies (H,M&L) | 4 |
| | | 2 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 4 |
| | | 2 |
| | | 4 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 3 |
| Y | partially plugged culvert at m.p. 1 | 3 |
| | | 2 |
| | | 2 |
| | obliterated | 2 |
| | | 3 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3600000 | 5.44 | County | Lower Lake | G | Hwy | pre1910 | | | | 100 | | L |
| 3700000 | 1.6 | USFS | N.Indian | B | S1 | by 1965 | Y | 100 | | | L | L |
| 3700573 | 0.93 | USFS | N.Indian | B | | 1975 | Y | 50 | 50 | | M | H |
| 5110000 | 1.77 | County | Elk2 | E | Co | by 1910 | Y | 50 | 50 | | | H/L |
| 5130000 | 17.3 | County | Various-Indian | E | Co | pre1910/65 | | | | 100 | | L |
| 5134000 | 3.27 | County | Long | E | Co | by 1910 | Y | | | 100 | L | L |
| 5140000 | 10.99 | County | Various-Deadw. | G/H6 | Co | by 1910 | Y | | | 100 | | L |
| 5142000 | 3.82 | County | W.F.Dead/Misery | G/H3,5 | Co | by 1910 | Y | | | 100 | | L |
| 5143000 | 1.49 | USFS | W.F. Deadwood | H5 | | by 1910 | Y | | | 100 | L | L |
| 5800000 | est. 2.1 | USFS | Various-Indian | A/B | S1 | by 1965 | Y | 50 | 50 | | H | M-H |
| 5800637 | 0.65 | USFS | Maria/Rogers | A | | 1967 | Y | | 100 | | L | H |
| 5800680 | 5.03 | USFS | N.Indian/Up.Ind | B | | by 75/63 | Y | 80 | 20 | | L | L |
| 5800681 | 0.76 | USFS | N.Indian | H4 | | by 1973 | Y | 100 | | | H | M |
| 5840000 | 9.39 | USFS | Various-Indian | A/B/E | | by 65/73 | Y | 90 | 10 | | L | L |
| 5840622 | 0.17 | USFS | Maria | A | | 1985 | N | | 100 | | L | M |
| 5840623 | 0.28 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | L |
| 5840624 | 2.04 | USFS | Maria | A | | by 1973 | Y | 60 | 40 | | M | M |
| 5840625 | 1.68 | USFS | Maria | A | | by 1973 | Y | 50 | 50 | | M | M |
| 5840626 | est. .25 | USFS | Maria | A | | | Y | 100 | | | L | H |
| 5840627 | 0.55 | USFS | Maria | A | | 1968 | N | 100 | | | L | L |
| 5840628 | 0.32 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | H |
| 5840630 | 0.66 | USFS | Maria/Long | A | | 1972 | N | 100 | | | L | L |
| 5840631 | 0.41 | USFS | Long | A | | 1972 | N | | 100 | | M | L |
| 5840632 | 0.54 | USFS | Long | A | | 1972 | N | 100 | | | L | L |
| 5840633 | 0.65 | USFS | Long | A | | 1973 | Y | 100 | | | L | L |
| 5840634 | 1.31 | USFS | M.S. Indian | E | | 1969 | Y | 100 | | | L | L |
| 5840636 | 0.9 | USFS | Long | A | | by 1965/73 | Y | 100 | | | | L |
| 5840637 | 0.12 | USFS | Long | A | | | | | 100 | | | H |
| 5840650 | 0.17 | USFS | Long | E | | 1985 | N | 100 | | | | L |
| 6300000 | 6.62 | USFS | Alpha/UpDead | C/G | | by24/52/65 | Y | 25 | 15 | 60 | M | L |
| 6300110 | 0.53 | USFS | Up.Dead | C | | by 1973 | Y | 100 | | | M | M |
| 6300118 | 0.68 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | M |
| 6300119 | 0.85 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | L |
| 6300122 | 0.45 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | M |
| 6300UK1 | est. 1.1 | USFS | Up.Dead | C | | | Y | 100 | | | | H |
| 6300126 | 0.5 | USFS | Up.Dead | C | | | Y | | 100 | | | H |
| 6300131 | 0.35 | USFS | Up.Dead | C | | 1958 | Y | 100 | | | | L |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prob.'s | | | | | | | | | | Overall Potential | | |
| Pre-flood | | | | | | | | | | Impact to Aquatics | | |
| (Y/N) | Comments & Damage caused by February 7, 1996 storm | | | | | | | | | (5=high, 1=low) | | |
| | HWY 36 | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 4 | |
| | Stability: ridge=H; midslope=L | | | | | | | | | | 2 | |
| | Mainline access up Indian | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| Y | chronic cutbank\fill erosion above Rogers\Maria; flood - passable slump @ 39.3 mi. (ERFO '96) | | | | | | | | | | 5 | |
| | | | | | | | | | | | 3 | |
| Y | sidecast pullback on spur in T16S, R10W, S3 and more | | | | | | | | | | 4 | |
| Y | sidecast pullback throughout | | | | | | | | | | 5 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | flood - 2 road slumps, both passable | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback throughout | | | | | | | | | | 4 | |
| | 80 cy slide @ .7 miles | | | | | | | | | | 1 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | waterbar and close op. spurs | | | | | | | | | | 2 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| Y | flood - 2 major sidecast failures into creek & part. plugged culvert @ m.p. 4 (see culv. analysis) | | | | | | | | | | 3thru5 | |
| Y | culvert removed @ .3; possible rd oblit. | | | | | | | | | | 3 | |
| Y | stability varies (L&H); has waterbars but needs 3 culverts pulled | | | | | | | | | | 5 | |
| | small piece of hisk slide risk @ end of spur | | | | | | | | | | 4 | |
| | | | | | | | | | | | 4 | |
| | 6300126 comes off this unknown spur to 6300 | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |

**Key:**

1/ **ATM Status** - Prim. = Primary Forest Road - all highway vehicle travel encouraged

S1 = Secondary Forest Road, Low Clearance - passenger car travel acceptable

S2 = Secondary Forest Road, High Clearance - passenger car travel discouraged

Co. = County maintained

2/ **Risk to Known Quality Habitat** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

3/ **Stability Risk (Slope/Soil)** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

4/ **Overall Potential Impact to Aquatics** - 1-5 (See Appendix 4.3 for analysis methods)

## Appendix K. Stream Habitat Condition Rating

| CREEK NAME | REACH | % DEEP POOLS | LWD | COMPLEX POOLS | % POOLS |
|---|---|---|---|---|---|
| Elk | 1 | F | NF | NF | F |
| | 2 | PF | NF | NF | F |
| | TRIB 1 | NF | NF | NF | PF |
| | TRIB 3 | F | NF | NF | F |
| | TRIB 4 | NF | NF | NF | F |
| Failor | 1 | P5F | NF | NF | F |
| | 2 | F | PF | NF | F |
| | 3 | F | NF | NF | F |
| | 4 | NF | NF | NF | PF |
| | TRIB 5 | NF | NF | NF | PF |
| | TRIB 6 | NF | NF | NF | NF |
| | TRIB 7 | NF | NF | NF | PF |
| | TRIB 9 | NF | NF | NF | NF |
| | TRIB 12 | NF | NF | NF | NF |
| | TRIB 15 | NF | NF | NF | NF |
| | TRIB 16 | NF | NF | NF | NF |
| Gibson | 1 | F | NF | NF | F |
| | TRIB 1 | NF | NF | NF | NF |
| | TRIB 4 | NF | NF | NF | NF |
| | TRIB 5 | NF | PF | NF | NF |
| Herman | 1 | NF | NF | NF | PF |
| | 2 | F | NF | NF | F |
| | 3 | NF | PF | NF | F |
| | TRIB 15 | NF | NF | NF | NF |
| | TRIB 7 | NF | NF | NF | NF |
| | TRIB 8 | NF | NF | NF | NF |
| Long | 1 | PF | NF | NF | F |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | PF |
| Maria | 1 | PF | PF | NF | F |
| | 2 | PF | NF | NF | F |
| | 3 | NF | NF | NF | PF |
| Maria Trib 5 | 1 | NF | NF | NF | F |
| | 2 | F | PF | PF | F |
| N. Fork Indian | 1 | F | NF | NF | F |
| | 2 | F | NF | F | F |
| | 3 | F | NF | NF | F |
| | 4 | F | NF | NF | F |
| | 5 | F | NF | NF | F |
| | TRIB 10 | NF | NF | NF | NF |
| | TRIB 12 | F | NF | NF | F |
| | MANN CR. TRIB 13 | NF | NF | NF | F |
| | TRIB 23 | F | NF | NF | F |

| CREEK NAME | REACH | % DEEP POOLS | LWD | COMPLEX POOLS | % POOLS |
|---|---|---|---|---|---|
| Pyle | 1 | NF | NF | PF | F |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | NF |
| | TRIB 2 | NF | NF | NF | NF |
| | TRIB 3 | NF | NF | NF | PF |
| Rogers | 1 | F | NF | NF | PF |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | NF |
| | 4 | NF | NF | NF | NF |
| | TRIB 25 | NF | NF | NF | NF |
| | TRIB 26 | NF | NF | NF | PF |
| | TRIB 8 | F | PF | NF | F |
| Smoot | 1 | F | NF | NF | F |
| | 2 | PF | NF | NF | F |
| | TRIB 3 | NF | NF | NF | NF |
| Taylor | 1 | F | NF | NF | F |
| | 2 | F | NF | NF | F |
| | TRIB 4 | NF | PF | NF | F |
| Velvet | 1 | F | NF | NF | F |
| | TRIB 4 | NF | NF | NF | NF |
| | TRIB 6 | NF | NF | NF | NF |
| | TRIB 7 | NF | PF | NF | NF |
| | TRIB 1 OF TRIB 7 | NF | PF | NF | NF |
| | TRIB 9 | NF | NF | NF | NF |
| West Fork Deadwood | 2 | NF | NF | NF | F |
| | 4 | F | NFN | NF | F |
| | 6 | F | NF | NF | F |
| | Panther Fk | NF | NF | NF | F |
| West Fork Indian | 1 | F | NF | NF | F |
| | 2 | F | NF | NF | F |
| | TRIB 1 | NF | NF | NF | NF |
| | TRIB 2 | NF | NF | | PF |
| West Headwaters Deadwood | 1 | F | NF | PF | F |
| | 2 | F | PF | PF | F |
| | TRIB 2 | NF | NF | NF | NF |
| | TRIB 3 | NF | NF | NF | NF |

F = Functioning for rearing habitat
PF = Partially functioning
NF = Not functioning

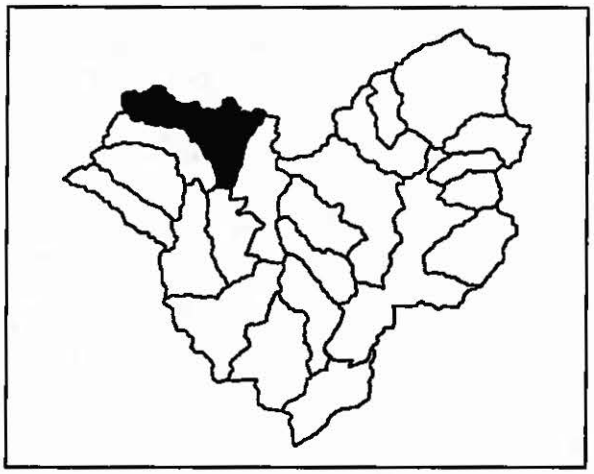
## North Indian - 1710020615

**At a Glance:**

*Sub-watershed size:* 6.48 sq. miles (4149 acres )

*Streams include:* North Fork Indian Creek

*Ownership:* Siuslaw N.F. (87.2%)
Industrial Private (10.9%)
Private (1.8%)



*History:* There were two homesteads in the lower half of the subwatershed and grazing occurred throughout North Fork Indian Creek. Records indicate five sawmills existed in a tributary on the north side of North Fork Indian Creek, one of which existed before 1945.

### Aquatics

Stream miles: 62.7
Stream density: 9.68 miles/sq.mile

Confinement & Gradient:

52.6 miles of *source* areas (confined and moderately confined, >8%)
4.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Much of the upper three miles of North Fork Indian Creek is very close to being in properly functioning condition except for the lack of large wood in the creek and on the floodplain. Stream improvement strategies consist of scattered riparian plantings of conifers for future large wood recruitment and deciduous trees for potential beaver habitat and use. The lower two miles are influenced by the current road placement and grazing along the creek. Beaver dams and instream structures have created pools for salmonid rearing in this section. Additional gains for fish habitat could be made by increasing the woody vegetation, willows and conifers on the streambanks to encourage stability. If grazing remains a component of management, proper fencing of pastures will be needed to ensure vegetative success and bank stability.

Survey information available:
- Summer, 1995, bracketed stream temperature monitoring on North Fork Indian Cr. (Ryans #902522 and #902524)
- Level II stream habitat surveys, August, 1991 and Sept.-Oct., 1994
- 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

## North Indian (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 37% | GASH - 30% |
| POMU - 31% | RHMA - 2% |

Land Type Associations: 3C1, 3C

Dominant Soils:

*Ridgetops* - Preacher loam, Bohannon gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Blachly silty clay loam, Bohannon gravelly loam
*Valley bottom* - Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 11% of subwatershed
Moderate potential - 39% of subwatershed
Low potential - 50% of subwatershed

### Management

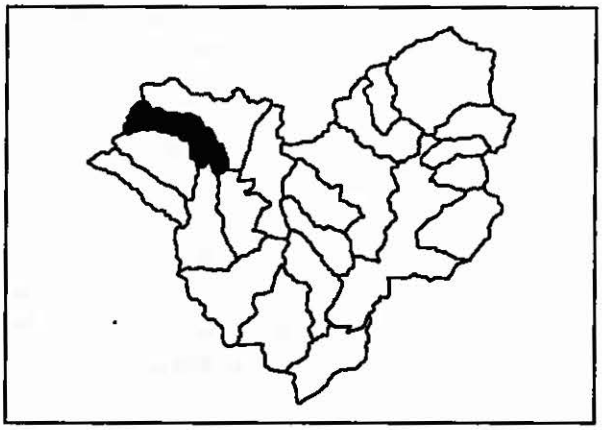
| | |
|---|---|
| *Natural acres:* | 1999 acres (48.2%) |
| *Managed acres:* | 2141 acres (51.6%) |
| *Non-timber land:* | 9 acres (0.2%) |

System road miles: 14.2
*Ridgetop roads*: 8.94 mi. (62.9%)
*Mid-slope roads*: 2.32 mi. (16.3%)
*Valley bottom roads*: 2.96 mi. (20.8%)

System road density: 2.19 miles/sq.mile
ATM roads: 2116, 3250 and 3700

## Upper Indian - 1710020615

**At a Glance:**



*Sub-watershed size:* 4.00 sq. miles (2559 acres )

*Streams include:* Upper mainstem Indian Creek

*Ownership:* Siuslaw N.F. (74.7%)
Private (25.3%)

*History:* There were at least four pre-1900 homesteads in the lower half of this subwatershed and grazing throughout the drainage extended up into the headwaters of Upper Indian Creek. There were six sawmills in this drainage, three of which were pre-1945.

### Aquatics

Stream miles: 33.4
Stream density: 8.35 miles/sq.mile

Confinement & Gradient:

27.8 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

This creek is largely in private ownership. Any stream improvements would have to be centered around large-scale partnerships. Unless opportunities to improve fish habitat develop, this area will be low priority for improvement work.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 38% | GASH - 25% |
| POMU - 34% | RHMA - 3% |

Land Type Associations: 3B, 3C1

## Upper Indian (continued)

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Peacher-Bohannon-Slickrock complex
*Valley bottom* - Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents:

High potential - 7% of subwatershed
Moderate potential - 34% of subwatershed
Low potential - 59% of subwatershed

### Management

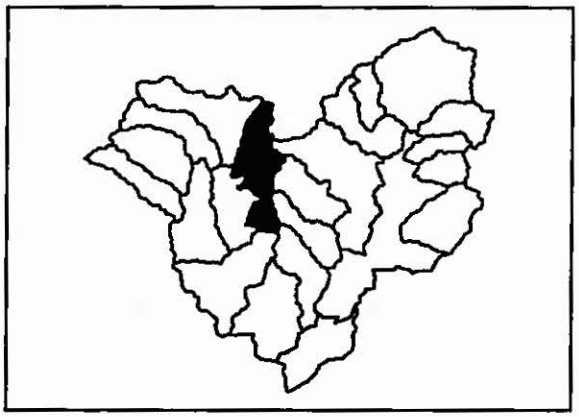
| | |
|---|---|
| *Natural acres:* | 1778 acres (69.5%) |
| *Managed acres:* | 781 acres (30.5%) |
| *Non-timber land:* | 0 acres |

System road miles: 14.1
*Ridgetop roads*: 6.13 mi. (43.5%)
*Mid-slope roads*: 4.66 mi. (33.1%)
*Valley bottom roads*: 3.30 mi. (23.4%)

System road density: 3.53 miles/sq.mile
ATM roads: 2100

## Herman - 1710020615

**At a Glance:**



*Sub-watershed size:* 5.53 sq. miles (3538 acres )

*Streams include:* Herman, Taylor and Gibson Creeks which are tributaries to Indian Creek

*Ownership:* Siuslaw N.F. (96.9%)
Private (3.1%)

*History:* There was one pre-1900 homestead in lower Herman Creek and a pre-1945 sawmill in lower Taylor Creek. Grazing occurred in lower Taylor Creek between the sawmill and Indian Creek. There were two historic trails in this subwatershed as well.

### Aquatics

Stream miles: 50.8
Stream density: 9.19 miles/sq.mile

Confinement & Gradient:

44.1 miles of *source* areas (confined and moderately confined, >8%)
.6 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Herman** - the upper 3/4 of Herman Creek is partially functioning as habitat for rearing of salmonids, but the absence of large wood in the creek limits this rearing potential. There is some beaver activity in Herman Creek that provides good rearing habitat. Planting of conifer in clumps and possibly willow could further enhance beaver habitat. Addition of wood from adjacent hillslopes and outside sources will promote short-term recovery of fish habitat. Herman Creek has the potential to be a major contributor to salmonid habitat within the Indian Creek watershed.

**Taylor** - Level II fish habitat surveys show that Taylor Creek is partially functioning as anadromous fish rearing habitat. Large wood is deficient and additions from adjacent hillslopes and outside sources would enhance the habitat. Planting of conifers in clumps where appropriate is recommended here. Although Taylor Creek does provide habitat off the heavily impacted mainstem of Indian Creek, this creek is not as high a priority as Herman Creek.

**Gibson** - Same as for Taylor except there may be more opportunity here for addition of large wood to the stream from adjacent hillslopes.

Survey information available: - Level II stream habitat surveys on Herman, Gibson and Taylor Creeks, Sept.-Oct., 1994
- 1990 water users inventory identified no water use permitees

## Herman (continued)

Aquatic Priority for Restoration: **High**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 35% | GASH - 31% |
| POMU - 31% | RHMA - 3% |

Land Type Association: 3C

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex
*Valley bottoms* - Meda loam and Nekoma silt loam

## Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 20% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 42% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1939 acres (54.8%) |
| *Managed acres:* | 1588 acres (44.9%) |
| *Non-timber land:* | 11 acres (0.3%) |

System road miles: 13.3
*Ridgetop roads*: 6.91 mi. (52.1%)
*Mid-slope roads*: 5.93 mi. (44.7%)
*Valley Bottom roads*: .43 mi. (3.2%)

System road density: 2.40 miles/sq.mile
ATM roads: 3200 (north half) & 3278

## Mainstem Indian - 1710020615

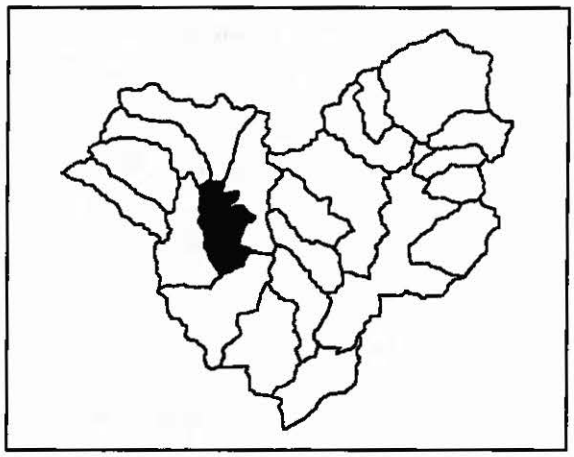
**At a Glance:**

*Sub-watershed size:* 4.10 sq. miles (2623 acres )

*Streams include:* Mainstem Indian Creek and Smoot Creek, a tributary to Indian Creek

*Ownership:* Siuslaw N.F. (63.6%)
Private (36.4%)

*History:* There was at least one pre-1900 homestead along the mainstem of Indian Creek and there were four post-1945 sawmills along the mainstem. Grazing historically occurred throughout the mainstem in this subwatershed.



### Aquatics

Stream miles: 28.8
Stream density: 7.02 miles/sq.mile

Confinement & Gradient:

21.9 miles of *source* areas (confined and moderately confined, >8%)
.7 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Through this reach there are a number of areas that are used by chinook salmon as spawning habitat. Grazing is the major activity along this reach of Indian Creek and consequently streambank stability, fine sediment introduction, and lack of riparian vegetation for shade are major problems. Little rearing habitat for salmonids exists. Primarily the mainstem is in private ownership and thus little stream restoration work can be done without development of partnerships, and will be a low priority for restoration until the partnerships are developed. First priority for restoration should be the re-establishment of woody vegetation in the riparian areas, more than just one row of alder along the banks.

Survey information available: - Level II stream habitat survey, October, 1994
- 1990 water users inventory identified 3 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

## Mainstem Indian (continued)

### Soils/Vegetation

Plant Association Groups: no information available
Land Type Association: 3C

Dominant Soils:

*Ridgetope* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex
*Valley bottom* - Nekoma silt loam, Meda loam, Eilertsen silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 15% of subwatershed
Moderate potential - 30% of subwatershed
Low potential - 55% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 1662 acres (63.4%) |
| *Managed acres:* | 741 acres (28.2%) |
| *Non-timber land:* | 220 acres (8.4%) |

System road miles: 11.3
*Ridgetop roads*: 4.39 mi. (38.8%)
*Mid-slope roads*: 2.24 mi. (19.8%)
*Valley bottom roads*: 4.68 mi. (41.4%)

System road density: 2.76 miles/sq.mile
ATM roads: 5140 & lower 3259

## Maria - 1710020615

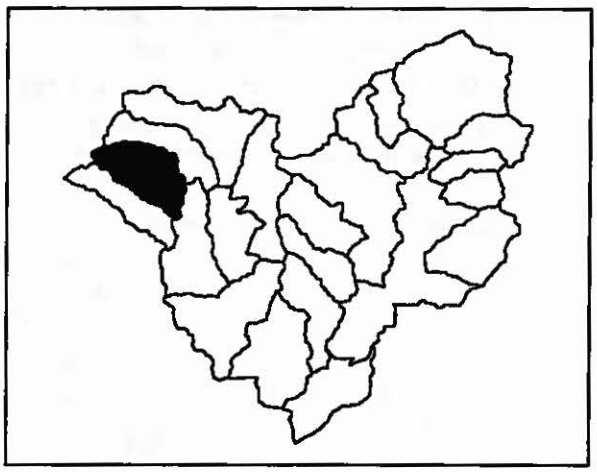
**At a Glance:**

*Sub-watershed size:* 4.80 sq. miles (3074 acres )

*Streams include:* Maria Creek and West Fork Indian Creek, both part of a **Key Watershed**

*Ownership:* Siuslaw N.F. (85.2%)
Private (14.8%)

*History:* There was one pre-1900 homestead on West Fork Indian and grazing occurred on at least 50% of West Fork Indian included in this sub-watershed. An historic trail also existed in the area.



### Aquatics

Stream miles: 41.1
Stream density: 8.56 miles/sq.mile

Confinement & Gradient:

33.7 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Maria Creek** - The majority of Maria Creek is considered partially functioning for rearing of anadromous salmonids. Gravel and cobble are plentiful and occasional pieces of large wood along with beaver dams provide deep complex pools for salmonid rearing. Improvement strategies for Maria Creek include large wood additions from adjacent hillslope stands, planting of conifers in clumps on toe slopes and scattered planting of shade tolerant conifers in some areas beneath the mature hardwood canopy. The major tributary to Maria Creek from the north has a section of stream rated as 'functioning' for salmonid rearing habitat. The strategy in this tributary is to extend this functioning area down to the main stem of Maria Creek (see habitat condition map). Establishment of a partnership with Davidson in the lower portion of Maria Creek would also be beneficial to restoration efforts. There are some large landslides in this drainage from the February 1996 storm. These should be evaluated prior to implementation of the strategies discussed above.

**West Fork Indian Creek** - The upper two miles of West Fork Indian Creek are rated as 'partially functioning' due to lack of large wood which creates the deep complex pools needed by rearing salmonids. Cobble and gravel are abundant although fine sediments are a concern. Improvement strategies for this section of creek include large wood additions from adjacent hillslope stands, planting of conifers in clumps on toe slopes and scattered planting of shade tolerant conifers below the mature hardwood canopy. Two 318 units have been harvested in 1995,1996 within the drainage and associated KV projects are being planned in

## Maria (continued)

association with these units to add large wood complexes to the creek. After these are completed, reconnaissance should be conducted to determine if further improvements are warranted. The next two miles of creek downstream are in private ownership and flow through an alder dominated stand. Although no formal stream surveys have been conducted on this section, gradient, substrate and riparian conditions are similar to that upstream, which probably lends to similar habitat conditions in this section. If partnerships could be developed here, similar strategies to those listed above should be employed.

Survey information available: - Stream temperature monitoring from 1990-1995 on West Fork Indian
- (summer, 1995 - Ryan #903870).
- Level II stream habitat surveys in both Maria and W. Fk. Indian Creeks, July-Sept., 1990.
- 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 33% | RUSP - 32% |
| POMU - 33% | RHMA - 2% |

Land Type Association: 3B

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottom* - Meda loam, Preacher-Bohannon-Slickrock cx, Bohannon gravelly loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 8% of subwatershed
Moderate potential - 41% of subwatershed
Low potential - 51% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2388 acres (77.7%) |
| *Managed acres:* | 679 acres (22.1%) |
| *Non-timber land:* | 7 acres (.2%) |

System road miles: 8.30
*Ridgetop roads*: 4.29 mi. (51.8%)
*Mid-slope roads*: 3.78 mi. (45.7%)
*Valley Bottom roads*: .21 mi. (2.5%)

System road density: 1.73 miles/sq.mil
ATM roads: none

## Rogers - 1710020615

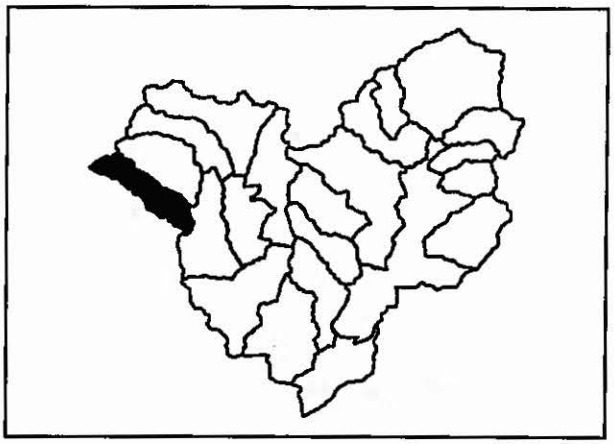
**At a Glance:**

*Sub-watershed size:* 3.52 sq. miles (2250 acres )

*Streams include:* Rogers Creek, tributary to West Fork Indian Creek. Rogers Creek is part of a **Key Watershed**

*Ownership:* Siuslaw N.F. (98.7%)
Private (1.3%)

*History:* There were two pre-1900 homesteads in lower Rogers Creek and grazing historically occurred in the lower half of this drainage.



### Aquatics

Stream miles: 29.8
Stream density: 8.47 miles/sq.mile

Confinement & Gradient:

25.5 miles of *source* areas (confined and moderately confined, >8%)
.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Rogers Creek has high potential to be a major fish producer for the Indian Creek drainage. It currently has a relatively healthy run of chinook and coho salmon . The creek is low gradient and relatively moderately confined. The substrate is primarily gravels and cobbles throughout the system. The lower 2.5 miles of the creek has recently been acquired by the Forest Service. Within this section of creek current habitat conditions for the rearing of anadromous salmonids is fair. Occasional pieces of large wood can be found in connection with the stream channel which create some deep complex pools associated with good salmonid rearing. There is evidence of past stream cleanout efforts on the floodplain throughout this section of stream and noxious weeds (tansy and thistle) are scattered throughout the section as well. Future additions of large wood will create more deep complex pools, provide off-channel habitat, and increase floodplain connectivity with the stream. In addition, diversity of riparian vegetation will be increased through planting of conifers in clumps on toe slopes and scattered plantings of shade tolerant species beneath mature hardwoods. Diversity of currently existing riparian vegetation (i.e. elderberry thickets) should be maintained.

The 1-mile portion of Rogers Creek above the acquired land is in good condition. Beaver activity is high in this area with numerous dams providing floodplain interaction and deep complex pools for cover and feeding,. A substantial amount of large wood is present on the floodplain and in the stream that will be beneficial at high winter flows and will be recruited as the creek continues to meander.

## Rogers (continued)

If there is any possibility of choosing 318 sales to be bought out or replaced, from a fisheries standpoint the Mister Rogers 3 units would be the highest priority. These stands located in a key watershed where we plan to establish aquatic refugia just do not make sense.

Survey information available: Level II stream habitat survey, July-August, 1990
1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 41% | GASH - 21% |
| POMU - 38% | RHMA - 0% |

Land Type Association: 3B

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottoms* - Meda loam, Nekoma silt loam, Preacher-Bohannon-Slickrock complex

## Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 8% of subwatershed
Moderate potential - 46% of subwatershed
Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1534 acres (68.2%) |
| *Managed acres:* | 716 acres (31.8%) |
| *Non-timber land:* | 0 acres |

System road miles: 10.4
*Ridgetop roads*: 5.30 mi. (51.1%)
*Mid-slope roads*: 2.90 mi. (28.0%)
*Valley bottom roads*: 2.17 mi. (20.9%)

System road density: 2.95 miles/sq.mile
ATM roads: none

## Long - 1710020615

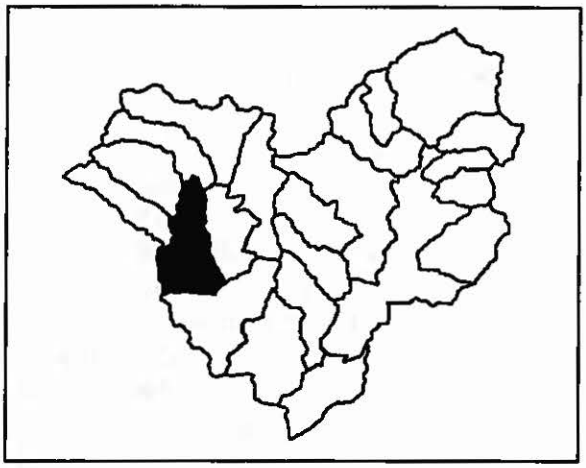
**At a Glance:**

*Sub-watershed size:* 5.45 sq. miles (3487 acres )

*Streams include:* West Fork Indian Creek; Pyle and Long Creeks, which are tributaries to W. Fk. Indian Creek

*Ownership:* Siuslaw N.F. (80.6%)
Private (19.4%)

*History:* There was one pre-1900 homestead on West Fork Indian Creek and grazing occurred all along West Fork Indian and lower Long Creeks in this subwatershed.



### Aquatics

Stream miles: 47.1
Stream density: 8.64 miles/sq.mile

Confinement & Gradient:

38.3 miles of *source* areas (confined and moderately confined, >8%)
.5 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
8.3 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Lower West Fork Indian Creek** - This section of West Fork Indian Creek is almost entirely on private ownership. Small alder-dominated strips line the banks throughout much of this section of creek. Other areas contain steep, actively eroding cutbanks where grazing has weakened the streambank and all woody vegetation has been removed. This section does provide a large amount of spawning habitat for chinook salmon. Rearing conditions for other salmonids is compromised by lack of wood , deep pools and potential temperature limitations caused by radiant heat warming the creek through sparse vegetation. If partnerships can be developed, improvement strategies would center around streambank stabilization and vegetation establishment along the creek to increase shade. Fencing to reduce impacts from grazing would speed up recovery of woody vegetation. Partnership with Davidson is first and foremost in this area. A large slide has blocked the road and entered the creek. Effects from this slide should be evaluated.

**Long Creek** - Level II stream habitat surveys indicate that Long Creek is partially functioning as anadromous fish rearing habitat. The addition of large wood to create deep complex pools would enable Long Creek to function better in the short term.

Survey information available: - Level II stream habitat surveys in Long Creek, July, 1990 and Pyle Creek, August, 1990
- 1990 water users inventory identified 7 water use permitees

## Long (continued)

Aquatic Priority for Restoration: **Moderate**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 40% | GASH - 26% |
| RUSP - 33% | RHMA - 2% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Preacher loam, Blachly silty clay loam
*Valley bottom* - Nekoma silt loam, Nehalem silt loam, Eilertsen silt loam, Meda loam,

## Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 11% of subwatershed
Moderate potential - 36% of subwatershed
Low potential - 53% of subwatershed

## Management

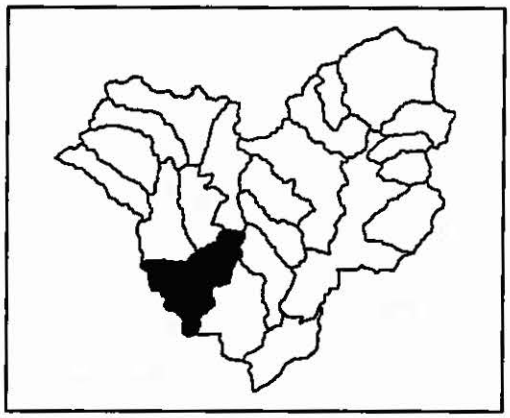
| | |
|---|---|
| *Natural acres:* | 2274 acres (65.2%) |
| *Managed acres:* | 1045 acres (30.0%) |
| *Non-timber land:* | 168 acres (4.8%) |

System road miles: 15.5
*Ridgetop roads*: 9.24 mi. (59.5%)
*Mid-slope roads*: 1.66 mi. (10.7%)
*Valley Bottom roads*: 4.64 mi. (29.8%)

System road density: 2.85 miles/sq.mile
ATM roads: lower 2500

## Elk2 - 1710020615

**At a Glance:**



*Sub-watershed size:* 7.43 sq. miles (4754 acres )

*Streams included:* Lower mainstem Indian Creek
Elk and Cremo, tributaries to
Indian Creek

*Ownership:* Siuslaw N.F. (63.2%)
Private (36.8%)

*History:* The lower mainstem of Indian Creek in this subwatershed includes two pre-1900 homesteads, historic grazing, two saw mills and one documented site where splash damming occurred in Indian Creek. There are also three historic Indian sites in this area.

### Aquatics

Stream miles: 59.4
Stream density: 8.00 miles/sq.mile

Confinement & Gradient:

45.4 miles of *source* areas (confined and moderately confined, >8%)
4.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
10.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream habitat surveys indicate that Elk Creek is providing partially functioning anadromous fish rearing habitat. There is potential to work with a local landowner to improve conditions at the mouth of Elk Creek. The addition of large wood further upstream to create deep complex pools would improve fish habitat.

Survey information available: - Level II stream habitat survey, August, 1990
- 1990 water users inventory identified 12 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Vegetation/Soils

Plant Association Groups:

| | |
|---|---|
| RUSP - 48% | POMU - 32% |
| GASH - 19% | RHMA - 1% |

## Elk2 (continued)

Land Type Association: 3C2, 3C

Dominant Soils:

*Ridgetops*: Bohannon gravelly loam with some Preacher loam
*Sideslopes*: Preacher-Bohannon-Slickrock complex with some Bohannon gravelly loam
*Indian Cr. Valley Bottom*: Nehalem silt loam
*Elk Cr. valley bottom*: predominately Preacher-Bohannon-Slickrock complex

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 10% of subwatershed
Moderate potential - 31% of subwatershed
Low potential - 59% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2551 acres (53.7%) |
| *Managed acres:* | 2032 acres (42.7%) |
| *Non-timber land:* | 158 acres (3.6%) |

System road miles: 16.6
*Ridgetop roads*: 6.65 mi. (40.0%)
*Mid-slope roads*: 4.25 mi. (25.6%)
*Valley Bottom roads*: 5.72 mi. (34.4%)

System road density: 2.24 miles/sq.mile
ATM roads: 5140, lower 3259 & 2500

## Lower Indian - 1710020615

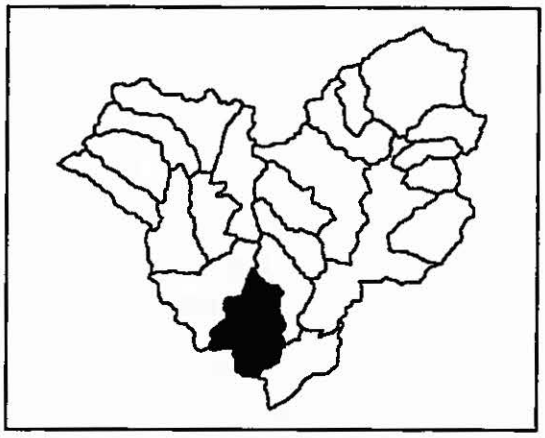
**At a Glance:**

*Sub-watershed size:* 6.63 sq. miles (4242 acres )

*Streams include:* Lower Mainstem Indian Creek
Velvet Creek, a tributary to Indian Creek

*Ownership:* Siuslaw N.F. (94.6%)
Private (5.4%)

*History:* The lower portion of Indian Creek in this subwatershed includes two areas of historic grazing.



### Aquatics

Stream miles: 59.0
Stream density: 8.90 miles/sq.mile

Confinement & Gradient:

49.6 miles of *source* areas (confined and moderately confined, >8%)
3.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Lower Mainstem Indian Creek** - This area is dominated by bedrock substrate with small stretches of deposited gravel and cobble. Some past habitat improvement projects have collected sediments to agrade the stream channel and reduce the amount of bedrock. There is potential to work with partnerships in this area to continue the improvements. Scattered conifer planting should be conducted in conjunction with instream work. By adding these improvements the fish habitat complexity will increase and reductions in water temperature in summer may be possible.

**Velvet Creek** - Level II stream habitat surveys indicate that Velvet Creek is partially functioning as anadromous fish rearing habitat. The addition of large wood to improve habitat complexity is recommended. Beaver activity is noted and should be promoted through hardwood and willow planting. Some conifer plantings could also be done .

Survey information available:
- Summer, 1995, stream temperature monitoring on lower Indian Cr. (Ryan #902523)
- Level II stream habitat survey in Velvet Cr., October, 1994
- 1990 water users inventory identified 3 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

## Lower Indian (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 41% | GASH - 24% |
| RUSP - 33% | RHMA - 2% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Preacher loam, Digger rock outcrop complex
*Valley bottom* - Nehalem silt loam, Meda loam,

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 12% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 48% of subwatershed

### Management

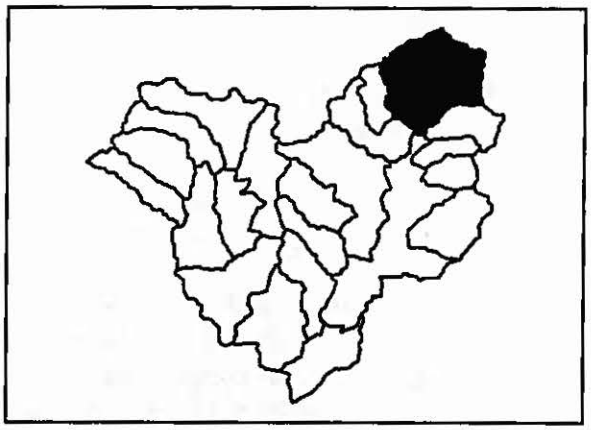
| | |
|---|---|
| *Natural acres:* | 2600 acres (61.3%) |
| *Managed acres:* | 1614 acres (38.1%) |
| *Non-timber land:* | 28 acres (0.7%) |

System road miles: 16.9
*Ridgetop roads*: 11.06 mi. (65.3%)
*Mid-slope roads*: 1.72 mi. (10.2%)
*Valley Bottom roads*: 4.15 mi. (24.5%)

System road density: 2.55 miles/sq.mile
ATM roads: 5130 & lower 3200

## Upper Deadwood - 1710020616

**At a Glance:**



*Sub-watershed size:* 10.34 sq. miles (6620 acres)

*Streams include:* The headwaters of Deadwood Creek

*Ownership:* Siuslaw N.F. (85.9%)
Industrial Private (7.0%)
Private (4.4%)
Bureau of Land Mgt. (2.7%)

*History:* There were two pre-1945 sawmills in the upper mainstem of Deadwood Creek and two documented locations where splash damming occurred in the same vicinity. Historically, grazing occurred on both mainstem Deadwood Creek and the lower portion of its western most tributary.

### Aquatics

Stream miles: 78.5
Stream density: 7.59 miles/sq.mile

Confinement & Gradient:

65.0 miles of *source* areas (confined and moderately confined, >8%)
6.1 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
7.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream surveys have indicated that some of the upper tributaries of Deadwood Creek are in properly functioning condition for rearing of anadromous salmonids. This concentration of functioning areas provides a good opportunity for creating refugia for anadromous salmonids even though this area was not designated a key watershed. The main emphasis for this area is to expand the properly functioning sections of this subwatershed to add security for the fish. Additional on-site evaluations are needed to determine how to best approach securing good habitat. Partnerships exist with private landowners for cooperative projects in 1996 and beyond. These projects include installation of instream structures to add large wood for promotion of stream habitat diversity. Instream large wood additions are needed in the mainstem to catch sediments moving out of the tributaries and to promote floodplain interaction. Currently, much of the mainstem is dominated by bedrock. Clumpy riparian planting of conifers on toe slopes is needed, especially on the mainstem. The west headwaters need scattered underplanting of shade tolerant conifers underneath mature hardwoods. There is potential for clumpy release in hardwood/mixed pole stands in the drainage as well.

Survey information available: - Level II stream habitat survey, Sept.-October, 1994
- 1990 water users inventory identified 8 water use permitees in this subwatershed

## Upper Deadwood (continued)

Aquatic Priority for Restoration: **High**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | RUSP - 25% |
| GASH - 34% | RHMA - 2% |

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam, Blachly silty clay loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottom* - Meda loam (mainstem Deadwood), Bohannon gravelly loam (headwaters)

### Slope Stability

Predicted potential for slides and debris torrents:

High potential - 7% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 53% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 4185 acres (63.2%) |
| *Managed acres:* | 2407 acres (36.4%) |
| *Non-timber land:* | 28 acres (.4%) |

System road miles: 26.5
*Ridgetop roads*: 15.22 mi. (57.4%)
*Mid-slope roads*: 8.33 mi. (31.4%)
*Valley bottom roads*: 2.96 mi. (11.2%)

System road density: 2.56 miles/sq.mile
ATM roads: 6300

## North Panther (Cougar) - 1710020616

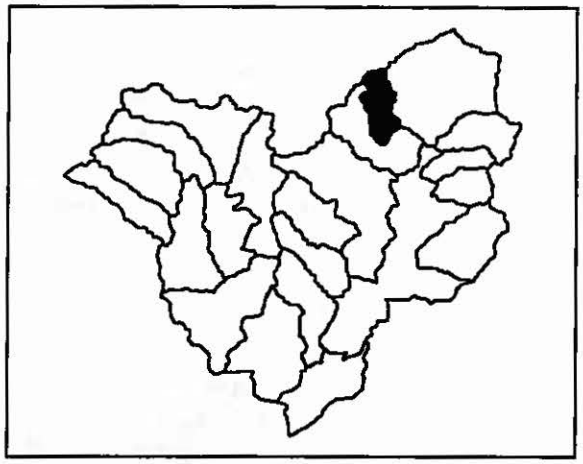
**At a Glance:**

*Sub-watershed size:* 2.16 sq. miles (1383 acres )

*Streams include:* North Fork Panther (Cougar) Cr.

*Ownership:* Siuslaw N.F. (93.7%)
Private (6.3%)

*History:* There was one pre-1945 sawmill in this drainage.



### Aquatics

Stream miles: 19.8
Stream density: 9.17 miles/sq.mile

Confinement & Gradient:

17.3 miles of *source* areas (confined and moderately confined, >8%)
.5 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
2.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

This drainage has high potential for enhancement of rearing habitat for anadromous salmonids. Beaver activity is high and should be promoted further. There is potential for obtaining large wood from upslope some of the mature conifer stands remaining in this drainage. Where little beaver activity exists, planting of conifers in clumps in hardwood dominated areas is recommended. Additionally, scattered planting of conifers could be done in beaver prone areas, but additional cost would be incurred for protection of these seedlings. There is also potential for cottonwood and willow plantings in this drainage.

Survey information available: - Level II stream habitat survey, August, 1992
- 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:
POMU - 40% RUSP - 19% GASH - 36% RHMA - 5%

**North Panther (continued)**

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock outcrop complex
*Valley bottoms* - Meda loam, Digger rock outcrop complex

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 16% of subwatershed
Moderate potential - 49% of subwatershed
Low potential - 35% of subwatershed

**Management**

| | |
|---|---|
| *Natural acres:* | 757 acres (54.7%) |
| *Managed acres:* | 626 acres (45.3%) |

System road miles: 4.6
Ridgetop roads: 4.53 mi. (98.3%)
Valley bottom roads: .08 mi. (1.7%)

System road density: 2.12 miles/sq.mile
ATM roads: 3500

## Panther2 (Cougar)- 1710020616

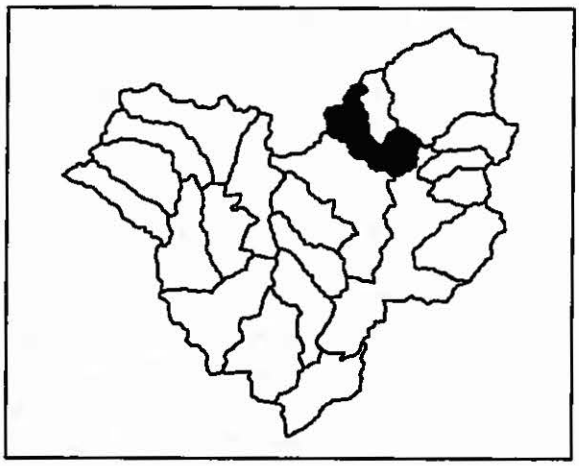
**At a Glance:**

*Sub-watershed size:* 4.49 sq. miles (2874 acres )

*Streams include:* Panther Creek

*Ownership:* Siuslaw N.F. (87.6%)
Private (11.3%)
Industrial Private (31.1%)

*History:* There was one pre-1945 sawmill in the upper portion of Panther (Cougar) Creek and grazing occurred in the lower two thirds of Panther Creek.



### Aquatics

Stream miles: 38.5
Stream density: 8.57 miles/sq.mile

Confinement & Gradient:
32.4 miles of *source* areas (confined and moderately confined, >8%)
.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.8 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
The bottom half of Panther Creek is primarily in private ownership which means that any enhancement will need to be through partnerships. The upper half of the creek is in partially functioning condition. Large wood and associated complex pools are lacking so enhancement should focus on incorporation of large wood into the creek. Adjacent hillslopes could be the potential source for immediate introduction of wood into the upper half of the creek. With partnerships, wood from outside sources could be used to introduce large wood complexes to the lower half as well. Planting of conifer in clumps within the hardwood dominated riparian communities is recommended for long-term potential recruitment of large wood. There is also some potential for release of existing small conifers.

Survey information available: 1990 water users inventory identifies 6 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

**Panther2 (continued)**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 37% | RUSP - 26% |
| GASH - 32% | RHMA - 5% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohanon gravelly loam, Preacher loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock complex, Preacher loam
*Valley bottom* - Nekoma silt loam, Meda loam

## Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 11% of subwatershed
Moderate potential - 43% of subwatershed
Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1722 acres (60.1%) |
| *Managed acres:* | 1145 acres (39.9%) |
| *Non-timber land:* | 2 acres (0.1%) |

System road miles: 13.2
*Ridgetop roads*: 9.30 mi. (70.5%)
*Mid-slope roads*: 1.46 mi. (11.1%)
*Valley bottom roads*: 2.43 mi. (18.4%)

System road density: 2.94 miles/sq.mile
ATM roads: none

## Elk - 1710020616

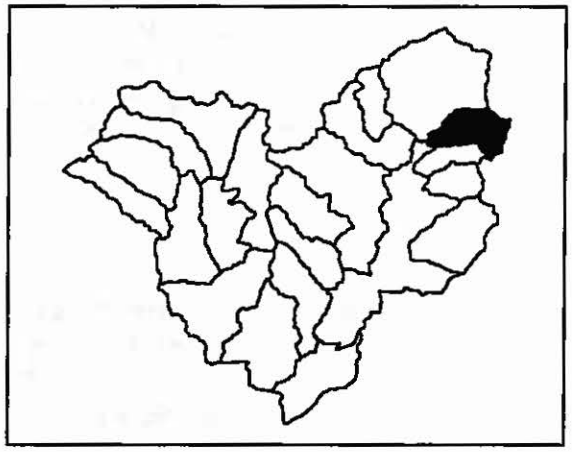
**At a Glance:**

*Sub-watershed size:* 3.15 sq. miles (2015 acres )

*Streams include:* Elk Cr.; tributary to Deadwood Creek

*Ownership:* Siuslaw N.F. (74.9%)
Private Industrial (17.0%)
Bureau of Land Mgt. (5.2%)
State & Other Private (2.9)

*History:* Includes an historic trail, early grazing on lower Elk Creek and a pre-1945 saw mill.



### Aquatics

Stream miles: 25.5
Stream density: 8.10 miles/sq.mile

Confinement & Gradient:

21.9 miles of *source* areas (confined and moderately confined, >8%)
2.4 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
1.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Elk Creek provides an opportunity to expand aquatic refugia already established on the upper section of Deadwood Creek. This creek has some mature natural stands that should supply some large wood to the stream and riparian zones in the future. Existing large wood on upslopes above Elk Creek could also be used for stream enhancement structures. Although the lower and probably most productive reach of the creek is in private ownership, the upper reaches could provide a large amount of productive salmonid habitat

Survey information available: 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Vegetation/Soil

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | RUSP - 22% |
| GASH - 37% | RHMA - 2% |

Land Type Association: 3F

**Elk (continued)**

Dominant Soils:

*Ridgetops* - Preacher loam

*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock outcrop complex

*Valley bottom* - Meda loam

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 10% of subwatershed

Moderate potential - 50% of subwatershed

Low potential - 40% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1558 acres (77.3%) |
| *Managed acres:* | 452 acres (22.4%) |
| *Non-timber land:* | 5 acres (0.3%) |

System road miles: 3.64

*Ridgetop roads*: 2.54 mi. (69.8%)

*Mid-slope roads*: .89 mi. (24.5%)

*Valley Bottom roads*: .21 mi. (5.8%)

System road density: 1.16 miles/sq.mile

ATM roads: none

## Buck - 1710020616

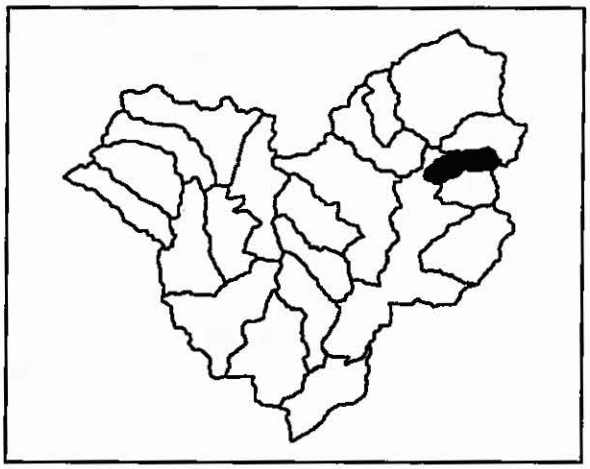
**At a Glance:**

*Sub-watershed size:* 1.74 sq. miles (1114 acres )

*Streams include:* Buck Creek, tributary to Deadwood Creek

*Ownership:* Siuslaw N.F. (82.8%)
Industrial Private (14.7%)
Private (2.5%)

*History:* Some grazing has occurred historically in the lower quarter of Buck Creek



### Aquatics

Stream miles: 13.1
Stream density: 7.53 miles/sq.mile

Confinement & Gradient:
11.0 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
2.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
This drainage provides an opportunity to expand the aquatic refugia in the Upper Deadwood subwatershed. The lower part of Buck Creek is in private ownership and has been fairly extensively logged. Planting of conifers in clumps where appropriate is recommended along the main stream. There are opportunities to add wood to Buck Creek from adjacent hillslopes. Buck Creek has substantial portion of the subwatershed in mature conifer that should act as good anchors for productive salmonid habitat.

Survey information available: 1990 water users inventory identifies no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 46% | RUSP - 21% |
| POMU - 30% | RHMA - 3% |

Land Type Association: 3F

## Buck (continued)

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam, Digger rock outcrop complex
*Sideslopes* - Bohannon gravelly loam
*Valley bottom* - Meda loam, Bohannon gravelly loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 6% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 56% of subwatershed

### Management

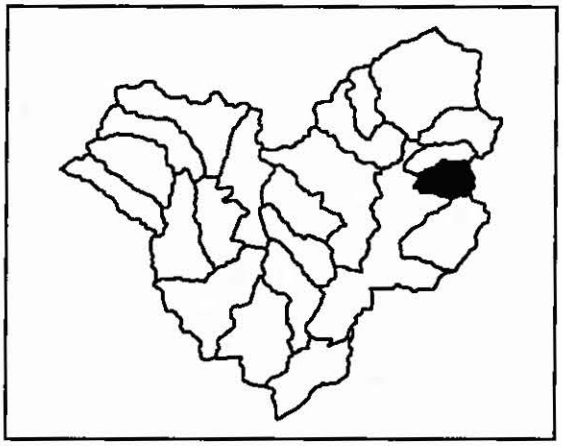
| | |
|---|---|
| *Natural acres:* | 585 acres (52.9%) |
| *Managed acres:* | 518 acres (46.9%) |
| *Non-timber land:* | 2 acres (0.2%) |

System road miles: 6.2
*Ridgetop roads*: 4.19 mi. (67.4%)
*Mid-slope roads*: 1.77 mi. (28.5%)
*Valley bottom roads*: .26 mi. (4.1%)

System road density: 3.56 miles/sq.mile
ATM roads: none

## Rock3 - 1710020616

**At a Glance:**



*Sub-watershed size:* 2.11 sq. miles (1349 acres )

*Streams include:* Rock Creek, tributary to Deadwood Creek

*Ownership:*
Siuslaw N.F. (37.6%)
Bureau of Land Mgt. (32.0%)
State (25.2%)
Private (3.3%)
Industrial Private (1.9%)

*History:* Some historic grazing in lower Rock Creek.

### Aquatics

Stream miles: 15.6
Stream density: 7.39 miles/sq.mile

Confinement & Gradient:
14.0 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
1.6 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
This drainage is shared by the Forest Service and the Bureau of Land Management. Rock Creek supplies a large amount of gravel to mainstem Deadwood Creek. Some large pieces have accumulated in the creek after the February, 1996 storm. Evaluation of this material should be conducted to determine stability of the structure and whether it needs to be secured. Rock Creek is an important source of gravels to the mainstem Deadwood Creek and the mainstem should be managed to take advantage of this.

Survey information available: 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 43% | RUSP - 16% |
| POMU - 36% | RHMA - 5% |

Land Type Association: 3F

## Rock3 (continued)

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Preacher loam
*Sideslope* - Digger rock outcrop complex, Bohannon gravelly loam
*Valley bottom* - Bohanon gravelly loam, Digger rock outcrop complex

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 17% of subwatershed
Moderate potential - 43% of subwatershed
Low potential - 40% of subwatershed

### Management

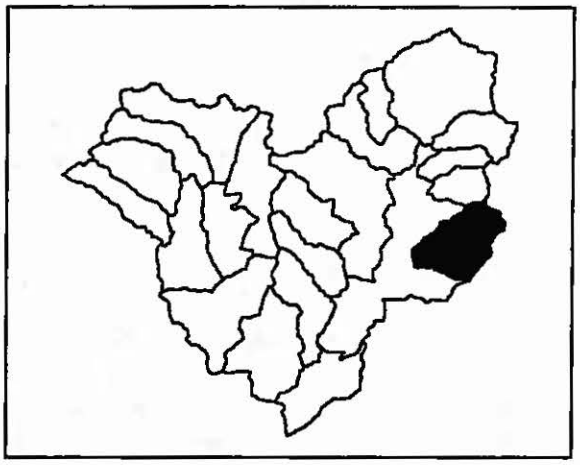
| | |
|---|---|
| *Natural acres:* | 1014 acres (75.7%) |
| *Managed acres:* | 322 acres (24.1%) |
| *Non-timber land:* | 3 acres (0.2%) |

System road miles: 3.0
*Ridgetop roads:* 2.48 mi. (82.9%)
*Mid-slope roads:* .41 mi. (13.7%)
*Valley Bottom roads:* .10 mi. (3.4%)

System road density: 1.42 miles/sq.mile
ATM roads: none

## North Bear - 1710020616

**At a Glance:**



*Sub-watershed size:* 5.08 sq. miles (3251 acres )

*Streams include:* Bear Creek and South Fork Bear Creek

*Ownership:* Bureau of Land Mgt. (79.1%)
Private (16.4%)
State (3.9%)
Industrial Private (0.6%)

*History:* There were four pre-1900 homesteads located at the bottom of Bear Creek and grazing occurred throughout Bear Creek and the lower portion of South Fork Bear. There is also an historic trail that loops around South Fork Bear Creek.

### Aquatics

Stream miles: 44.3
Stream density: 8.72 miles/sq.mile

Confinement & Gradient:

39.5 miles of *source* areas (confined and moderately confined, >8%)
.4 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The majority of this drainage is administered by the BLM with the lower sections in private ownership. This stream does contain some partially functioning stream which supports chinook, coho and steelhead. Large wood is lacking in this drainage and some structure work has been completed in the past. Additional structures and riparian plantings are planned for 1996 with ecosystem initiative funds. Beaver activity should be encouraged throughout this drainage.

Survey information available: 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 38% | RUSP - 24% |
| POMU - 34% | RHMA - 4% |

## North Bear (continued)

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Bohannon gravelly loam, Digger rock outcrop complex
*Valley bottoms* - Meda loam, Nestucca silt loam, Nehalem silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 14% of subwatershed
Moderate potential - 49% of subwatershed
Low potential - 37% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2727 acres (83.9%) |
| *Managed acres:* | 380 acres (11.7%) |
| *Non-timber land:* | 54 acres (1.7%) |

System road miles: 4.4
*Ridgetop roads*: 2.74 mi. (61.7%)
*Valley Bottom roads*: 1.70 mi. (38.3%)

System road density: 1.15 miles/sq.mile
ATM roads: none

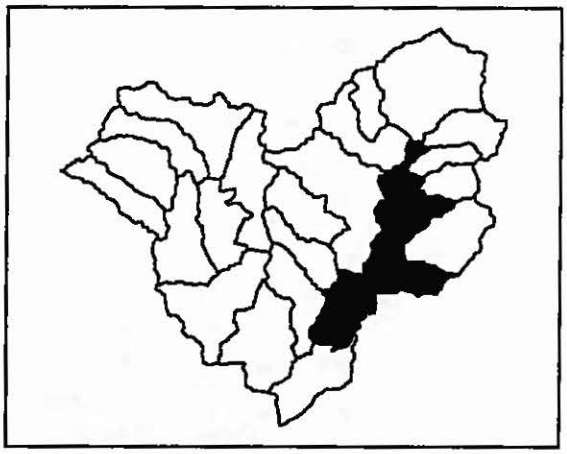
## Alpha - 1710020616

**At a Glance:**

*Sub-watershed size:* 12.57 sq. miles (8045 acres)

*Streams include:* Mainstem Deadwood Cr.
Deer, Raleigh, Shwartz & Alpha Creeks which are tributaries to Deadwood Cr.

*Ownership:* Private (30.7%)
Bureau of Land Mgt. (27.2%)
Siuslaw N.F. (26.6%)
Private Industrial (10.7%)
State (4.8%)



*History:* At least six pre-1900 homesteads on the mainstem of Deadwood which included grazing. Also, at least four documented splash dams at the upper end of this subwatershed on mainstem Deadwood Creek.

### Aquatics

Stream miles: 89.5
Stream density: 7.12 miles/sq.mile

Confinement & Gradient:

68.0 miles of *source* areas (confined and moderately confined, >8%)
2.6 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
18.9 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

ODF&W collected habitat information on the mainstem with the 'Hire the Fisherman' program in 1995. The data has not been made available at this time. Generally, the stream is bedrock dominated with isolated stretches of fair substrate accumulations. Stream temperatures high in the mainstem and in most areas are too high to rear salmonids through the summer. Partnerships are very important to the partial recovery of this mainstem area. Structure work should be done in areas to take advantage of inputs from tributaries (esp. Rock Creek). Fencing and riparian plantings are important throughout the mainstem area.

Survey information available:
- Summer, 1995, stream temperature monitoring in upper Mainstem and the mouth of Deadwood Cr. (Ryan #902520 @ the mouth; Ryan #902527 @ the Sundstrom residence).
- 1990 water users inventory identified 29 water use permitees in this subwatershed
- 1995 ODFW stream survey

Aquatic Priority for Restoration: **Low, unless partnerships are developed.**

## Alpha (continued)

### Vegetation/Soil

Plant Association Groups:

| | |
|---|---|
| POMU - 42% | GASH - 26% |
| RUSP - 29% | RHMA - 3% |

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Digger rock outcrop complex, Bohannon gravelly loam
*Deadwood mainstem* - Nehalem and Nekoma silt loams
*Valley bottoms of tributaries to Deadwood* - Meda loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 13% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 47% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 6408 acres (79.7%) |
| *Managed acres:* | 1637 acres (20.3%) |

System road miles: 23.2
*Ridgetop roads*: 4.28 mi. (18.4%)
*Mid-slope roads*: 3.07 mi. (13.2%)
*Valley Bottom roads*: 15.86 mi. (68.3%)

System road density: 1.85 miles/sq.mile
ATM roads: 5140 & lower 3259

## Misery - 1710020616

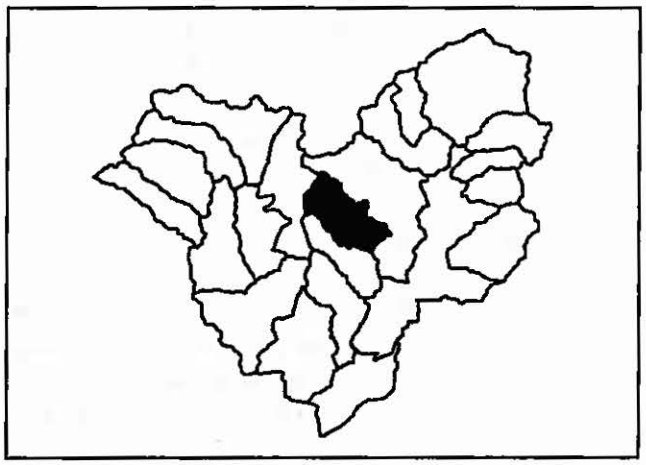
**At a Glance:**

*Sub-watershed size:* 4.04 sq. miles (2586 acres )

*Streams include:* Misery Creek

*Ownership:* Siuslaw N.F. (90.4%)
Private (5.8%)
State (3.8)

*History:* A pre-1945 sawmill was located half way up Misery Creek and grazing has historically occurred throughout this drainage up to the present day.



### Aquatics

Stream miles: 32.8
Stream density: 8.12 miles/sq.mile

Confinement & Gradient:

28.1 miles of *source* areas (confined and moderately confined, >8%)
.9 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.8 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The majority of the creek is in private ownership and therefore any improvements will have to be conducted through partnerships. Existing potential for partnerships is limited at this time but should they become available, they should be pursued.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 31% | RUSP - 27% |
| GASH - 28% | RHMA - 4% |

Land Type Association: 3C

**Misery (continued)**

Dominant Soils:

*Ridgetops* - Preacher loam, Bohannon gravelly loam

*Sideslopes* - Preacher-Bohannon-Siltrock complex, Preacher loam, Bohannon gravelly loam

*Valley bottoms* - Nekoma silt loam, Meda loam, Preacher-Bohannon-Slickrock complex

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 16% of subwatershed

Moderate potential - 38% of subwatershed

Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1336 acres (51.7%) |
| *Managed acres:* | 1216 acres (47.0%) |
| *Non-timber land:* | 34 acres (1.3%) |

System road miles: 10.3

*Ridgetop roads*: 4.29 mi. (41.5%)

*Mid-slope roads*: 2.82 mi. (27.3%)

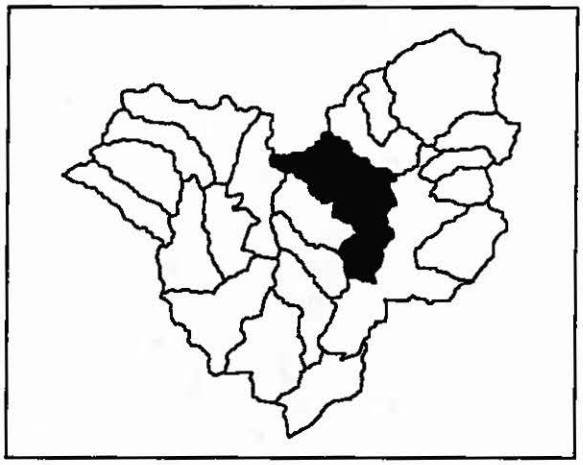
*Valley bottom roads*: 3.22 mi. (31.2%)

System road density: 2.55 miles/sq.mile

ATM roads: none

## West Deadwood - 1710020616

**At a Glance:**



*Sub-watershed size:* 9.67 sq. miles (6189 acres)

*Streams include:* The West Fork of Deadwood Creek which is a **Forest Key Watershed**

*Ownership:* Siuslaw N.F. (92.7%)
Private (6.5%)
State (0.8%)

*History:* There were two pre-1900 homesteads in the lower quarter of West Fork Deadwood Creek. In addition, there was a pre-1945 sawmill in the same area and historically, grazing occurred throughout the lower half of the subwatershed.

### Aquatics

Stream miles: 81.7
Stream density: 8.44 miles/sq.mile

Confinement & Gradient:

66.8 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
12.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream habitat surveys indicate that the West Fork of Deadwood is partially functioning as rearing habitat for anadromous salmonids. Large wood is deficient in the system and therefore habitat complexity is low. There is good partnership potential with new landowners in this drainage and should be emphasized. Riparian woody vegetation is lacking in many areas and planting of conifers in clumps as well as willow plantings will improve streambank stability and increase shade. Acquisition of upper section of private inholding should be pursued if opportunity presents itself. This drainage is a Forest key watershed and has high potential for being a major contributor to the anadromous salmon populations in the Deadwood watershed.

Survey information available:
- Summer, 1995, bracketed stream temperature monitoring on West Fork Deadwood Cr. (Ryans #902518 and #902519)
- Level II stream habitat survey, August, 1992
- 1990 water users inventory identified 9 water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

## West Deadwood (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 37% | GASH - 30% |
| RUSP - 30% | RHMA - 3% |

Land Type Association: 3F

Dominant Soils:

*Ridgetope* - Preacher loam, Bohannon gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger outcrop complex
*Valley bottom* - Meda loam, Nekoma silt loam, Nehalem silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 12% of subwatershed
Moderate potential - 42% of subwatershed
Low potential - 46% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 3359 acres (54.3%) |
| *Managed acres:* | 2695 acres (43.5%) |
| *Non-timber land:* | 135 acres (2.2%) |

System road miles: 23.9
*Ridgetop roads*: 14.5 mi. (60.7%)
*Mid-slope roads*: 5.52 mi. (23.1%)
*Valley bottom roads*: 3.88 mi. (16.2%)

System road density: 2.47 miles/sq.mile
ATM roads: upper 3259

## Failor - 1710020616

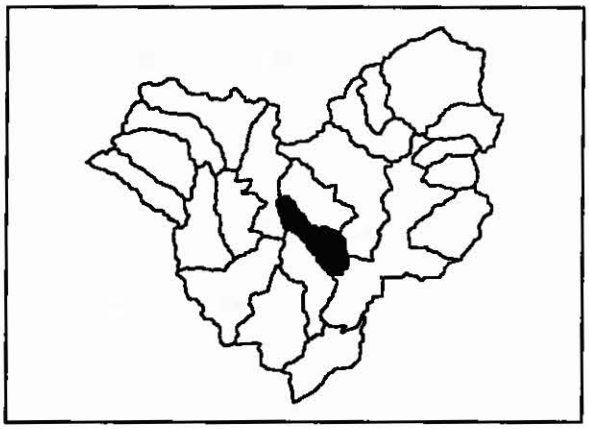
**At a Glance:**

*Sub-watershed size:* 3.16 sq. miles (2024 acres )

*Streams include:* Failor Creek

*Ownership:* Siuslaw N.F. (99.8%)
Other (0.2%)

*History:* There was one pre-1945 sawmill located just above the confluence with Deadwood Creek.



### Aquatics

Stream miles: 24.2
Stream density: 7.66 miles/sq.mile

Confinement & Gradient:

20.4 miles of *source* areas (confined and moderately confined, >8%)
.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.6 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Failor has been heavily harvested in the past but does not have an existing road on the valley bottom of the drainage. Level II fish habitat surveys indicate that the middle section of Failor Creek, associated with adjacent natural stands, is providing functioning rearing habitat for anadromous salmonids. The main emphasis in this drainage will be to expand existing functioning habitat. Upstream and downstream of the functioning section, the creek is only partially functioning as rearing, but these areas do meet some necessary requirements. Large wood needed to create deep complex pools is deficient, but addition of large wood from adjacent stands and wood accumulation from commercial thinning will help to remedy this deficiency. Riparian planting of conifers can be done throughout the length of the stream since historic photos show this area supported conifers throughout.

Survey information available:
- Summer, 1995, stream temperature monitoring at the mouth of Failor Cr. (Hobo #1933)
- Level II stream habitat survey, October, 1994
- 1990 water users inventory identified 1 water use permitee in this subwatershed
- **Good potential for monitoring at subwatershed scale**

Aquatic Priority for Restoration: **High**

## Failor (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 34% | GASH - 29% |
| RUSP - 34% | RHMA - 3% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Preacher loam, Bohannon gravelly loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Preacher loam
*Failor valley bottom* - Preacher-Bohannon-Slickrock complex, Meda loam near the mouth

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

Low potential - 20% of subwatershed
Moderate potential - 35% of subwatershed
High potential - 44% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 734 acres (36.3%) |
| *Managed acres:* | 1290 acres (63.7%) |

System road miles: 6.9
*Ridgetop roads*: 5.70 mi. (83.2%)

System road density: 2.17 miles/sq.mile
ATM roads: none
*Mid-slope roads*: 1.15 mi. (16.8%)

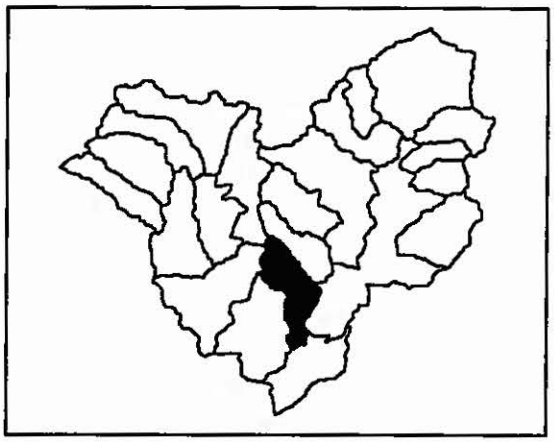
## Green Creek - 1710020616

**At a Glance:**

*Sub-watershed size:* 4.16 sq. miles (2661 acres )

*Streams include:* Green Cr.

*Ownership:* Siuslaw N.F. (90.2%)
Private (6.3%)
State (3.5%)



### Aquatic Statistics/Conditions

Stream miles: 34.2
Stream density: 8.22 miles/sq.mile

Confinement & Gradient:

29.4 miles of *source* areas (confined and moderately confined, >8%)
.1 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The lower half of Green Creek is primarily in private ownership, and without partnerships little fish habitat improvement is likely here. The stream above the private ownership has good potential for rearing of anadromous salmonids with a low gradient and fairly unconfined channel. Extensive beaver activity has provided good rearing conditions for young salmonids and the beaver activity should be promoted by plantings of willow and deciduous trees. Some large wood instream complexes could be added where valley confinement and gradient are higher.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 40% | GASH - 28% |
| RUSP - 29% | RHMA - 3% |

**Green Creek (continued)**

Land Type Association: 3C

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Digger gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex (upper Green Cr.), Digger rock outcrop complex (lower Green Cr.), Bohannon gravelly loam
*Valley bottom* - Meda loam

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 12% of subwatershed
Moderate potential - 41% of subwatershed
Low potential - 47% of subwatershed

**Management**

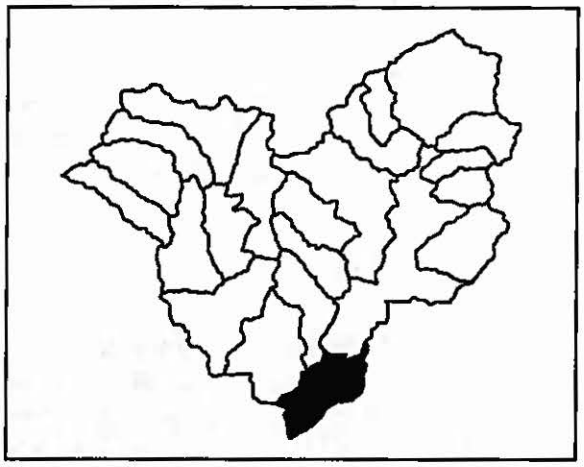
| | |
|---|---|
| *Natural acres:* | 1259 acres (47.3%) |
| *Managed acres:* | 1402 acres (52.7%) |

System road miles: 17.2
*Ridgetop roads*: 9.01 mi. (52.3%)
*Mid-slope roads*: 3.77 mi. (21.9%)
*Valley Bottom roads*: 4.45 mi. (25.8%)

System road density: 4.13 miles/sq.mile
ATM roads: none

## Lower Lake - 1710020617

**At a Glance:**



*Sub-watershed size:* 4.24 sq. miles (2710 acres )

*Streams include:* Lower Mainstem Lake Creek

*Ownership:* Siuslaw N.F. (67.1%)
Private (23.2%)
Industrial Private (4.0%)
Oregon State Fish and Wildlife (3.3%)
State (2.4%)

*History:* There were two pre-1900 homesteads right at the confluence of Deadwood and Lake Creeks.

### Aquatics

Stream miles: 31.8
Stream density: 7.50 miles/sq.mile

Confinement & Gradient:

26.1 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Lower Lake includes Lake Creek from just upstream of the confluence with Deadwood Creek to the confluence with the Siuslaw River. Lake Creek is wide ( average over 200 feet) and is bordered by deciduous trees, primarily alder. There is a large amount of bedrock in this portion of Lake Creek and solar heating is a concern. There are scattered areas of chinook spawning habitat through this reach. Highway 36, which is directly adjacent to the creek, limits floodplain interaction and impacts the creek. There is little emphasis planned here for fish habitat restoration. There has been discussion about a possible land exchange in this area, but from a fisheries standpoint land exchanges elsewhere should be sought first.

Survey information available: 1990 water users inventory identified 14 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | GASH - 27% |
| RUSP - 30% | RHMA - 4% |

## Lower Lake (continued)

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Digger rock outcrop complex, Digger gravelly loam, Hembre silt loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Digger rock outcrop complex
*Valley bottom* - Nehalem silt loam, Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 17% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 45% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 1740 acres (64.2%) |
| *Managed acres:* | 944 acres (34.8%) |
| *Non-timber land:* | 27 acres (1.0%) |

System road miles: 8.21
*Ridgetop roads*: 1.31 mi. (16.0%)
*Mid-slope roads*: .29 mi. (3.5%)
*Valley Bottom roads*: 6.61 mi. (80.5%)

System road density: 1.94 miles/sq.mile
ATM roads: none

## Appendix L. Landscape Block Data

Table 1. Landownership by Landscape Block (acres)

| Landscape Block | Federal | % fed. | State | Private, nonindustrial | Industrial | TOTAL |
|---|---|---|---|---|---|---|
| A | 5780 | 90% | - | 621 | - | 6,401 |
| B | 3204 | 82 | - | 693 | - | 3,897 |
| C | 7175 | 89 | - | 376 | 466 | 8,017 |
| D | 3493 | 77 | 354 | 121 | 540 | 4,508 |
| E | 7289 | 69 | - | 3257 | - | 10,546 |
| F | 2610 | 79 | 137 | 532 | 20 | 3,299 |
| G | 6891 | 57 | 623 | 3421 | 1161 | 12,096 |
| H1 | 5721 | 92 | 94 | 396 | - | 6,211 |
| H2 | 2020 | 99 | - | 4 | - | 2,024 |
| H3 | 2337 | 90 | 99 | 151 | - | 2,587 |
| H4 | 5816 | 91 | - | 137 | 454 | 6,407 |
| H5 | 5743 | 93 | 50 | 402 | - | 6,195 |
| H6 | 1803 | 97 | - | 58 | - | 1,861 |
| **TOTAL** | **59,882** | **81** | **1357** | **10,169** | **2641** | **74,049** |

Table 2. Vegetation Condition by Landscape Block (acres)

| Block | Managed | Natural | % Nat. | Mature & L-S [2/] | % mature | Late-succ.[2/] | % L-S | Other | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **A** | 1730 | 4638 | 73% | 3058 | 48% | 1381 | 22% | - | 6,368 ac. |
| **B** | 1374 | 2491 | 64 | 1539 | 40 | 227 | 6 | - | 3,865 |
| **C** | 3032 | 4941 | 62 | 3240 | 40 | 976 | 12 | 28 | 8,001 |
| **D** | 1292 | 3157 | 71 | 2055 | 46 | 1082 | 24 | 10 | 4,459 |
| **E** | 3653 | 6333 | 60 | 3778 | 36 | 1201 | 11 | 542 | 10,529 |
| **F** | 380 | 2817 | 87 | 1206 | 37 | 303 | 9 | 54 | 3,251 |
| **G** | 1770 | 8764 | 74 | 2950 [1/] | 32 [1/] | 854 [1/] | 7[1/] | 1266 | 11,800 |
| **H1** | 2846 | 3298 | 53 | 1970 | 32 | 521 | 8 | 28 | 6,172 |
| **H2** | 1290 | 734 | 36 | 400 | 20 | 176 | 9 | - | 2,024 |
| **H3** | 1216 | 1336 | 52 | 872 | 34 | 317 | 12 | 34 | 2,586 |
| **H4** | 3136 | 3224 | 51 | 1929 | 30 | 445 | 7 | 20 | 6,380 |
| **H5** | 2695 | 3359 | 54 | 2307 | 37 | 324 | 5 | 135 | 6,189 |
| **H6** | 848 | 1006 | 54 | 237 | 13 | 1 | <.1 | - | 1,854 |
| **TOTAL** | 25,262 | 46,098 | 63 | 25,541 | NA | 7,808 | NA | 2117 | 73,478 |

[1/] Based on 9,090 total acres in Landscape Block G, which excludes Lower Lake.

2/ If the Sect. 318 sales are harvested, the percent Mature/Late-Successional vegetation will drop to 43% in Block A and 35% in Block B. (500 acres of mature vegetation will be harvested, including 236 acres of late-successional vegetation.)

Table 3. Interior Forest Habitat by Landscape Block, in acres

| Block | Mature/L-S | % mature | Late-succ. | % L-S | Interior - all mature | % of mature in interior | Interior - late-succ. | % of L-S in interior |
|---|---|---|---|---|---|---|---|---|
| A | 3058 | 48% | 1381 | 22% | 367 | 12% | 59 | 4 |
| B | 1539 | 40 | 227 | 6 | 148 | 10 | - | - |
| C | 3240 | 40 | 976 | 12 | 282 | 9 | 34 | 3 |
| D | 2055 | 46 | 1082 | 24 | 442 | 22 | 186 | 17 |
| E | 3778 | 36 | 1201 | 11 | 360 | 10 | 6 | <1 |
| F | 1206 | 37 | 303 | 9 | 4 | <1 | - | - |
| G | 2950 [1/] | 32 | 854 [1/] | 7 | 58 [1/] | 2 | 4 [1/] | <1 |
| H1 | 1970 | 32 | 521 | 8 | 215 | 11 | - | - |
| H2 | 400 | 20 | 176 | 9 | 31 | 8 | 22 | 12 |
| H3 | 872 | 34 | 317 | 12 | 31 | 4 | 2 | <1 |
| H4 | 1929 | 30 | 445 | 7 | 415 | 21 | 3 | <1 |
| H5 | 2307 | 37 | 324 | 5 | 179 | 8 | - | - |
| H6 | 237 | 13 | 1 | <.1 | - | - | - | - |
| TOTAL | 25,541 | NA | 7,808 | NA | | | | |

[1/] Based on 9,090 total acres in Landscape Block G, which excludes Lower Lake.

Interior forest: Forest areas that are greater than 500 feet from an edge.
The following categories of vegetation were selected to assess current acres of interior mature conifer forest:

1. Stands of single-storied or multi-storied mature conifer or conifer-mix (at least 50% conifer) with and without remnants.
2. Stands > 80 years old or > 18" diameter at breast height.
3. Habitats > 500' from stand edge.

Interior late-successional forest ("biodiversity hotspots) were selected using the same categories, except the stands also had to contain multiple-stories and/or old growth remnants.

Table 4. Riparian Reserve Vegetation Characteristics by Landscape Block, in acres

| Block | Managed Stands | Natural Stands | % Natural | Other Veg. | TOTAL |
|---|---|---|---|---|---|
| A | 1585 | 3949 | 71% | - | 5,534 |
| B | 1136 | 1872 | 62 | - | 3,008 |
| C | 2744 | 3625 | 57 | - | 6,369 |
| D | 981 | 2128 | 68 | 1 | 3,110 |
| E | 2712 | 4403 | 62 | 26 | 7,141 |
| F | 238 | 2147 | 90 | - | 2,385 |
| G | 1125 | 3460 | 75 | 9 | 4,594 |
| H1 | 2740 | 2899 | 51 | - | 5,639 |
| H2 | 1290 | 729 | 36 | - | 2,019 |
| H3 | 1148 | 1183 | 51 | 5 | 2,336 |
| H4 | 3027 | 2663 | 47 | 9 | 5,699 |
| H5 | 2367 | 2939 | 55 | 32 | 5,338 |
| H6 | 774 | 896 | 54 | - | 1,670 |
| TOTAL | 21,867 | 32,893 | 60 | 82 | 54,842 |

## Appendix M. Priority Management Recommendations by Landscape Block

High priority projects are identified for each Landscape Block. In addition, each Landscape Block has been prioritized for terrestrial and aquatic resource management needs. The highest priority projects for the watershed are, therefore, those identified in the highest priority Landscape Blocks, e.g., Block A, C and H2.

The projects listed below are broken into two time periods--those that are recommended for early management (years 1-3) and those that could be implemented after the third year (e.g., years 4-10).

Each project has a purpose code identified:

T (terrestrial) = to improve vegetation for LSR conditions

R (Riparian Reserve) = to improve connectivity for terrestrial species thru Riparian Reserves.

A (aquatic resource) = to improve streamside vegetation and in-stream conditions for aquatic resources, to reduce risk of adverse impact to aquatic resources from roads.

M = miscellaneous purpose

The list of silvicultural treatments includes plantation units that meet criteria for terrestrial and /or aquatic objectives, as described in Chapter 6. In addition, units identified for precommercial thinning are currently age 10-18 years; units identified for commercial thinning are 25 years or older. The units selected for precommercial thinning need to be further screened to eliminate those already thinned. Units selected for commercial thinning were screened and those units already thinned are noted with an *.

Some of the plantation opportunities listed below may not appear to be high priority from a silvicultural perspective, i.e., they may be older than recommended for thinning or they may be at suitable stocking levels. However, the units have been identified as important for either aquatic or terrestrial objectives and should be evaluated during project planning stage to determine if they could be included for treatment along with other project work.

Appendix I lists all the Forest Service and county roads in the watershed. Each road has been rated (from 1 to 5, low to high respectively) for its potential to adversely impact aquatic resources. Criteria used to rate roads included slope position, slope stability, whether or not the road was sidecast built, risk to known quality habitat, presence of known problems, and ATM status. All roads rated 3-5 are considered high priority to stabilize and are included in each block's early management time period. The roads appear in order of priority based on their rating. At a minimum, all non-ATM roads that are listed should be waterbarred and closed in the first 3-year period. Additional operator spurs that were identified in the road assessment to be waterbarred and closed are included in the roads database with the associated road segment.

**Landscape Block A** (Mariah, Rogers)
Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:
The objective is to thin and underplant plantations to accelerate late-successional conditions by favoring late-successional species. The recommended levels of thinning and species to underplant varies by Plant Association Group. See Table 6.1.

| Commercial thinning | Precommercial thinning |
|---|---|
| 2133 004 (A/T) | 2133 032 (A) |
| 2133 017 (T) * | 2133 035 (A) |
| 2133 067 (A/T) | 2133 036 (A) |
| 2133 056 (T) | 2133 037 (A) |
| 2133 058 (A/T) | 2133 040 (A/T) |
| 2133 060 (A/T) | 2133 044 (A\T) |
| 2133 063 (A/T) | 2133 054 (T) |
| 2133 064 (A/T) | 2133 069 (T) |
| 2133 065 (A/T) | 2133 089(T) |
| | 2133 097 (T) |

Roads to stabilize (A)

- (5) FR 2500B (upper 2.6 miles) - large amount of sidecast pullback and deep patching
  - waterbar and close two operator spurs off 2500
- (5) FR 5800 has chronic stability problems above Rogers and Maria; Close if monies to maintain road are unavailable and aquatic resources would be degraded.
- (4) FR 2100639
- (3) FR 2100640 - '96 storm - road slump with slide beneath @ m.p. 2.0; sidecast problems above Rogers Cr.
- (3) FR 5800637
- (3) FR 5840622
- (3) FR 5840624
- (3) FR 5840625
- (3) FR 5840633 - identified sidecast pullback
  (3) FR 5840637

The following roads should be stabilized and closed as soon as any necessary management activities are completed. Closing these roads will further the management objectives of: 1) protecting the Key Watershed and 2) restoring part of a secure, isolated area for wildlife:

- (2) FR 2500643
- (2) FR 5840626
- (2) FR 5840631
- (2) FR 5840636
- (1) FR 5840
- (1) FR 5840627
- (1) FR 5840630 - waterbar and close operator spur off this road
- (1) FR 5840632

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- Rogers Cr. - 40 fish structures (1997)
- Mariah Cr. - locate opportunities to add large wood.
- W.Fk. Indian - KV work (1996/1997), and locate opportunities to add large wood.

Riparian Vegetation (A)

- Rogers Cr. - plant in and upstream of functioning stretches, especially where alders are in late-successional stands. Maintain existing riparian vegetation diversity.
- Rogers Cr. - plant clumps of trees in areas of sparse vegetation below functioning portion of Rogers Cr.
- W.Fk.Indian - plant clumpy patches of trees where vegetation sparse.
- Maria Cr. - make scattered plantings under old alders.

Miscellaneous (A)

- Control and reduce noxious weeds in old pasture lands along Rogers Cr.
- Explore partnership opportunity with Davidson for stream restoration work.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2133 005 (A/T) | 2133 033 (T) |
| 2133 021 (T) | 2133 034 (T) |
| 2133 049 (A/T) | 2133 077 (T) |
| 2133 055 (T) | 2133 078 (T) |
| 2133 068 (A) | 2133 081 (T) |
| | 2133 0_5 (T) - 1985 unit |

**Landscape Block B** (N.Indian--upper portion, Upper Indian)
Priorities: H - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2131 001 (A) | 2131 103 (A) |
| 2131 004 (A/T) | 2131 104 (A) |
| 2131 034 (A) | 2131 105 (A) |
| 2131 038 (A) | 2131 146 (T) |
| 2131 042 (A) | |
| 2131 144 (A) | |

Roads to stabilize (A)
- (5) FR 2116617 - 4 bad culverts, road washed out @ m.p. .5, private access
- (4) FR 5800680 - sidecast pullback, waterbar and close at least 3 spurs off 680
- (4) FR 5840628 - sidecast pullback throughout
- (4) FR 2100 - '96 storm - 5 moderate to large failures affecting road bed, 2 small cutbank failures and 1 blocked culvert
- (4) FR 3700573
- Waterbar and close 2 operator spurs off 3250

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Riparian vegetation (A)
- Upper Indian - release existing plantings.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2131 001 (A) | 2131 103 (A) |
| 2131 006 (A/T) | 2131 104 (A) |
| 2131 007 (R/A) | 2131 105 (A) |
| 2131 009 (T) | |
| 2131 018 (A/T) | |
| 2131 023 (R/T) | |
| 2131 024 (R/A) | |
| 2131 025 (A/T) | |
| 2131 026 (T) | |
| 2131 028 (A/T) | |
| 2131 031 (T) | |
| 2131 059 (T) | |
| 2131 085 (A) | |

In-stream projects (A)

- N.Indian Cr. - consider adding LWD to create complex pools; repair bank instability. (Beaver are prevalent in area.)

Riparian vegetation (A)

- N.Indian Cr. - high potential for willow planting in areas needing vegetation.
- N.Indian Cr. - plant clumpy patches of conifer along upper 2/3 of mainstem.
- Upper Indian Cr. - make clumpy plantings along 3/4 mile stretch on national forest land.

Miscellaneous (A) -

- Control and reduce noxious weeds along roadsides.

**Landscape Block C** (N.Panther--upper portion, Upper Deadwood)

Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 3505-2C1 (A/T) | 3504-5C3 (A) |
| 3505-1C1 (A/T) | 3504-94D3 (A) |
| 3504-40C3 (A/T) | 3505-96D7 (A) |
| 6160-7044 (A/T) | 3505-153B1 (A) |
| 3505-15B2 (A/T) | 3505-39C2 (A) |
| 3504-36D2 (A/T) | 3505-154C3 (A) |
| 3505-19B3 (A/T) | 3505-53C1 (A) |
| 6160-7024 (A/T) | 3505-90B1 (A) |
| | 3505-139D2 (A) |
| | 6160-7005 (1985 unit at headwater) |

Road to stablilize (A)

- (5) FR 6300118 - repair drainage problems (culverts and waterbar)
- (4) FR 6300 - at least 3 undersized culverts need replacing; partially plugged culvert @ mp 4
- (4) FR 3500 - partially plugged culvert @ 4.6; 2 sidecast pullbacks; deep patching needed throughout; '96 storm - 1-350 cy slide closed rd
- (4) FR 3515
- (4) FR 3515115
- (4) FR 3515118
- (4) FR 3515122
- (4) FR 3515127
- (4) FR 6300119
- (4) FR 6300122
- (4) FR 6300126
- (3) FR 3515117
- (3) FR 3315111
- (3) FR 3315112
- (3) FR 3500111
- (3) FR 3511112 - fix large slump @ .4
- (3) FR 3515114
- (3) FR 3515116
- (3) FR 3515126
- (3) FR 3515130
- (3) FR 3515200
- (3) FR 6300110 - culvert removal needed @ .3; possible obliteration
- (3) FR 6300UK1

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- Mainstem Deadwood - look for opportunitites to add large woody debris and to include side channels. Note: On-site evaluation needed to determine how to secure good habitat.
- Pursue opportunities for partnerships

Riparian vegetation (A)
(Potential for clumpy release in deciduous/mixed pole stands; potential for cottonwood and willow throughout.)

- West headwaters - underplant with shade tolerant species scattered in mature deciduous.
- Plant conifers along toeslopes where potential for conifer survival is high.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 1960 unit (Fawn Cr.) | 3504-5C3 (A) |
| 3504-44C4(A) | 3505-90B1 (A) |
| 3505-154C3(A/T) | 3505-139D2 (A) |
| 3505-39C2(A/T) | |
| 3505-12C2(A/T) | |
| 3505-9C2(A/T) | |
| 3505-5B1(A/T) | |
| 3505-10C2 (A) | |
| 6160-7008 (1977 unit) (A) | |
| 6160-7021 (1961 unit) (A) | |
| 3505-4C1 (A) | |
| 3505-3B1 (A) | |
| 6160-7019 (1973 unit) (A) | |
| 6160-7043 (A/T) | |
| 1974 unit (A) | |

Riparian vegetation (A)

- Plant clumps of conifer on Upper Cougar Cr.
- Encourage private landowners to plant shade tolerant species under mature deciduous trees.

Miscellaneous

- Promote beaver habitat in N. Panther.

**Landscape Block D** (Elk, Buck, Rock3)
Priorities: H - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
3505-23C4 (T)
3505-2204 (A) (6160-8002)

Roads to stabilize (A)
- (3) FR 3525 - repair partially plugged culverts and slide associated with a culvert.
- (3) FR 3526113
- BLM 16-8-35.10 - 2 sidecast failures.

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event, especially wood additions.

Miscellaneous
- Assist Deadwood community group in layout and construction of Elk Cr. trail.
- Explore opportunity to acquire state-owned land in lower portion of watershed to enhance opportunity to manage LSR. (Note: part of the parcel is in Landscape Block F. State is interested in exchanging this parcel.)

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 3505-35D3 (A) | 3505-142B5 (A) |
| 1964 unit (A) | 3505-114C5 (A) |
| 3505-78C5 (A) | 3505-29D4 (A) |
| 3505-32C5 (A) | 6 units in Rock Cr. (1983-1992) |
| 3505-30C4 (A) | |
| 3505-24D4 (A) | |
| 3505-35D3 (A) | |
| 3505- (1963 unit) | |

Riparian Planting (A)
- Plant clumps of riparian species along Buck and Rock Creeks.

**Landscape Block E** (mainstem Indian Cr., including Elk2, Herman--SW portion, Long--lower portion)
Priorities: M - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2154 040 (T-eagle)

Roads to stablilize (A)
- (5) 3278663 - sidecast pullback throughout; oblit. - no access needed
- (4) 3278000 - ATM
- (4) FR 2170UK1 (T17S, R10W, NE corner of S14) - Sidecast pullback and waterbar
- (4) FR 3200000 - Deep patching needed in several places, slump at mp .2 from '96 storm
  (See Block H4 for more storm info for FR 3200000)
- (4) FR 3278666
- (4) FR 3200759 - several sidecast failures
- (3) FR 3200672 - '96 storm - 20 cy rock slide @ 1.8, shoulder failure with pipe end exposed @ 2.4
- (3) FR 3200672UK1 (T16S, R9W, SE S30)
- (3) FR 2500000 (bottom portion = ATM)
- (3) FR 2500650
- (3) FR 2500654
- (3) Old spur off 3278 (T16S, R9W, S30) - remove wooden culverts and decommission
- (3) CO 5130

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2154 041 (T-eagle) | 2154 101 (T-eagle) |
| 2154 043 (T-eagle) | 2134 10 ? (T-eagle) |
| 2154 045 (T-eagle) | 2134 040 (A) |
| 2134 004 (A) | 2134 043 (A) |
| 2134 005 (A) | 2134 044 (A) |
| 2134 006 (A) | 2134 107 (A) |
| 2134 007 (A) | 2134 109 (A) |
| 2134 019 (A) | 2134 112 (A) |
| 2134 036 (A) | 2134 114 (A) |
| 2134 038 (A) | 2134 123 (A) |
| 2134 042 (A) | |
| 2154 006 (A) | |
| 2154 007 (A) | |
| 2154 035 (A) | |
| 2154 039 (A) | |
| 2154 040 (A) | |
| 2154 042 (A) | |

In-stream projects (A)
- Evaluate opportunity to remove partial fish barrier on Smoot Cr.
- Elk Cr. - enhance deep pools with large woody debris.

- Explore partnership potential for in-stream work in mainstem Indian Cr.
- Explore opportunity for partnership with new landowner on mainstem Indian Cr.

Riparian vegetation (A)
- Elk Cr. - do clumpy planting along creek.
- Encourage private landowners to plant some conifer along streambanks.

Miscellaneous (A)
- Evaluate culvert fish passage capacity at mouth of Elk Cr.

**Landscape Block F** (N.Bear)
Priorities: L - terrestrial
M - aquatic

First 3 years -

Road work (A)
- BLM 16-8-20.00 - sidecast failure

In-stream projects (A)
- Raleigh Cr. - add wood structures to improve pool habitat and increase cover
- Rock Cr. - add wood and rock structure complexes.
- S.Fk. Bear Cr. - locate opportunities to add additional wood structures.
- Continue partnership with Howard Pazdral in 1996 for in-stream structures and riparian planting

Riparian vegetation (A)
- Plant scattered shade-tolerant species, e.g., cedar, in deciduous-dominated areas.

Later time period -

Silvicultural treatments:
Precommercial thinning
1987 unit
1988 unit
1990 unit
1992 unit

**Landscape Block G** (mainstem Deadwood, Lower Lake)
Priorities: L - terrestrial
M - aquatic

First 3 years -

Roads to stabilize (A)
- (3) FR 3259645
- (3) FR 3279750 - priority to waterbar and close
- (3) FR 3259 (lower portion)
- Initiate development of cooperative relationship with county road maintenance department. Encourage county to begin culvert replacements/road relocations, etc. as needed to reduce impact of road on stream function.

In-stream projects (A)
- Participate in stream structure projects planned for 1996 with Deadwood residents.
- Pursue project planning with landowners interested in stream restoration for future years.
- Evaluate effects of Feb. 1996 storm event.

Riparian vegetation (A)
- Initiate project planning with private landowners interested in planting scattered conifer and deciduous trees, e.g., willow, along stream.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2141 074 (A) | 1986 unit (BLM) |
| 1956/58 units (A) | |
| 1952 unit (A) | |

Miscellaneous (T)
- Explore opportunity to acquire state-owned land parcels (2 in northern porion) to improve LSR conditions. (State is interested in exchanging these parcels.)

**Landscape Block H1** (Lower Indian, Green Cr.)
Priorities: M - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2143 091 (R/A)
2143 095 (R/A)
2143 137 (R/A)

Road to stabilize (A)
- (4) FR 2170764 - sidecast pullback and waterbar
- (4) FR 3289000 - 2 cutbank failures and a road slump from '96 storm; additional culvert work
- (4) FR 3279000 - sidecast pullback, waterbar and close
- (3) FR 3200742
- (3) FR 3279669 - priority to waterbar and close
- (3) FR 3279747 - priority to waterbar and close
- (3) FR 3289UK1 (T17S, R9W, NW corner of S4) - waterbar and close riparian road

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.
- Dismantle Green Cr. bridge and place in stream as fish structures.

Riparian vegetation (A)
- Plant willow in middle section of Green Cr. to encourage beaver activity.

Miscellaneous (T)
- Explore opportunity to acquire state-owned lands to improve ability to manage for bald eagle nesting habitat. (State is interested in exchanging property.)

Later time periods -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2143 012 (A) | 2143 011 (A) |
| 2143 026 (A) | 2143 017 (A) |
| 2143 027 (A) | 2143 032 (A) |
| 2143 028 (A) | 2143 036 (A) |
| 2143 029 (A) | 2143 052 (A) |
| 2143 030 (A) | 2143 053 (A) |
| 2143 031 (A) | 2143 055 (A) |
| 2143 033 (A) | 2143 074 (A) |
| 2143 045 (A) | 2143 078 (A) |
| 2143 047 (R) | 2143 081 (A) |
| 2143 054 (A) | 2143 098 (R) |
| 2143 057 (A) | 2143 127 (A) |
| 2143 058 (A) | 2143 158 (A) |
| 2143 078 (A) | |
| 2143 082 (A) | |
| 2143 086 (A) | |
| 2143 087 (A) | |
| 2143 091 (A) | |

2143 092 (A)
2143 095 (A)
2143 097 (A)
2143 099 (R)
2143 102 (A)
2143 137 (A)
2143 143 (A)
2143 ? (1959 unit)(A)
2154 006 (A)
2154 007 (A) *
2154 008 (A) *
2154 035 (A)
2154 039 (A)
2154 040 (A)
2154 042 (A) *

In-stream projects (A)

- Pursue partnership with private landowners in lower mainstem of Indian Cr. to assist with in-stream structures.

Riparian vegetation (A)

- Velvet Cr. - plant clumps of riparian vegetation and possibly release conifers.
- Green Cr. - plant clumps of vegetation on toeslopes at top and bottom of drainage.

Miscellaneous (A)

- Lower Indian Cr. dispersed camping sites - manage erosion problems or consider removal of sites.
- Participate in riparian research project (S.Chan's plots)

**Landscape Block H2** (Failor)
Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 012 (A/R) | 2142 053 (A/R) |
| 2142 051 (A/R) | 2142 058 (A/R) |
| 2142 054 (A/R) | 2142 059 (R) |
| 2142 057 (A/R) | 2142 106 (R) |
| 2142 060 (A/R) | |
| 2142 061 (A/R) | |
| 2142 062 (A/R) | |

Roads to stabilize (A)
- (4) FR 3279668 - priority to waterbar and close
- (3) FR 3279667 - priority to waterbar and close
- (3) FR 3279670 - priority to waterbar and close
- (3) FR 3279748 - priority to waterbar and close
- (3) FR 3269000
- (3) FR 3269662

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.
- Failor Cr. - locate opportunities to add large woody debris

Riparian vegetation (A)
- Plant clumps of vegetation and release conifers in upper Failor first.

Miscellaneous
- Initiate subbasin monitoring of effects of management activities on stream conditions.

Later time period -

Silvicultural treatments:

Commercial thinning
2142 008 (A) *
2142 010 (A)
2142 011 (A)
2142 052 (A)
2142 054 (A) *
2142 055 (A) *
2142 060 (A)
2142 065 (A)

Riparian vegetation (A)
- Plant clumps of vegetation along lower Failor Cr.

**Landscape Block H3** (Misery)
Priorities: M - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 004 (A/T/R) | 2142 078 (A/R) |

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 002 (A) | 2142 047 (A) |
| 2142 003 (A) | |
| 2142 004 (A) | |
| 2142 016 (A) | |
| 2142 025 (A) | |

Roads to stabilize (A)
- (4) FR 3269UK1(T16S, R9W, NW corner S27) - sidecast pullback and possible decommission.
- (4) FR 3500612 - '96 storm - 400 cy slide blocking rd. @ .8, rd. slump @ 1.3, sidecast pullback @ 1.75, huge sidecast blowout @ 1.85 where 1/2 of road bed is gone, sidecast problems from 2-2.75
- (4) FR 3200650
- (3) FR 3269660
- (3) FR 3500615
- (3) FR 3500616

Riparian Vegetation (A)
(Note: limited opportunity due to private land ownership)
- Small section below private - make clumpy planting of shade tolerant conifer under deciduous species.

Miscellaneous (A/T)
- Explore opportunities for land acquisition along Misery Cr.
- Explore opportunity to acquire state-owned land parcel between Misery Cr and W.Fk. Deadwood Cr.. (State is interested in exchanging the property.)

**Landscape Block H4** (Herman)

Priorities: M - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:

Commercial thinning

2132 026 (A/T)
2132 029 (A/T)
2131 050 (R/A) *
2131 069 (R/A) *

Roads to stabilize (A)

- (5) FR 2160 -sidecast pullback, replace culverts, waste removal, waterbar
- (5) FR 3200647 - sidecast pullback, waterbar, fix other drainage problems
- (5) FR 5800681 - sidecast pullback throughout
- (4) FR 2116618
- (4) FR 3200646 - sidecast pullback near jct with 647
- (3) FR 3200UK5 (T16S, R9W, SE S6)
- (3) FR 3200628
- (3) FR 3200629
- (3) FR 3200654

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- N.Fork Indian - maintain existing structures.

Riparian Vegetation (A)

- Plant conifers along N. Fork Indian.
- Establish riparian vegetation in open meadow areas along N. Fk. Indian Cr. to restore lands within grazing allotment.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2132 002 (A) | 2132 009 (A) |
| 2132 003 (A) | 2132 095 (A) |
| 2132 006 (A) | 2131 041 (A) |
| 2132 007 (A) | 2131 042 (A) |
| 2132 011 (A) | 2131 071 (A) |
| 2132 021 (A) | 2131 072 (A) |
| 2132 026 (A) | 2131 086 (A) |
| 2132 046 (A) | 2131 130 (A) |
| 2132 048 (A) | 2131 134 (A) |
| 2131 049 (A) | 2131 140 (A) |
| 2131 070 (R) | |
| 2131 073 (A) | |
| 2131 074 (A) | |
| 2131 075 (A) | |
| 2131 080 (A) | |
| 2131 081 (A) | |
| 2131 087 (A) | |
| 2131 088 (A) | |
| 2131 090 (A) | |

2131 091 (A)
2131 092 (A)
2131 093 (A)

Instream projects (A)

- Herman, Gibson, Taylor Creeks - explore opportunities to add large woody debris to streams.

Riparian vegetation (A)

- Herman - do clumpy plantings along creek above private land.
- Gibson - do clumpy plantings along creek above private land

Miscellaneous (A/T)

- Identify management strategy for accommodating grazing on FS allottment along N. Fk. Indian (Mann Creek).
- Control and reduce noxious weeds along N. Fk. Indian (Mann Creek).

**Landscape Block H5** (W.Fk. Deadwood)

Priorities: M - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2141 007 (T) | 2141 012 (T) |
| 2141 010 (A) | 2141 042 (A) |
| 2141 011 (A) | 2141 135 (A) |
| 2141 016 (A) | 2141 137 (A) |
| 2141 038 (A) | 2141 138 (A) |
| 2141 039 (A) | |
| 2141 040 (A) | |
| 2141 046 (A/R/T) | |
| 2141 047 (A/R/T) * | |
| 2141 053 (A) | |
| 2141 061 (A) | |
| 2141 080 (A) | |
| 2141 098 (A) | |
| 2141 108 (T) | |
| 2141 149 (A) | |
| 2142 023 (A) | |
| 2142 026 (A) | |

Roads to stabilize (A)

- (4) FR 3200 - '96 storm - 4 major slumps barely passable, 2 smaller cutbank failures
- (4) FR 3200UK4 (T16S, R9W, S8 - down to 35-acre unit)
- (4) FR 3259632
- (4) FR 3259637 - '96 storm - 400' of slumping road bed - old hillside instability - major reconstr.
- (4) FR 3259640 - '96 storm - 20 cy cutbank failure closing road @ .1
- (3) FR 3259 (upper portion) - '96 storm - 2 sidecast failures affecting road bed, 1-10 cy cutbank failure
- (3) FR 3259618 - culvert needed @ mp .5, slide @ mp 2.85; '96 storm - sidecast failure @ 1.1 (from CO 5142) that went 1000' to the creek; 100 cy cutbank failure at 2.7 from 5142
- (3) FR 3259620
- (3) FR 3259621
- (3) FR 3259631
- (3) FR 3259633
- (3) FR 3259635 - waterbar and close spurs here
- (3) FR 3259636
- (3) FR 3259638
- (3) FR 3259642

In-stream structures (A)

- Evaluate effects of Feb. 1996 storm event.
- Work with new landowner in lower W. Fork Deadwood.

Riparian vegetation (A)

(High potential for willow.)

- Make clumpy planting in upper portion of watershed.
- Release existing young conifer throughout middle section.
- Work with new landowner in lower W. Fork Deadwood.

Later time period -

Silvicultural treatments:

Commercial thinning

2142 024 (A)
2141 041 (A)
2141 049 (A)
2141 058 (A)
2141 063 (A)
2141 064 (A)
2141 083 (A)
2141 106 (A)

In-stream projects (A)

- Add large woody debris complexes.

Riparian vegetation (A)

- Make scattered planting of conifer in middle section.

Miscellaneous (A)

- Explore opportunities for land acquisition in upper portion of drainage.

**Landscape Block H6** (Panther)
Priorities: L - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2141 005 (A/R/T)

Road projects (A)
- (4) FR 3510 - slide @ .1 plugging culvert; waterbar and close 2 spurs off this road.
- (3) FR 3511 - massive slump @ 2.1
- (3) FR 3520

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:
Commercial thinning
2141 001 (A)
2141 006 (R/T)
2141 085 (A)
2141 107 (A)

In-stream projects (A)
- Locate opportunities to add large woody debris to Panther Creek.

Riparian vegetation (A)
- Make clumpy planting of conifers along creek.
- Explore possibility of planting willows to encourage beaver activity.

## Appendix N. Subwatershed Priorities for Restoration

Team members involved with the aquatic resources devised a systematic approach to rate subwatersheds in the Indian and Deadwood drainages according to their potential for successful restoration (High rating = high potential to restore). In most cases this strategy sought to locate the best existing aquatic habitat in an attempt to focus restoration efforts and dollars in areas where refugia, that may buffer existing habitat from disturbances, can be maintained and enhanced. In some cases a somewhat longer timeframe for restoration was considered in the potential. The ten criteria devised consider natural characteristics and managed conditions (criteria 1-6) as well as the potential to influence conditions (criteria 7-10) within the 22 subwatersheds in the Indian/Deadwood watershed. The following descriptions outline the thinking behind each criterion:

**1. Northwest Forest Plan or Forest Key Watershed**

**0 = No**
**2 = Yes**

The Aquatic Conservation Strategy of the Northwest Forest Plan designated key watersheds where special attention must be given to the management of at-risk fish populations (tier 1) and high water quality (tier 2). Three subwatersheds in the Indian Creek drainage were designated as tier 1 watersheds and should be considered priority areas for restoration. In addition, West Fork Deadwood is a subwatershed that is highlighted as "key" by the Forest.

**2. Percent natural stands in watershed**

**0 = Low percentage (< 55%)**
**1 = Medium percentage (55-75%)**
**2 = High percentage (> 75%)**

Subwatersheds with a higher percentage of natural stands were considered somewhat more stable because of root strength in established natural stands. Natural stands include sources of large wood that could either fall into the stream over time or could be used in stream habitat improvement projects. In general natural stands would provide more shading to the stream where conditions are within reach of the stream channel. Subwatersheds with a higher percentage of natural stands will also have riparian areas and stream courses that are less impacted by management activities than a subwatershed with a low percentage of natural stands.

**3. Number and position of roads under County and Forest Service control**

**0 = Dominated by ridgetop roads**
**1 = Dominated by midslope/valley bottom roads**
**2 = Dominated by midslope/valley bottom roads with known problems**

This criterion attempts to identify subwatersheds that have a high incidence of roads that are identified as higher risk to failure based on slope position, construction method and known problems in need of repair. The assumption made is that ridgetop roads are generally more stable and less likely to negatively impact aquatic resources ,whereas, midslope and valley bottom roads would be more likely to deter proper riparian and instream function (i.e. slides during intense storm events, interception and rerouting of subsurface flow, stream crossings that may hinder fish passage or disruption of connectivity between the hillslope and valley bottom).

4. **Potential aquatic habitat on federal lands in unconfined and moderately confined channels, < 4% gradient.**
   - **0 = Private dominated**
   - **1 = 50/50 Private/USFS**
   - **2 = USFS dominated**

This criterion gives preference for restoration to subwatersheds that include longer, more continuous instream and riparian areas within federal management. The confinement and gradient limitations within this criterion are based on the assumption that unconfined and moderately confined stream segments less than 4% gradient are generally where the best anadromous fish habitat is located. Fragmented ownership of a stream channel makes it more difficult to implement restoration strategies, especially where segments adjacent to federally managed reaches have been degraded and cumulative effects of negative impacts influence the entire stream. A higher rating implies higher likelihood of intact aquatic refugia and better accessibility for riparian and instream restoration projects.

5. **Current aquatic habitat condition**
   - **0 = Very poor condition; no functioning habitat**
   - **1 = Habitat partially functioning**
   - **2 = Presence of functioning habitat**

Based on Level II stream surveys, this criterion helps to define where functioning salmonid rearing habitat can be maintained, enhanced and expanded. Information used to rate each subwatershed included percentage of each stream reach in pools, percentage of deep pools, percentage of complex pools, amount of large wood in streams, known locations of anadromous fish spawning and rearing, locations of high beaver activity and riparian condition throughout the Indian and Deadwood drainages.

6. **Presence or absence of large woody debris in the stream based on management practices.**
   - **0 = Pre-buffer with cleanout (pre-1980)**
   - **1 = Buffer with cleanout (1980-1985)**
   - **2 = Buffer and no cleanout (post-1985)**

This criterion looked at managed areas near streams in each subwatershed and used plantation age to determine how buffers and stream cleanout practices may have affected amounts of large woody debris in these streams during three distinct periods. This criterion assumes the following practices took place during each period:

1. Before 1980, assume no riparian buffers were left and stream cleanout was the norm.
2. Between 1980 and 1985, assume buffers were left but some stream cleanout continued.
3. After 1985, assume buffers were left and stream cleanout was no longer being practiced.

7. **Riparian function in terms of influence on stream temperature, wood supply and floodplain condition.**
   - **0 = Low (function)**
   - **1 = Moderate (function)**
   - **2 = High (function)**

Where mature conifers naturally occur in the riparian area, they provide more long-term sources of shade and large woody debris than deciduous riparian trees for both instream and floodplain function. Current seral stage and species composition were used to locate areas that are dominated by deciduous or deciduous/conifer mix . In addition, stand age was used to identify areas where average stand diameter is insufficient to serve as large woody debris in the floodplain and in-stream. Large woody debris was assumed to begin to reach a functional diameter from plantation age = 30 years. Examples of high and low end criteria are as follows:

Low Functioning = Plantation < 30 years, Hardwood dominated and/or meadow dominated.

High Functioning = Natural late/mature conifer dominated or mature conifer/hardwood mix.

**8. Percent federal lands in watershed**

**0 = Low percentage (< 75% Federal)**

**1 = Medium percentage (75-85% Federal)**

**2 = High percentage (> 85% Federal)**

This criterion attempts to give a higher rating to subwatersheds that are dominated by federal ownership. A higher rating implies more ability to influence management practices and potential to create or enhance late successional conditions. Higher percent federal ownership also allows more accurate estimation of future management and the effects that management may have on stream function.

**9. Potential for private landowner cooperation**

**0 = Low**

**1 = Moderate**

**2 = High**

Where stream and riparian work is dependent on private landowner cooperation, subwatersheds were rated on potential for this cooperation. The subwatersheds rated highest include those private landowners that are either currently working with the Forest Service to improve aquatic conditions, or have indicated a willingness to cooperate in the near future.

**10. Potential for influencing riparian area by thinning (time to LSR condition, distance of unit from stream, potential to create habitat [i.e. LWD availability] and proximity to known functioning fish habitat).**

**0 = Low potential**

**1 = Moderate potential**

**2 = High potential**

This criterion sought to identify plantations with the highest potential to affect riparian character through thinning. Factors included distance of units from streams, proximity to known functioning fish habitat, potential to create or enhance complex fish habitat in stream and time required to reach LSR conditions

The following table gives criterion numbers for each subwatershed, its cumulative total score and the resulting rating based on the final score. Map 6.2, Aquatic Priorities, displays this rating.

| Criteria => | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | Rating |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sub-Watershed | | | | | | | | | | | | |
| N. Indian | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | 2 | 9 | MOD |
| Up. Indian | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | LOW |
| Herman | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 0 | 1 | 2 | 12 | HIGH |
| M.S. Indian | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | LOW |
| Maria | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 14 | HIGH |
| Rogers | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 0 | 13 | HIGH |
| Long | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 | 8 | MOD |
| Elk2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 5 | LOW |
| L. Indian | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 1 | 11 | HIGH |
| Up. Dead | 0 | 1 | 2 | 1 | 2 | 0 | 2 | 2 | 1 | 2 | 13 | HIGH |
| N. Pan | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 2 | 1 | 7 | MOD |
| Pan2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | LOW |
| Elk | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 8 | MOD |
| Buck | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 7 | MOD |
| Rock3 | 1 | 2 | 1 | 2 | 0 | 0 | 1 | 1 | 1 | 0 | 9 | MOD |
| N. Bear | 1 | 2 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 8 | MOD |
| Alpha | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 | LOW |
| Misery | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 5 | LOW |
| W. Dead | 0 | 0 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 12 | HIGH |
| Failor | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 11 | HIGH |
| Green Ck | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 6 | MOD |
| L. Lake | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | LOW |

**Rating Key:** Total Score: 1-5 = Low Priority
6-10 = Moderate Priority
11-14 = High Priority

The final step taken to complete the aquatic restoration strategy was to identify restoration projects by subwatershed. These projects fell into five different categories related to their importance in terms of watershed restoration: road work, riparian vegetation, in-stream work, upland thinning and miscellaneous projects. Concepts behind the objectives of these categories of projects are discussed in Chapter 6. This project list has been incorporated into Appendix M, which lists priority projects by landscape block.

## Appendix H. Regional Forester's Sensitive Species List

### For Siuslaw National Forest - Threatened, Endangered And Sensitive Species List

Updated June 13, 1996

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | HABITAT INFORMATION |
|---|---|---|
| RF = Regional Forester's List; Fed = Federal; State = Oregon; ONHP = Oregon Natural Heritage Program, D = Documented on Forest (all others suspected) | | |
| **BIRDS** | | |
| Gavia immer<br>Common loon | S/-/-/2/D | Winters along the coast; nests on large lakes. |
| Pelecanus erythrorhynchos<br>American white pelican | S/-/V/2/D | Large bodies of water; usually found east of the Cascades. |
| P. occidentalis californicus<br>California brown pelican | S/E/E/2/D | Forages along coastlines and bays. |
| Branta canadensis leucopareia<br>Aleutian Canada goose | S/T/E/1/D | Winter resident; forages in open pastures and marshes. |
| Haliaeetus leucocephalus<br>Northern bald eagle | S/T/T/1/D<br>Recovery Plan | Nests and roosts in mature and old growth conifers near large bodies of water. |
| Falco peregrinus anatum<br>American peregrine falcon | S/E/E/1/D<br>Recovery Plan | Nests and perches near cliffs near coasts and where prey is abundant. |
| Charadrius alexandrinus nivosus<br>Western snowy plover | S/T/T/2/D | Nests on sandy beaches and in dunes. |
| Numenius americanus<br>Long-billed curlew | S/**/-/4/D | Winters on mudflats and shore-lines; breeds in grasslands. |
| Brachyramphus marmoratus<br>Marbled murrelet | S/T/C/2/D<br>Proposed Critical Habitat | Nests in old growth conifers within 50 miles of the coast. |
| Strix occidentalis caurina<br>Northern spotted owl | S/T/T/1/D<br>Designated Critical Habitat | Nests in mature coniferous forests with old growth component and characteristics. |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | HABITAT INFORMATION |
|---|---|---|
| **MAMMALS** | | |
| Arborimus albipes<br>White-footed vole | S/**/P/3/D | Small permanent drainages dominated by red alder with dense deciduous understory. |
| Gulo gulo luteus<br>California wolverine | S/**/T/2/- | Remote areas, especially along timberline in mountains. |
| Plecotus townsendii townsendii<br>Townsend's big-eared bat | S/**/C/2/D | Found in caves, rock crevices, mines, under bridges and in abandoned buildings. |
| **REPTILES AND AMPHIBIANS** | | |
| Clemmys marmorata marmorata<br>Northwestern pond turtle | S/**/C/2/D | Ponds, slow-moving streams and rivers, marshes. |
| Rana aurora<br>Red-legged frog | S/**/U/4/D | Quiet streams, marshes, ponds, and moist forests. |
| **INVERTEBRATES** | | |
| Ochrotrichia alsea<br>Alsea micro caddisfly | S/ /-/3/D | Large streams and rivers with stable substrate of boulders and logs and moderate current. |
| Rhyacophila haddocki<br>Haddock's micro caddisfly | S/**/-/3/D | High elevation creeks and seeps. |
| Speyeria zerene hippolyta<br>Oregon silverspot butterfly | S/T/-/1/D | Open inland and coastal meadow habitat. |
| **FISH** | | |
| Oncorhynchus clarki<br>Umpqua River cuttroat trout | S/PE/-/-/D | Umpqua River watershed rivers and tributaries. |
| Oncorhynchus kisutch<br>Coho | S/PT/-/-/D | |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS** | | | |
| Abronia umbellata spp breviflora<br>Pink sandverbena | S/**/E/1/D | May-Oct | Beaches and foredunes; open sand. |
| Anemone oregana var felix<br>Oregon bog anemone | S/-/-/2/D | Mar-Jun | Coastal marshes and spagnum bogs. |
| Bensoniella oregana<br>Bensonia | S/**/-/-/- | | Intermittent streams or meadow edges in mixed evergreen forests; upper slopes, ridgetop saddles with north aspect. |
| Cardamine pattersonii<br>Saddle mountain bittercress | S/**/C/1/D | May-Jun | Bogs, wet areas, moist cliffs and edges. |
| Carex macrochaeta<br>Large-awn sedge. | S/-/-/2/- | Jun-Aug | Moist openings, usually close to beaches. |
| Carex pluriflora<br>Several-flowered sedge | S/-/-/2/- | Jun-Jul | Sphagnum bogs, brackish water near the coast. |
| Cimicifuga elata<br>Tall bugbane | S/**/C/1/- | Jun-Jul | Moist forest, along edges and roadsides; often north slopes with bigleaf maple. |
| Cordylanthus maritimus ssp. palustris<br>Salt-marsh bird's beak | S/**/C/1/D | Jun-Aug | Coastal salt marshes,fringes of lakes and bogs. |
| Dodecatheon austrofrigidu<br>Fridgid shooting star | S/**/-/1/- | May-Jun | On rocks below the high water line on rivers; mostly at higher elevation. |
| Dryopteris filix-mas<br>Male fern | S/-/-/2/- | May-Aug | Along streams; dense shade |
| Erigeron peregrinus peregrinus var peregrinus<br>Wandering daisy | S/-/-/2/- | Jun-Jul | Moist, grassy, open and rocky meadows in coastal mountains. |
| Erythronium elegans<br>Elegant fawn-lily | S/**/C/1/D | May | High elevation meadows; bogs & rock cliffs; open conifer forests. |
| Filipendula occidentalis<br>Queen-of-the-forest | S/**/C/1/D | May-Aug | Moist headwalls, seeps, wet rocks above high water along streams. |

Updated 06/13/96

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS**, con't. | | | |
| Fritillaria camshatcensis<br>Black lily | S/-/-/2/- | May-July | Bogs and marshes. |
| Geum triglorum<br>var campanulatum<br>Western red avens | S/-/-/2/- | May-Jun | Exposed grassy and dry areas at high elevations. |
| Hydrocotyle verticillata<br>Water pennywort | S/-/-/2/D | Jul-Aug | Dune deflation plains; bog edges, marshes and ponds. |
| Isopyrum stipitatum<br>Dwarf rue-anemone | S/-/-/3/- | Feb-May | Bare, wet ground in deciduous woodlands, often along streams; lawns. |
| Lewisia columbiana<br>var rupicola<br>Rosy lewisia | S/-/-/2/- | Jun-Jul | Exposed gravelly and rocky slopes at higher elevation |
| Lilium occidentale | S/T/LE/1/- | | Occurs in forest or brushy openings on poorly drained soils often along margins of ephemeral ponds/small channels under shrubs, potential habitat in south area of Oregon Dunes NRA. |
| Limbella fryei<br>Frye's limbella moss | S/**/C/1/- ??? | | Sphagnum bogs; grows at base of willows and crabapples. |
| Lycopodium inundatum<br>Northern bog club moss, | S/-/-/2/D | Jul-Oct | Dune deflation plains; coastal bogs, lake margins |
| Ophioglossum vulgatum<br>Adder's tongue | S/-/-/2/D | Jul-Aug | Edges of lakes, ponds, dune deflation plains. |
| Plantago macrocarpa<br>North Pacific plantain. | S/-/-/2/- | May-Aug | Sphagnum bogs; along lake shores. |
| Poa kellogii<br>Kellogg's bluegrass. | S/-/-/2/- | Jun-Jul | Along edges of ponds, marshes and seeps. |
| Poa laxiflora<br>Loose-flowered bluegrass | S/-/-/4/D | May-July | Forests on moist seeps, benches, stream edges. |
| Pohlia sphagnicola<br>Pohlia moss | S/-/-/2/D | Year-round | Sphagnum hummocks in bogs near the coast. |
| Saxifraga hitchcockiana<br>Saddle Mtn saxifrage | S/**/C/1/- | Apr-Aug | Grassy, rocky, or gravelly areas at higher elevations. |

| SPECIES | STATUS RF/Fed/State/ONHP/Documented | FLOWERING SEASON | HABITAT INFORMATION |
|---|---|---|---|
| **PLANTS**, con't. | | | |
| Scirpus cyperinus<br>Wool-grass | S/-/-/2/- | Jul-Aug | Wet, low ground. |
| Senecio flettii<br>Flett's groundse. | S/-/-/2/- | Jun-Jul | Open, rocky and tallus slopes. |
| Sidalcea hirtipes<br>Hairy-stemed checker mallow. | S/-/C/1/D | Jun-Jul | Grassy meadows, coastal bluffs. |
| Silene douglasii<br>var oraria<br>Cascade Head catchfly | S/**/C/1/- | May-Jul | Grassy coastal bluffs. |
| Utricularia gibba<br>Humped bladderwort. | S/-/-/2/- | Jul-Sep | Standing or slow-moving water, sloughs. |
| Utricularia minor<br>Lesser bladderwort. | S/-/-/2/- | | Standing or slow-moving water, sloughs. |
| Wolffia columbiana<br>Columbia watermeal. | S/-/-/2/- | | Ponds, floating below the surface. |
| Wolffia punctata<br>Dotted watermeal | S/-/-/2/- | | Ponds; free-floating. |

## STATUS CODES

**FEDERAL:**

**Endangered (E) =** Any species in danger of extinction throughout all or a significant portion of its range
**Threatened (T) =** Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
**Proposed (P) =** Proposed to be listed as threatened or endangered.
**Category 1 Candidate (C1) =** Taxa for which the US Fish and Wildlife Service has sufficient information to support a proposal to list the species as endangered or threatened.
**Category 2 Candidate (**) =** This federal status was eliminated in 1995. Species with a ** in the Federal status column were listed as Category 2 at the time the status was dropped.
**Category 3A =** Taxa for which the Service has persuasive evidence of extinction.
**Category 3B =** Names that on the basis of current taxonomic understanding do not represent taxa meeting the Endangered Species Act's definition of "species."
**Category 3C =** Taxa that have been proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

**STATE**

**Endangered (E) =** Native species determined to be in danger of extinction throughout all or any significant portion of its range or those listed as endangered on the Federal list
**Threatened (T) =** Native species likely to become endangered within the foreseeable future throughout all or a significant portion of its range or those listed as threatened on the Federal list.
**Critical (C) =** Native species for which listing as threatened or endangered is pending.
**Vulnerable (V) =** Native species for which listing is not believed to be imminent and can be avoided with adequate protective measures.
**Peripheral or Naturally Rare (P) =** Peripheral species refer to those whose populations are on the edge of their range. Naturally rare species are those whith historically low numbers due to naturally limiting factors.
**Undetermined Status (U) =** Species for which status is unclear and requires further scientific data.

**OREGON NATURAL HERITAGE PROGRAM (ONHP):**

**List 1 =** Taxa that are threatened with extinction throughout their entire range, or which are presumed extinct.
**List 2 =** Taxa that are threatened with extirpation or presumed extirpated from Oregon, but are more common or stable elsewhere
**List 3 =** Taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
**List 4 =** Taxa of concern which are not currently threatened or endangered. Includes taxa which are very rare but currently secure, as well as taxa which are declining in numbers but are still too common to be proposed as threatened or endangered.

**FOREST:**

D = Documented on Forest. (All others suspected only).

## REFERENCES


Federal Register Vol. 57, No. 10, January 15, 1992. Final Rule--Critical Habitat for the Northern Spotted Owl.

Federal Register Vol. 59, No. 18, January 27, 1994. Proposed Rule--Designation of Critical Habitat for the Marbled Murrelet.

Natural Heritage Advisory Council to the State Land Board. 1993. Oregon Natural Heritage Plan. State Land Board, Salem, OR. 158pp.

Regional Forester's Sensitive Species List. Region 6, USDA Forest Service. Latest revision June 10, 1991 (for plants; last updated 1989 for vertebrates).

Oregon Department of Fish and Wildlife. 1993. Oregon Wildlife Diversity Plan. Second Edition.

U.S. Department of Interior, Fish and Wildlife Service, August 23, 1993, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.

## Appendix I. Road Inventory for Indian/Deadwood Watershed Analysis

Appendix I lists all Forest Service and county roads included in Indian/Deadwood. Each road was rated for its potential to adversely impact aquatic resources (from 1 to 5, low to high, respectively). The following discussion describes how data sources were derived:

**Slope position** - from 7.5-minute USGS topographic maps, roads were identified as ridgetop, midslope or valley bottom. In general, it was assumed that ridgetop roads are more stable and less likely to impact aquatic resources, whereas, midslope and valley bottom roads would be more likely to deter proper riparian and instream function (i.e. interception and rerouting of subsurface flow, slides during intense storm events, stream crossings that may hinder fish passage or disruption of connectivity between the hill slope and valley bottom).

**Slope stability** - roads in the watershed were overlaid on a map showing soil type and slope mapped by the Soil Conservation Service. Past work by George Bush, Forest soils scientist, rated each soil/slope class as high, moderate or low for landslide and surface erosion potential based on specific soil characteristics and personal experience with these soil types and where on the landscape each type existed. If a particular road crossed an area dominated by a soil type that had high potential for landslides, the road was considered to have higher potential to negatively impact aquatic resources.

**Roads that were sidecast built** - using past road records and the knowledge of district personnel, a map was developed to show where sidecast and non-sidecast constructed roads exist in the watershed. Sidecast roads are considered higher risk to aquatic resources because overhanging fill material can become saturated during intense storm events and is more likely to fail, especially where midslope roads cross steep headwalls. Construction of this map was based almost entirely on memory of district personnel, when combined with other information, it was helpful in assigning an overall rating for each road.

**Risk to known quality fish habitat** - Paul Burns, the district fish biologist, constructed a map of existing fish habitat quality based on stream survey information and District knowledge. This was limited to streams with completed stream surveys. Stream survey components that were most influential to habitat quality included percent pools, number of deep pools, number of complex pools and amount of large wood present. Using this map showing location of quality habitat, roads that had potential to influence high quality fish habitat were identified. An example of "potential to influence" would include a midslope road, sidecast built in a slide prone area with several stream crossings above known high quality fish habitat. Roads that showed high risk to quality habitat coupled with high risk of instability were given a "5" rating in every case.

**Presence of known problems** - a full roads assessment was done for Indian/Deadwood by the Forest Engineering and Road Maintenance group which identified culvert drainage problems, road slumps, cutbank failures, sidecast pullback needs and any other road problems that were observed. Where any of these problems caused increased sedimentation or potential for mass movement, these roads were given a higher overall rating.

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to[2] | Stability[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM[1] | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 2100000 | 5.07 | USFS/CO | U. Indian | B | | 1924/65 | | | 30 | 70 | | H |
| 2100639 | 0.31 | USFS | Rogers | A | | 1968 | N | 80 | 20 | | H | H |
| 2100640 | 4.03 | USFS | Maria/Rogers | A | | by 1965 | 80% | 50 | 50 | | L | H |
| 2116000 | 3.53 | USFS | N.Indian | B/H4 | S2 | by73/64/10 | Y | 20 | 5 | 75 | H | L |
| 2116617 | 1.3 | USFS | N.Indian | B/H4 | | by 1965 | Y | | 60 | 40 | M | M |
| 2116618 | 0.63 | USFS | N.Indian | H4 | | 1964 | Y | 30 | 70 | | H | H |
| 2127000 | 3.61 | USFS | Long/Elk2 | E | | by 1965 | Y | 55 | 10 | 35 | M | L |
| 2127770 | 0.41 | USFS | Elk2 | E | | 1984 | N | 100 | | | L | L |
| 2127771 | 0.24 | USFS | Elk2 | E | | 1984 | N | 100 | | | L | L |
| 2160000 | 4.32 | USFS | Herman/N.Indian | H4 | | by 1965 | Y | 40 | 60 | | H | M |
| 2160620 | 1.02 | USFS | N.Indian | H4 | | 1970 | Y | 100 | | | M | L |
| 2160621 | 0.12 | USFS | N.Indian | H4 | | 1958 | Y | 100 | | | M | L |
| 2160622 | 0.37 | USFS | N.Indian | H4 | | 1964 | Y | 100 | | | M | L |
| 2170000 | est. 1.8 | USFS | Elk2/L.Indian | E/H1 | | by 1965 | Y | 100? | | | | L |
| 2170UK1 | est. .25 | USFS | Elk2 | E | | 1964 | Y | ? | | | | H |
| 2170759 | est. .15 | USFS | Elk2 | E | | 1958 | Y | 100 | | | | H |
| 2170763 | 0.82 | USFS | L.Indian | E/H1 | | 1960 | Y | 100 | | | | M |
| 2170764 | 1.05 | USFS | L.Indian | H1 | | 1973 | 50% | 100 | | | | L |
| 2170765 | 1.12 | USFS | L.Indian | H1 | | 1973 | 80% | 100 | | | | L |
| 2500A | est. 1.7 | USFS | Elk2/L.Ind | E | S1 | | Y | 100 | | | | |
| 2500B | est. 2.6 | USFS | Long/Rogers | A | | | Y | 100 | | | H | H |
| 2500643 | 1.02 | USFS | Rogers | A | | 1958/75 | Y | 100 | | | L | L |
| 2500649 | 0.87 | USFS | Long | E | | by 1965 | Y | 100 | | | L | L |
| 2500650 | 0.42 | USFS | Long | E | | 1958 | Y | 100 | | | L | H |
| 2500654 | 1.52 | USFS | Long | E | | 1957 | Y | 100 | | | L | H |
| 2500790 | 0.71 | USFS | Elk2 | E | | 1975 | N | 100 | | | L | L |
| 2500793 | 0.86 | USFS | Elk2 | E | | 1960 | Y | 100 | | | L | L |
| 3200000 | 10.3 | USFS | Various-I&D | H1-5/E | S1 | by 1965 | Y | 75 | 25 | | M | H |
| 3200UK5 | est. .50 | USFS | Herman | H4 | | 1973 | Y | 100 | | | M | L |
| 3200628 | 0.43 | USFS | Herman | H4 | | | Y | | | | M | H |
| 3200629 | 0.31 | USFS | Herman | H4 | | 1971 | Y | 100 | | | M | L |
| 3200UK4 | est. .20 | USFS | W.Fk.Dead | H5 | | 1970 | Y | | 100 | | | H |
| 3200646 | 1.95 | USFS | Herman | H4 | | 1965 | Y | 90 | 10 | | M | M |
| 3200647 | 0.3 | USFS | Herman | H4 | | by 1973 | Y | 100 | | | H | H |
| 3200650 | 1.65 | USFS | W.Dead/Misery | H3/H5 | | 1964 | Y | 25 | 75 | | | M |
| 3200651 | 0.32 | USFS | W.Fk.Dead | H5 | | 1974 | N | 100 | | | L | M |
| 3200653 | 0.75 | USFS | W.Fk.Dead | H5 | | by 1973 | Y | | 100 | | M | H |
| 3200654 | 0.34 | USFS | Herman | H4 | | 1974 | Y | 100 | | | L | H |
| 3200UK3 | est. .10 | USFS | Herman | H4 | | 1978 | Y | 100 | | | L | L |
| 3200670 | 0.34 | USFS | Herman | H4 | | 1982 | N | 100 | | | M | L |
| 3200671 | 0.43 | USFS | Green Ck. | H1 | | 1975 | Y | 100 | | | | L |
| 3200672 | 2.98 | USFS | Elk2/Herman | E/H4 | | 1954 | N | | 100 | | | H |
| 3200672U | est. .10 | USFS | Elk2 | H4 | | 1973 | N | | 100 | | | H |
| 3200UK2 | est. .10 | USFS | Elk2 | E | | 1973 | Y | 100 | | | | L |
| 3200675 | 0.68 | USFS | Elk2 | E | | 1965 | N | 100 | | | | L |
| 3200676 | 0.24 | USFS | Elk2 | E | | 1972 | Y | 100 | | | | L |
| 3200678 | est. .20 | USFS | Green Ck. | H1 | | 1965 | Y | 100 | | | L | L |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential[4] Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| Y | 5 mod-large slides, 2 cutbank failures, 1 blocked culvert - rd reopened but repairs needed | 4 |
| | | 4 |
| | Major slump and sidecast failure below slump @ 2 mi. - rd reopened | 3 |
| | | 2 |
| Y | 4 bad culverts; rd. washed out in 2 places where culverts are blocked - to be closed in '96 | 5 |
| | | 4 |
| | 1 large slump, 3 small slides, 1 sidecast pullback - rd open | 2 |
| | | 1 |
| | | 1 |
| Y | 4 sidecast pullbacks (pre-flood), 1-185' slump, 2 large slides - rd closed (1997 ERFO project) | 5 |
| | | 1 |
| | | 2 |
| | | 1 |
| | 1-20 cy slide and 1-150 cy slide - rd closed | 1 |
| Y | Unknown spur, NE1/4, S30; s.c. pullback, waterbar | 4 |
| | | 2 |
| | | 2 |
| Y | 1 sidecast pullback area, end 50% not sidecast built | 4 |
| | 20% of rd. not sidecast built at end | 2 |
| Y | ATM portion of 25 closed after flood due to large cutbank fail., now reopened | 3 |
| Y | non-ATM portion, various sidecast and slump problems (major repairs scheduled for '96, 97') | 5 |
| | | 2 |
| | | 2 |
| | | 3 |
| | | 3 |
| | | 1 |
| | rock slide blocking road @ .3 miles | 1 |
| Y | 6 major rd. bed slumps, 2 cutbank fail., 2 sidecast p.b.'s - rd open (ERFO '96) | 4 |
| | unknown spur above 3200628 | 3 |
| | | 3 |
| | | 3 |
| | unknown spur just beneath 646 down to 35-acre unit | 4 |
| Y | Huge slide at top blocks any access, sidecast pullback needed near spur 3200647 | 4 |
| Y | sidecast pullback needed throughout | 5 |
| | spur next to 651in very bad shape, major sidecast fail. @ .2 mi - waterbar and close | 4 |
| | | 2 |
| | | 3 |
| | | 3 |
| | waterbar landing spur; in-unit slide below | 2 |
| | | 2 |
| | | 2 |
| | 20-cy rock slide, shoulder failure - rd. passable | 3 |
| | unknown spur to 3200672 (sec. 30) | 3 |
| | between 3200675 and 3200672 | 2 |
| | | 1 |
| | | 2 |
| | | 2 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3200740 | 0.28 | USFS | L.Indian | H1 | | 1980 | N | 100 | | | M | L |
| 3200741 | 0.2 | USFS | L.Indian | H1 | | 1980 | N | 100 | | | | H |
| 3200742 | 0.09 | USFS | L.Indian | H1 | | 1978 | N | | 100 | | | H |
| 3200UK1 | est. .3 | USFS | Green Ck. | H1 | | 1969 | N | 100 | | | | H |
| 3200751 | 4.21 | USFS | GrnCk/L.Ind | H1 | | 1969 | 50% | 100 | | | M | L |
| 3200752 | 0.07 | USFS | Green Ck | H1 | | 1975 | N | 100 | | | | L |
| 3200754 | 0.58 | USFS | Green Ck. | H1 | | 1964/75 | Y | 100 | | | | L |
| 3200755 | 1.45 | USFS | L. Indian | H1 | | 1980 | N | 100 | | | M | L |
| 3200756 | 0.28 | USFS | L.Indian | H1 | | 1972 | N | 100 | | | | L |
| 3200757 | est. .25 | USFS | Green Ck. | H1 | | 1969 | | 100 | | | | H |
| 3200758 | 0.46 | USFS | L.Indian | H1 | | 1969 | N | 100 | | | | L |
| 3200759 | 0.66 | USFS | Elk2 | E/H1 | | 1968 | Y | 100 | | | | H |
| 3200760 | 0.35 | USFS | L. Indian | H1 | | 1979 | N | 100 | | | M | M |
| 3200770 | 0.74 | USFS | L. Indian | H1 | | 1989 | N | 100 | | | | L |
| 3200771 | 0.16 | USFS | L. Indian | H1 | | 1989 | N | 100 | | | | L |
| 3250000 | est. 2.6 | USFS | Herman/N.Indian | H4/B | S2 | by 1965 | Y | 100 | | | L | L |
| 3250514 | 0.44 | USFS | N.Indian | B | | 1964/75 | Y/N | 100 | | | L | L |
| 3259000 | 7.79 | USFS | Alph/WDd/Pan2 | H5,6/G | S2 | by 1965 | Y | 60 | 40 | | | M-H |
| 3259618 | 3.81 | USFS | WFDead/Alpha | H5/G | | by 1965 | Y | 80 | 20 | | M | M |
| 3259620 | 1.14 | USFS | WFDead/Alpha | H5/G | | by 1973 | Y | 100 | | | | M |
| 3259621 | 0.72 | USFS | WFDead | H5 | | 1965/89 | 50% | 100 | | | | M |
| 3259623 | 0.73 | USFS | Alpha | G | | 1960 | Y | 100 | | | | M |
| 3259625 | 1.09 | USFS | WFDead | H5 | | 1960/89 | 30% | 90 | 10 | | | M |
| 3259631 | 0.91 | USFS | WFDead | H5 | | 1966/68 | Y | 50 | 50 | | L | H |
| 3259632 | 0.46 | USFS | WFDead | H5 | | 1966 | Y | | 100 | | M | H |
| 3259633 | 0.35 | USFS | WFDead | H5 | | 1968 | N | | 100 | | L | H |
| 3259634 | 0.11 | USFS | Pan2 | H6 | | 1983 | N | 100 | | | L | M |
| 3259635 | 0.39 | USFS | WFDead | H5 | | 1968 | Y | 100 | | | L | H |
| 3259636 | est. .10 | USFS | WFDead | H5 | | 1968 | Y | ? | | | L | H |
| 3259637 | 1.25 | USFS | WFDead | H5 | | 1964/67 | 75% | 100 | | | L | M-H |
| 3259638 | 0.23 | USFS | WFDead | H5 | | 1964 | Y | 100 | | | M | M |
| 3259640 | 1.13 | USFS | WFDead | H5 | | 72/78/89 | 75% | 50 | 50 | | L | M |
| 3259641 | 0.53 | USFS | WFDead | H5 | | 1975 | N | 100 | | | L | M |
| 3259642 | 0.3 | USFS | WFDead | H5 | | 1979 | N | 100 | | | L | H |
| 3259643 | 1.44 | USFS | Pan2 | H6 | | 64/69/89 | 90% | 100 | | | L | M-H |
| 3259644 | 0.78 | USFS | Pan2 | H6 | | 1957/69 | Y | 100 | | | L | M |
| 3259645 | 0.46 | USFS | Alpha | G | | 1958 | Y | 40 | 60 | | | M-H |
| 3269000 | 5.78 | USFS | Fail/Mis/WDead | H2,3,5/G | | by 1965/73 | 65% | 95 | 5 | | L | H |
| 3269659 | 0.45 | USFS | Misery | H3 | | 1977 | N | 100 | | | | H |
| 3269UK1 | est. .30 | USFS | Misery | H3 | | | Y | | 100? | | | H |
| 3269660 | 0.75 | USFS | Misery/W.Dead | H3,5 | | by 1973 | Y | 100 | | | | H |
| 3269662 | 0.11 | USFS | Failor | H2 | | 1977 | Y | 100 | | | M | H |
| 3278000 | 2.59 | USFS | Herman | H4/E | S2 | by 1973/65 | Y | 25 | 50 | 25 | | L |
| 3278663 | 0.88 | USFS | Herman | H4/E | | | Y | 50 | 50 | | H | H |
| 3278665 | 0.59 | USFS | Herman | E | | 1971 | N | 100 | | | | L |
| 3278666 | 0.15 | USFS | Herman | E | | 1981 | Y | | 100 | | | H |
| 3279000 | 5.6 | USFS | GrnCk/Failor | H1,2/G | | by1973/65 | Y | 90 | 10 | | M | M |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| | | 1 |
| | | 2 |
| | | 3 |
| | unknown spur above 3200751 | 1 |
| Y | 4 slides (1=500cy) and 1-150x25x10 slump @ 1 mi. - road closed | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 2 |
| | | 1 |
| Y | includes 761 & 762 | 4 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | 4 major slumps, 1 cutbank failure & 1 sidecast p.b. - road closed (ERFO '97) | 3 |
| Y | 90'x1000' sidecast fail. to Cr; 100cy cutbank fail - both passable | 3 |
| | | 3 |
| | | 3 |
| | | 2 |
| | 2/3 built in 1980; 30 cy slide, culvert blocked .3 miles from jct. with 618 - rd. closed | 2 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 1 |
| | | 3 |
| | | 3 |
| Y | 400' rd. slump and major slide below - road permanently closed | 4 |
| | | 3 |
| Y | 1 small cutbank fail. blocking rd., ditch and culvert @ .1; sidecast pullback needed | 4 |
| | | 2 |
| | | 3 |
| | last 1/4 = high slide risk | 2 |
| | | 2 |
| | | 3 |
| | 3 major failures of rd. bed @ .4, 2.8 & 4.6 mi. - closed; lower 1/3 not sidecast built | 3 |
| | at top of 3269 near 3200 | 2 |
| Y | unknown spur near 3269659 - oblit. candidate | 4 |
| | | 3 |
| | | 3 |
| Y | 1 small see rd. assessment | 4 |
| Y | sidecast pullback throughout; oblit.- no access needed | 5 |
| | | 1 |
| | | 4 |
| Y | lower portion built in 1973; 2 small slides at 1.7 and 4.8 miles - open; system priority to waterbar | 4 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3279667 | 0.38 | USFS | Failor | H2 | | | Y | 100 | | | M | L |
| 3279668 | 0.35 | USFS | Failor | H2 | | 1956 | Y | 100 | | | M | H |
| 3279669 | 0.61 | USFS | Green Ck. | H1 | | 1974 | Y | 100 | | | | M |
| 3279670 | 0.47 | USFS | Failor | H2 | | 1960 | Y | 100 | | | M | M |
| 3279747 | 0.38 | USFS | Green Ck. | H1 | | 1975 | Y | 100 | | | | H |
| 3279748 | 0.31 | USFS | Failor | H2/G | | 1973 | Y | 100 | | | | H |
| 3279749 | 0.42 | USFS | Failor | G | | 1973 | Y | 100 | | | | L |
| 3279750 | 0.63 | USFS | GmCk/LLake | G | | 1978 | Y | 50 | 50 | | | H |
| 3289000 | 5.57 | USFS | Green Ck. | H1 | | by 1954/65 | Y | | 10 | 90 | | M |
| 3289UK1 | est. .3 | USFS | Green Ck. | H1 | | 1968 | Y | | | 100 | | H |
| 3315000 | 0.03 | USFS | Up.Dead | C | | | Y | 100 | | | L | M |
| 3315111 | 0.65 | USFS | Up.Dead | C | | | Y | 100 | | | L | H |
| 3315112 | 0.21 | USFS | Up.Dead | C | | | Y | 100 | | | | H |
| 3500000 | est. 2.6 | USFS | NPan/UpDead | H6/C | Prim. | by 1965 | Y | 90 | 10 | | L | M |
| 3500111 | est. .25 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | M | M |
| 3500112 | est. .30 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | L | L |
| 3500114 | est. .5 | USFS | Pan2 | C | | 1964 | Y | 100 | | | M | M |
| 3500115 | est. .2 | USFS | Pan2 | C | | 1964 | Y | 100 | | | M | M-H |
| 3500612 | 2.6 | USFS | Misery/WFDead | H3,5 | | by 1965/73 | 67% | 40 | 30 | 30 | M | M-H |
| 3500615 | 0.98 | USFS | Misery/WFDead | H3,5 | | by 1973 | Y | 100 | | | | M |
| 3500616 | 0.07 | USFS | Misery | H3 | | by 1973 | Y | 100 | | | | M |
| 3510000 | est. 2.1 | USFS | an2/NPan/UpDe | H6/C | | 1967 | Y | 100 | | | M | M |
| 3510622 | 0.72 | USFS | Pan2 | H6 | | 1978 | Y | 100 | | | | L |
| 3511000 | 2.16 | USFS | Pan2/NPan | H6/C | | by 1965/73 | Y | 100 | | | M | L/H |
| 3511111 | 0.19 | USFS | Up.Dead | C | | | Y | 100 | | | L | L |
| 3511112 | 0.15 | USFS | NPan | C | | | Y | 100 | | | M | H |
| 3511113 | est. .10 | USFS | NPan | C | | | Y | 100 | | | M | H |
| 3511114 | 0.77 | USFS | Pan2/NPan | H6 | | by 1973 | Y | 100 | | | | H |
| 3515000 | 4.04 | USFS | Up.Dead | C | | by 1965 | Y | 35 | 65 | | H | M |
| 3515113 | 0.83 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | | L |
| 3515114 | 0.79 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | M | L |
| 3515115 | 0.25 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | M | H |
| 3515116 | 1.09 | USFS | Up.Dead | C | | | Y | 100 | | | M | M |
| 3515117 | 0.32 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | L |
| 3515118 | 0.77 | USFS | Up.Dead | C | | | Y | 40 | 60 | | H | M-H |
| 3515119 | 0.51 | USFS | Up.Dead | C | | 1964 | Y | 100 | | | | L |
| 3515122 | 0.21 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | M |
| 3515126 | 0.36 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | M | H |
| 3515127 | est. .5 | USFS | Up.Dead | C | | | Y | | 100 | | | M |
| 3515130 | 0.08 | USFS | Up.Dead | C | | 1961 | Y | 100 | | | M | L |
| 3515200 | 0.11 | USFS | Up.Dead | C | | | Y | 100 | | | M | H |
| 3520000 | 1.07 | USFS | Pan2/UpDead | H6/C | | by 1965 | Y | 100 | | | M | M |
| 3525000 | 5.13 | USFS | Rock3/Buck | C/D | | by 1965 | Y | 70 | 20 | 10 | L | H/L |
| 3525113 | 0.74 | USFS | Elk | D | | | Y | 100 | | | | M |
| 3525125 | 0.24 | USFS | Buck | D | | | Y | 100 | | | L | H |
| 3526000 | 3.35 | USFS | Buck/Elk | D | | by 1965 | Y | 90 | 10 | | L | M |
| 3526113 | 0.9 | USFS | Elk | D | | | Y | | 100 | | M | M-H |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known Prob.'s Pre-flood (Y/N) | Comments & Damage caused by February 7, 1996 storm | Overall Potential Impact to Aquatics (5=high, 1=low) |
|---|---|---|
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 3 |
| | | 3 |
| | | 2 |
| | | 3 |
| Y | 1 slump, 2 small cutbanks, 1 sleused channel in rd - all passable | 4 |
| | unknown riparian spur to 3289 (NW corner of sec. 4) | 3 |
| | | 2 |
| | | 3 |
| | | 3 |
| Y | 2 sidecast pbs, part. plugged culv. @ 4.6, midslope slide risk = high; 1-350cy slide after flood | 4 |
| | | 3 |
| | | 2 |
| | stability varies (H,M&L) | 2 |
| | | 2 |
| Y | Post-flood - 2 huge slides, 1 slump & many sidecast and culvert problems - closed @ .6 | 4 |
| | | 3 |
| | | 3 |
| Y | slide @ .1 = plugged culvert; stability varies (L,M&H) | 4 |
| | | 1 |
| Y | massive slump @ 2.1; stability varies (L&H) | 3 |
| | | 2 |
| | slump @ .4 | 3 |
| | | 2 |
| | | 2 |
| | stability varies (H,M&L) | 4 |
| | | 2 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 4 |
| | | 2 |
| | | 4 |
| | | 3 |
| | | 4 |
| | | 3 |
| | | 3 |
| | | 3 |
| Y | partially plugged culvert at m.p. 1 | 3 |
| | | 2 |
| | | 2 |
| | obliterated | 2 |
| | | 3 |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3600000 | 5.44 | County | Lower Lake | G | Hwy | pre1910 | | | | 100 | | L |
| 3700000 | 1.6 | USFS | N.Indian | B | S1 | by 1965 | Y | 100 | | | L | L |
| 3700573 | 0.93 | USFS | N.Indian | B | | 1975 | Y | 50 | 50 | | M | H |
| 5110000 | 1.77 | County | Elk2 | E | Co | by 1910 | Y | 50 | 50 | | | H/L |
| 5130000 | 17.3 | County | Various-Indian | E | Co | pre1910/65 | | | | 100 | | L |
| 5134000 | 3.27 | County | Long | E | Co | by 1910 | Y | | | 100 | L | L |
| 5140000 | 10.99 | County | Various-Deadw. | G/H6 | Co | by 1910 | Y | | | 100 | | L |
| 5142000 | 3.82 | County | W.F.Dead/Misery | G/H3,5 | Co | by 1910 | Y | | | 100 | | L |
| 5143000 | 1.49 | USFS | W.F. Deadwood | H5 | | by 1910 | Y | | | 100 | L | L |
| 5800000 | est. 2.1 | USFS | Various-Indian | A/B | S1 | by 1965 | Y | 50 | 50 | | H | M-H |
| 5800637 | 0.65 | USFS | Maria/Rogers | A | | 1967 | Y | | 100 | | L | H |
| 5800680 | 5.03 | USFS | N.Indian/Up.Ind | B | | by 75/63 | Y | 80 | 20 | | L | L |
| 5800681 | 0.76 | USFS | N.Indian | H4 | | by 1973 | Y | 100 | | | H | M |
| 5840000 | 9.39 | USFS | Various-Indian | A/B/E | | by 65/73 | Y | 90 | 10 | | L | L |
| 5840622 | 0.17 | USFS | Maria | A | | 1985 | N | | 100 | | L | M |
| 5840623 | 0.28 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | L |
| 5840624 | 2.04 | USFS | Maria | A | | by 1973 | Y | 60 | 40 | | M | M |
| 5840625 | 1.68 | USFS | Maria | A | | by 1973 | Y | 50 | 50 | | M | M |
| 5840626 | est. .25 | USFS | Maria | A | | | Y | 100 | | | L | H |
| 5840627 | 0.55 | USFS | Maria | A | | 1968 | N | 100 | | | L | L |
| 5840628 | 0.32 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | H |
| 5840630 | 0.66 | USFS | Maria/Long | A | | 1972 | N | 100 | | | L | L |
| 5840631 | 0.41 | USFS | Long | A | | 1972 | N | | 100 | | M | L |
| 5840632 | 0.54 | USFS | Long | A | | 1972 | N | 100 | | | L | L |
| 5840633 | 0.65 | USFS | Long | A | | 1973 | Y | 100 | | | L | L |
| 5840634 | 1.31 | USFS | M.S. Indian | E | | 1969 | Y | 100 | | | L | L |
| 5840636 | 0.9 | USFS | Long | A | | by 1965/73 | Y | 100 | | | | L |
| 5840637 | 0.12 | USFS | Long | A | | | | | 100 | | | H |
| 5840650 | 0.17 | USFS | Long | E | | 1985 | N | 100 | | | | L |
| 6300000 | 6.62 | USFS | Alpha/UpDead | C/G | | by24/52/65 | Y | 25 | 15 | 60 | M | L |
| 6300110 | 0.53 | USFS | Up.Dead | C | | by 1973 | Y | 100 | | | M | M |
| 6300118 | 0.68 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | M |
| 6300119 | 0.85 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | L |
| 6300122 | 0.45 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | M |
| 6300UK1 | est. 1.1 | USFS | Up.Dead | C | | | Y | 100 | | | | H |
| 6300126 | 0.5 | USFS | Up.Dead | C | | | Y | | 100 | | | H |
| 6300131 | 0.35 | USFS | Up.Dead | C | | 1958 | Y | 100 | | | | L |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prob.'s | | | | | | | | | | Overall Potential | | |
| Pre-flood | | | | | | | | | | Impact to Aquatics | | |
| (Y/N) | Comments & Damage caused by February 7, 1996 storm | | | | | | | | | (5=high, 1=low) | | |
| | HWY 36 | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 4 | |
| | Stability: ridge=H; midslope=L | | | | | | | | | | 2 | |
| | Mainline access up Indian | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| Y | chronic cutbank\fill erosion above Rogers\Maria; flood - passable slump @ 39.3 mi. (ERFO '96) | | | | | | | | | | 5 | |
| | | | | | | | | | | | 3 | |
| Y | sidecast pullback on spur in T16S, R10W, S3 and more | | | | | | | | | | 4 | |
| Y | sidecast pullback throughout | | | | | | | | | | 5 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | flood - 2 road slumps, both passable | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback throughout | | | | | | | | | | 4 | |
| | 80 cy slide @ .7 miles | | | | | | | | | | 1 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | waterbar and close op. spurs | | | | | | | | | | 2 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| Y | flood - 2 major sidecast failures into creek & part. plugged culvert @ m.p. 4 (see culv. analysis) | | | | | | | | | | 3thru5 | |
| Y | culvert removed @ .3; possible rd oblit. | | | | | | | | | | 3 | |
| Y | stability varies (L&H); has waterbars but needs 3 culverts pulled | | | | | | | | | | 5 | |
| | small piece of hisk slide risk @ end of spur | | | | | | | | | | 4 | |
| | | | | | | | | | | | 4 | |
| | 6300126 comes off this unknown spur to 6300 | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |

**Key:**

1/ **ATM Status** - Prim. = Primary Forest Road - all highway vehicle travel encouraged

S1 = Secondary Forest Road, Low Clearance - passenger car travel acceptable

S2 = Secondary Forest Road, High Clearance - passenger car travel discouraged

Co. = County maintained

2/ **Risk to Known Quality Habitat** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

3/ **Stability Risk (Slope/Soil)** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

4/ **Overall Potential Impact to Aquatics** - 1-5 (See Appendix 4.3 for analysis methods)

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| | | | | | | | | | | | Risk to | Stability |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current | | Land- | | | Side- | Slope Position % | | | Known | Risk |
| | Dist. | Maint. | Sub- | scape | ATM | Year | cast | Ridge | Mid- | Valley | Quality | (Slope/ |
| Road # | (Miles) | (Co.,USFS) | Watershed | Block | Status | Built | (Y/N) | top | slope | Bottom | Habitat | Soil) |
| 3600000 | 5.44 | County | Lower Lake | G | Hwy | pre1910 | | | | 100 | | L |
| 3700000 | 1.6 | USFS | N.Indian | B | S1 | by 1965 | Y | 100 | | | L | L |
| 3700573 | 0.93 | USFS | N.Indian | B | | 1975 | Y | 50 | 50 | | M | H |
| 5110000 | 1.77 | County | Elk2 | E | Co | by 1910 | Y | 50 | 50 | | | H/L |
| 5130000 | 17.3 | County | Various-Indian | E | Co | pre1910/65 | | | | 100 | | L |
| 5134000 | 3.27 | County | Long | E | Co | by 1910 | Y | | | 100 | L | L |
| 5140000 | 10.99 | County | Various-Deadw. | G/H6 | Co | by 1910 | Y | | | 100 | | L |
| 5142000 | 3.82 | County | W.F.Dead/Misery | G/H3,5 | Co | by 1910 | Y | | | 100 | | L |
| 5143000 | 1.49 | USFS | W.F. Deadwood | H5 | | by 1910 | Y | | | 100 | L | L |
| 5800000 | est. 2.1 | USFS | Various-Indian | A/B | S1 | by 1965 | Y | 50 | 50 | | H | M-H |
| 5800637 | 0.65 | USFS | Maria/Rogers | A | | 1967 | Y | | 100 | | L | H |
| 5800680 | 5.03 | USFS | N.Indian/Up.Ind | B | | by 75/63 | Y | 80 | 20 | | L | L |
| 5800681 | 0.76 | USFS | N.Indian | H4 | | by 1973 | Y | 100 | | | H | M |
| 5840000 | 9.39 | USFS | Various-Indian | A/B/E | | by 65/73 | Y | 90 | 10 | | L | L |
| 5840622 | 0.17 | USFS | Maria | A | | 1985 | N | | 100 | | L | M |
| 5840623 | 0.28 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | L |
| 5840624 | 2.04 | USFS | Maria | A | | by 1973 | Y | 60 | 40 | | M | M |
| 5840625 | 1.68 | USFS | Maria | A | | by 1973 | Y | 50 | 50 | | M | M |
| 5840626 | est. .25 | USFS | Maria | A | | | Y | 100 | | | L | H |
| 5840627 | 0.55 | USFS | Maria | A | | 1968 | N | 100 | | | L | L |
| 5840628 | 0.32 | USFS | Up.Indian | B | | 1968 | N | 100 | | | | H |
| 5840630 | 0.66 | USFS | Maria/Long | A | | 1972 | N | 100 | | | L | L |
| 5840631 | 0.41 | USFS | Long | A | | 1972 | N | | 100 | | M | L |
| 5840632 | 0.54 | USFS | Long | A | | 1972 | N | 100 | | | L | L |
| 5840633 | 0.65 | USFS | Long | A | | 1973 | Y | 100 | | | L | L |
| 5840634 | 1.31 | USFS | M.S. Indian | E | | 1969 | Y | 100 | | | L | L |
| 5840636 | 0.9 | USFS | Long | A | | by 1965/73 | Y | 100 | | | | L |
| 5840637 | 0.12 | USFS | Long | A | | | | | 100 | | | H |
| 5840650 | 0.17 | USFS | Long | E | | 1985 | N | 100 | | | | L |
| 6300000 | 6.62 | USFS | Alpha/UpDead | C/G | | by24/52/65 | Y | 25 | 15 | 60 | M | L |
| 6300110 | 0.53 | USFS | Up.Dead | C | | by 1973 | Y | 100 | | | M | M |
| 6300118 | 0.68 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | M |
| 6300119 | 0.85 | USFS | Up.Dead | C | | 1958 | Y | | 100 | | H | L |
| 6300122 | 0.45 | USFS | Up.Dead | C | | 1961 | Y | | 100 | | H | M |
| 6300UK1 | est. 1.1 | USFS | Up.Dead | C | | | Y | 100 | | | | H |
| 6300126 | 0.5 | USFS | Up.Dead | C | | | Y | | 100 | | | H |
| 6300131 | 0.35 | USFS | Up.Dead | C | | 1958 | Y | 100 | | | | L |

# Appendix I - Roads Inventory for Indian/Deadwood Watershed Analysis

| Known | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prob.'s | | | | | | | | | | Overall Potential | | |
| Pre-flood | | | | | | | | | | Impact to Aquatics | | |
| (Y/N) | Comments & Damage caused by February 7, 1996 storm | | | | | | | | | (5=high, 1=low) | | |
| | HWY 36 | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 4 | |
| | Stability: ridge=H; midslope=L | | | | | | | | | | 2 | |
| | Mainline access up Indian | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 1 | |
| Y | chronic cutbank\fill erosion above Rogers\Maria; flood - passable slump @ 39.3 mi. (ERFO '96) | | | | | | | | | | 5 | |
| | | | | | | | | | | | 3 | |
| Y | sidecast pullback on spur in T16S, R10W, S3 and more | | | | | | | | | | 4 | |
| Y | sidecast pullback throughout | | | | | | | | | | 5 | |
| | | | | | | | | | | | 1 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| | flood - 2 road slumps, both passable | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback throughout | | | | | | | | | | 4 | |
| | 80 cy slide @ .7 miles | | | | | | | | | | 1 | |
| | | | | | | | | | | | 2 | |
| | | | | | | | | | | | 1 | |
| Y | sidecast pullback | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |
| | waterbar and close op. spurs | | | | | | | | | | 2 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 1 | |
| Y | flood - 2 major sidecast failures into creek & part. plugged culvert @ m.p. 4 (see culv. analysis) | | | | | | | | | | 3thru5 | |
| Y | culvert removed @ .3; possible rd oblit. | | | | | | | | | | 3 | |
| Y | stability varies (L&H); has waterbars but needs 3 culverts pulled | | | | | | | | | | 5 | |
| | small piece of hisk slide risk @ end of spur | | | | | | | | | | 4 | |
| | | | | | | | | | | | 4 | |
| | 6300126 comes off this unknown spur to 6300 | | | | | | | | | | 3 | |
| | | | | | | | | | | | 3 | |
| | | | | | | | | | | | 2 | |

**Key:**

1/ **ATM Status** - Prim. = Primary Forest Road - all highway vehicle travel encouraged

S1 = Secondary Forest Road, Low Clearance - passenger car travel acceptable

S2 = Secondary Forest Road, High Clearance - passenger car travel discouraged

Co. = County maintained

2/ **Risk to Known Quality Habitat** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

3/ **Stability Risk (Slope/Soil)** - High, Moderate or Low (See Appendix 4.3 for analysis methods)

4/ **Overall Potential Impact to Aquatics** - 1-5 (See Appendix 4.3 for analysis methods)

## Appendix K. Stream Habitat Condition Rating

| CREEK NAME | REACH | % DEEP POOLS | LWD | COMPLEX POOLS | % POOLS |
|---|---|---|---|---|---|
| Elk | 1 | F | NF | NF | F |
| | 2 | PF | NF | NF | F |
| | TRIB 1 | NF | NF | NF | PF |
| | TRIB 3 | F | NF | NF | F |
| | TRIB 4 | NF | NF | NF | F |
| Failor | 1 | P5F | NF | NF | F |
| | 2 | F | PF | NF | F |
| | 3 | F | NF | NF | F |
| | 4 | NF | NF | NF | PF |
| | TRIB 5 | NF | NF | NF | PF |
| | TRIB 6 | NF | NF | NF | NF |
| | TRIB 7 | NF | NF | NF | PF |
| | TRIB 9 | NF | NF | NF | NF |
| | TRIB 12 | NF | NF | NF | NF |
| | TRIB 15 | NF | NF | NF | NF |
| | TRIB 16 | NF | NF | NF | NF |
| Gibson | 1 | F | NF | NF | F |
| | TRIB 1 | NF | NF | NF | NF |
| | TRIB 4 | NF | NF | NF | NF |
| | TRIB 5 | NF | PF | NF | NF |
| Herman | 1 | NF | NF | NF | PF |
| | 2 | F | NF | NF | F |
| | 3 | NF | PF | NF | F |
| | TRIB 15 | NF | NF | NF | NF |
| | TRIB 7 | NF | NF | NF | NF |
| | TRIB 8 | NF | NF | NF | NF |
| Long | 1 | PF | NF | NF | F |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | PF |
| Maria | 1 | PF | PF | NF | F |
| | 2 | PF | NF | NF | F |
| | 3 | NF | NF | NF | PF |
| Maria Trib 5 | 1 | NF | NF | NF | F |
| | 2 | F | PF | PF | F |
| N. Fork Indian | 1 | F | NF | NF | F |
| | 2 | F | NF | F | F |
| | 3 | F | NF | NF | F |
| | 4 | F | NF | NF | F |
| | 5 | F | NF | NF | F |
| | TRIB 10 | NF | NF | NF | NF |
| | TRIB 12 | F | NF | NF | F |
| | MANN CR. TRIB 13 | NF | NF | NF | F |
| | TRIB 23 | F | NF | NF | F |

| CREEK NAME | REACH | % DEEP POOLS | LWD | COMPLEX POOLS | % POOLS |
|---|---|---|---|---|---|
| Pyle | 1 | NF | NF | PF | F |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | NF |
| | TRIB 2 | NF | NF | NF | NF |
| | TRIB 3 | NF | NF | NF | PF |
| Rogers | 1 | F | NF | NF | PF |
| | 2 | F | NF | NF | F |
| | 3 | NF | NF | NF | NF |
| | 4 | NF | NF | NF | NF |
| | TRIB 25 | NF | NF | NF | NF |
| | TRIB 26 | NF | NF | NF | PF |
| | TRIB 8 | F | PF | NF | F |
| Smoot | 1 | F | NF | NF | F |
| | 2 | PF | NF | NF | F |
| | TRIB 3 | NF | NF | NF | NF |
| Taylor | 1 | F | NF | NF | F |
| | 2 | F | NF | NF | F |
| | TRIB 4 | NF | PF | NF | F |
| Velvet | 1 | F | NF | NF | F |
| | TRIB 4 | NF | NF | NF | NF |
| | TRIB 6 | NF | NF | NF | NF |
| | TRIB 7 | NF | PF | NF | NF |
| | TRIB 1 OF TRIB 7 | NF | PF | NF | NF |
| | TRIB 9 | NF | NF | NF | NF |
| West Fork Deadwood | 2 | NF | NF | NF | F |
| | 4 | F | NFN | NF | F |
| | 6 | F | NF | NF | F |
| | Panther Fk | NF | NF | NF | F |
| West Fork Indian | 1 | F | NF | NF | F |
| | 2 | F | NF | NF | F |
| | TRIB 1 | NF | NF | NF | NF |
| | TRIB 2 | NF | NF | | PF |
| West Headwaters Deadwood | 1 | F | NF | PF | F |
| | 2 | F | PF | PF | F |
| | TRIB 2 | NF | NF | NF | NF |
| | TRIB 3 | NF | NF | NF | NF |

F = Functioning for rearing habitat
PF = Partially functioning
NF = Not functioning

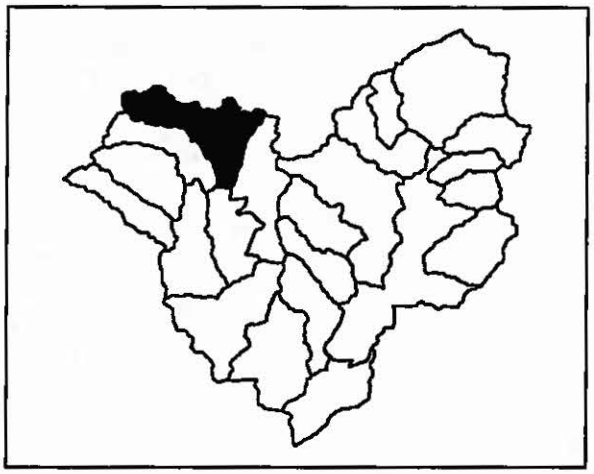
## North Indian - 1710020615

**At a Glance:**

*Sub-watershed size:* 6.48 sq. miles (4149 acres )

*Streams include:* North Fork Indian Creek

*Ownership:* Siuslaw N.F. (87.2%)
Industrial Private (10.9%)
Private (1.8%)



*History:* There were two homesteads in the lower half of the subwatershed and grazing occurred throughout North Fork Indian Creek. Records indicate five sawmills existed in a tributary on the north side of North Fork Indian Creek, one of which existed before 1945.

### Aquatics

Stream miles: 62.7
Stream density: 9.68 miles/sq.mile

Confinement & Gradient:

52.6 miles of *source* areas (confined and moderately confined, >8%)
4.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Much of the upper three miles of North Fork Indian Creek is very close to being in properly functioning condition except for the lack of large wood in the creek and on the floodplain. Stream improvement strategies consist of scattered riparian plantings of conifers for future large wood recruitment and deciduous trees for potential beaver habitat and use. The lower two miles are influenced by the current road placement and grazing along the creek. Beaver dams and instream structures have created pools for salmonid rearing in this section. Additional gains for fish habitat could be made by increasing the woody vegetation, willows and conifers on the streambanks to encourage stability. If grazing remains a component of management, proper fencing of pastures will be needed to ensure vegetative success and bank stability.

Survey information available:
- Summer, 1995, bracketed stream temperature monitoring on North Fork Indian Cr. (Ryans #902522 and #902524)
- Level II stream habitat surveys, August, 1991 and Sept.-Oct., 1994
- 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

## North Indian (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 37% | GASH - 30% |
| POMU - 31% | RHMA - 2% |

Land Type Associations: 3C1, 3C

Dominant Soils:

*Ridgetops* - Preacher loam, Bohannon gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Blachly silty clay loam, Bohannon gravelly loam
*Valley bottom* - Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 11% of subwatershed
Moderate potential - 39% of subwatershed
Low potential - 50% of subwatershed

### Management

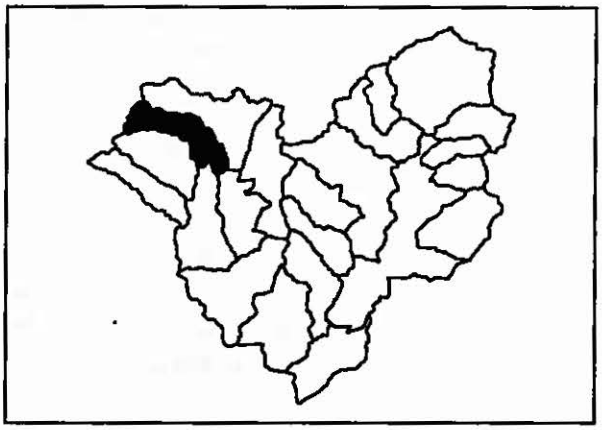
| | |
|---|---|
| *Natural acres:* | 1999 acres (48.2%) |
| *Managed acres:* | 2141 acres (51.6%) |
| *Non-timber land:* | 9 acres (0.2%) |

System road miles: 14.2
*Ridgetop roads*: 8.94 mi. (62.9%)
*Mid-slope roads*: 2.32 mi. (16.3%)
*Valley bottom roads*: 2.96 mi. (20.8%)

System road density: 2.19 miles/sq.mile
ATM roads: 2116, 3250 and 3700

## Upper Indian - 1710020615

**At a Glance:**



*Sub-watershed size:* 4.00 sq. miles (2559 acres )

*Streams include:* Upper mainstem Indian Creek

*Ownership:* Siuslaw N.F. (74.7%)
Private (25.3%)

*History:* There were at least four pre-1900 homesteads in the lower half of this subwatershed and grazing throughout the drainage extended up into the headwaters of Upper Indian Creek. There were six sawmills in this drainage, three of which were pre-1945.

### Aquatics

Stream miles: 33.4
Stream density: 8.35 miles/sq.mile

Confinement & Gradient:

27.8 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

This creek is largely in private ownership. Any stream improvements would have to be centered around large-scale partnerships. Unless opportunities to improve fish habitat develop, this area will be low priority for improvement work.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 38% | GASH - 25% |
| POMU - 34% | RHMA - 3% |

Land Type Associations: 3B, 3C1

## Upper Indian (continued)

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Peacher-Bohannon-Slickrock complex
*Valley bottom* - Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents:

High potential - 7% of subwatershed
Moderate potential - 34% of subwatershed
Low potential - 59% of subwatershed

### Management

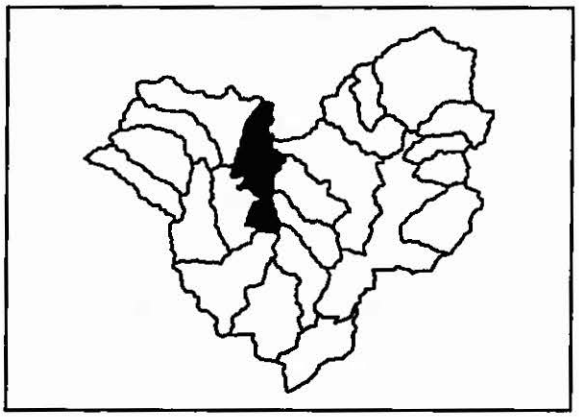
| | |
|---|---|
| *Natural acres:* | 1778 acres (69.5%) |
| *Managed acres:* | 781 acres (30.5%) |
| *Non-timber land:* | 0 acres |

System road miles: 14.1
*Ridgetop roads*: 6.13 mi. (43.5%)
*Mid-slope roads*: 4.66 mi. (33.1%)
*Valley bottom roads*: 3.30 mi. (23.4%)

System road density: 3.53 miles/sq.mile
ATM roads: 2100

## Herman - 1710020615

**At a Glance:**



*Sub-watershed size:* 5.53 sq. miles (3538 acres )

*Streams include:* Herman, Taylor and Gibson Creeks which are tributaries to Indian Creek

*Ownership:* Siuslaw N.F. (96.9%)
Private (3.1%)

*History:* There was one pre-1900 homestead in lower Herman Creek and a pre-1945 sawmill in lower Taylor Creek. Grazing occurred in lower Taylor Creek between the sawmill and Indian Creek. There were two historic trails in this subwatershed as well.

### Aquatics

Stream miles: 50.8
Stream density: 9.19 miles/sq.mile

Confinement & Gradient:

44.1 miles of *source* areas (confined and moderately confined, >8%)
.6 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Herman** - the upper 3/4 of Herman Creek is partially functioning as habitat for rearing of salmonids, but the absence of large wood in the creek limits this rearing potential. There is some beaver activity in Herman Creek that provides good rearing habitat. Planting of conifer in clumps and possibly willow could further enhance beaver habitat. Addition of wood from adjacent hillslopes and outside sources will promote short-term recovery of fish habitat. Herman Creek has the potential to be a major contributor to salmonid habitat within the Indian Creek watershed.

**Taylor** - Level II fish habitat surveys show that Taylor Creek is partially functioning as anadromous fish rearing habitat. Large wood is deficient and additions from adjacent hillslopes and outside sources would enhance the habitat. Planting of conifers in clumps where appropriate is recommended here. Although Taylor Creek does provide habitat off the heavily impacted mainstem of Indian Creek, this creek is not as high a priority as Herman Creek.

**Gibson** - Same as for Taylor except there may be more opportunity here for addition of large wood to the stream from adjacent hillslopes.

Survey information available: - Level II stream habitat surveys on Herman, Gibson and Taylor Creeks, Sept.-Oct., 1994
- 1990 water users inventory identified no water use permitees

## Herman (continued)

Aquatic Priority for Restoration: **High**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 35% | GASH - 31% |
| POMU - 31% | RHMA - 3% |

Land Type Association: 3C

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex
*Valley bottoms* - Meda loam and Nekoma silt loam

## Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 20% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 42% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1939 acres (54.8%) |
| *Managed acres:* | 1588 acres (44.9%) |
| *Non-timber land:* | 11 acres (0.3%) |

System road miles: 13.3
*Ridgetop roads*: 6.91 mi. (52.1%)
*Mid-slope roads*: 5.93 mi. (44.7%)
*Valley Bottom roads*: .43 mi. (3.2%)

System road density: 2.40 miles/sq.mile
ATM roads: 3200 (north half) & 3278

## Mainstem Indian - 1710020615

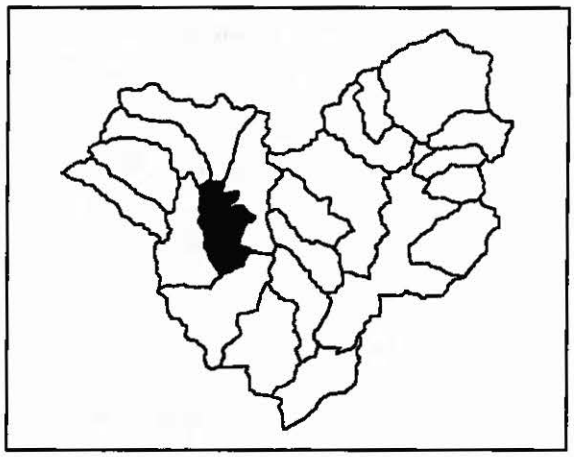
**At a Glance:**

*Sub-watershed size:* 4.10 sq. miles (2623 acres )

*Streams include:* Mainstem Indian Creek and Smoot Creek, a tributary to Indian Creek

*Ownership:* Siuslaw N.F. (63.6%)
Private (36.4%)

*History:* There was at least one pre-1900 homestead along the mainstem of Indian Creek and there were four post-1945 sawmills along the mainstem. Grazing historically occurred throughout the mainstem in this subwatershed.



### Aquatics

Stream miles: 28.8
Stream density: 7.02 miles/sq.mile

Confinement & Gradient:

21.9 miles of *source* areas (confined and moderately confined, >8%)
.7 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Through this reach there are a number of areas that are used by chinook salmon as spawning habitat. Grazing is the major activity along this reach of Indian Creek and consequently streambank stability, fine sediment introduction, and lack of riparian vegetation for shade are major problems. Little rearing habitat for salmonids exists. Primarily the mainstem is in private ownership and thus little stream restoration work can be done without development of partnerships, and will be a low priority for restoration until the partnerships are developed. First priority for restoration should be the re-establishment of woody vegetation in the riparian areas, more than just one row of alder along the banks.

Survey information available: - Level II stream habitat survey, October, 1994
- 1990 water users inventory identified 3 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

## Mainstem Indian (continued)

### Soils/Vegetation

Plant Association Groups: no information available
Land Type Association: 3C

Dominant Soils:

*Ridgetope* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex
*Valley bottom* - Nekoma silt loam, Meda loam, Eilertsen silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 15% of subwatershed
Moderate potential - 30% of subwatershed
Low potential - 55% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 1662 acres (63.4%) |
| *Managed acres:* | 741 acres (28.2%) |
| *Non-timber land:* | 220 acres (8.4%) |

System road miles: 11.3
*Ridgetop roads*: 4.39 mi. (38.8%)
*Mid-slope roads*: 2.24 mi. (19.8%)
*Valley bottom roads*: 4.68 mi. (41.4%)

System road density: 2.76 miles/sq.mile
ATM roads: 5140 & lower 3259

## Maria - 1710020615

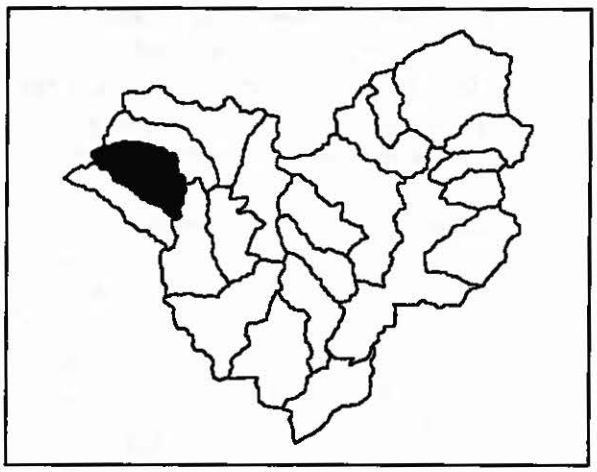
**At a Glance:**

*Sub-watershed size:* 4.80 sq. miles (3074 acres )

*Streams include:* Maria Creek and West Fork Indian Creek, both part of a **Key Watershed**

*Ownership:* Siuslaw N.F. (85.2%)
Private (14.8%)

*History:* There was one pre-1900 homestead on West Fork Indian and grazing occurred on at least 50% of West Fork Indian included in this sub-watershed. An historic trail also existed in the area.



### Aquatics

Stream miles: 41.1
Stream density: 8.56 miles/sq.mile

Confinement & Gradient:

33.7 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Maria Creek** - The majority of Maria Creek is considered partially functioning for rearing of anadromous salmonids. Gravel and cobble are plentiful and occasional pieces of large wood along with beaver dams provide deep complex pools for salmonid rearing. Improvement strategies for Maria Creek include large wood additions from adjacent hillslope stands, planting of conifers in clumps on toe slopes and scattered planting of shade tolerant conifers in some areas beneath the mature hardwood canopy. The major tributary to Maria Creek from the north has a section of stream rated as 'functioning' for salmonid rearing habitat. The strategy in this tributary is to extend this functioning area down to the main stem of Maria Creek (see habitat condition map). Establishment of a partnership with Davidson in the lower portion of Maria Creek would also be beneficial to restoration efforts. There are some large landslides in this drainage from the February 1996 storm. These should be evaluated prior to implementation of the strategies discussed above.

**West Fork Indian Creek** - The upper two miles of West Fork Indian Creek are rated as 'partially functioning' due to lack of large wood which creates the deep complex pools needed by rearing salmonids. Cobble and gravel are abundant although fine sediments are a concern. Improvement strategies for this section of creek include large wood additions from adjacent hillslope stands, planting of conifers in clumps on toe slopes and scattered planting of shade tolerant conifers below the mature hardwood canopy. Two 318 units have been harvested in 1995,1996 within the drainage and associated KV projects are being planned in

## Maria (continued)

association with these units to add large wood complexes to the creek. After these are completed, reconnaissance should be conducted to determine if further improvements are warranted. The next two miles of creek downstream are in private ownership and flow through an alder dominated stand. Although no formal stream surveys have been conducted on this section, gradient, substrate and riparian conditions are similar to that upstream, which probably lends to similar habitat conditions in this section. If partnerships could be developed here, similar strategies to those listed above should be employed.

Survey information available: - Stream temperature monitoring from 1990-1995 on West Fork Indian
- (summer, 1995 - Ryan #903870).
- Level II stream habitat surveys in both Maria and W. Fk. Indian Creeks, July-Sept., 1990.
- 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 33% | RUSP - 32% |
| POMU - 33% | RHMA - 2% |

Land Type Association: 3B

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottom* - Meda loam, Preacher-Bohannon-Slickrock cx, Bohannon gravelly loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 8% of subwatershed
Moderate potential - 41% of subwatershed
Low potential - 51% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2388 acres (77.7%) |
| *Managed acres:* | 679 acres (22.1%) |
| *Non-timber land:* | 7 acres (.2%) |

System road miles: 8.30
*Ridgetop roads*: 4.29 mi. (51.8%)
*Mid-slope roads*: 3.78 mi. (45.7%)
*Valley Bottom roads*: .21 mi. (2.5%)

System road density: 1.73 miles/sq.mil
ATM roads: none

## Rogers - 1710020615

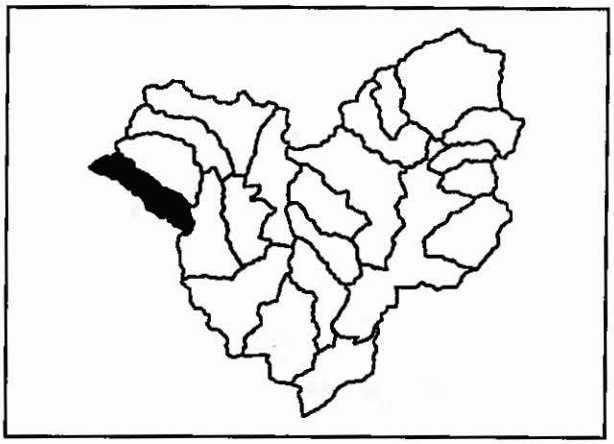
**At a Glance:**

*Sub-watershed size:* 3.52 sq. miles (2250 acres )

*Streams include:* Rogers Creek, tributary to West Fork Indian Creek. Rogers Creek is part of a **Key Watershed**

*Ownership:* Siuslaw N.F. (98.7%)
Private (1.3%)

*History:* There were two pre-1900 homesteads in lower Rogers Creek and grazing historically occurred in the lower half of this drainage.



### Aquatics

Stream miles: 29.8
Stream density: 8.47 miles/sq.mile

Confinement & Gradient:

25.5 miles of *source* areas (confined and moderately confined, >8%)
.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Rogers Creek has high potential to be a major fish producer for the Indian Creek drainage. It currently has a relatively healthy run of chinook and coho salmon . The creek is low gradient and relatively moderately confined. The substrate is primarily gravels and cobbles throughout the system. The lower 2.5 miles of the creek has recently been acquired by the Forest Service. Within this section of creek current habitat conditions for the rearing of anadromous salmonids is fair. Occasional pieces of large wood can be found in connection with the stream channel which create some deep complex pools associated with good salmonid rearing. There is evidence of past stream cleanout efforts on the floodplain throughout this section of stream and noxious weeds (tansy and thistle) are scattered throughout the section as well. Future additions of large wood will create more deep complex pools, provide off-channel habitat, and increase floodplain connectivity with the stream. In addition, diversity of riparian vegetation will be increased through planting of conifers in clumps on toe slopes and scattered plantings of shade tolerant species beneath mature hardwoods. Diversity of currently existing riparian vegetation (i.e. elderberry thickets) should be maintained.

The 1-mile portion of Rogers Creek above the acquired land is in good condition. Beaver activity is high in this area with numerous dams providing floodplain interaction and deep complex pools for cover and feeding,. A substantial amount of large wood is present on the floodplain and in the stream that will be beneficial at high winter flows and will be recruited as the creek continues to meander.

## Rogers (continued)

If there is any possibility of choosing 318 sales to be bought out or replaced, from a fisheries standpoint the Mister Rogers 3 units would be the highest priority. These stands located in a key watershed where we plan to establish aquatic refugia just do not make sense.

Survey information available: Level II stream habitat survey, July-August, 1990
1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 41% | GASH - 21% |
| POMU - 38% | RHMA - 0% |

Land Type Association: 3B

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottoms* - Meda loam, Nekoma silt loam, Preacher-Bohannon-Slickrock complex

## Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 8% of subwatershed
Moderate potential - 46% of subwatershed
Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1534 acres (68.2%) |
| *Managed acres:* | 716 acres (31.8%) |
| *Non-timber land:* | 0 acres |

System road miles: 10.4
*Ridgetop roads*: 5.30 mi. (51.1%)
*Mid-slope roads*: 2.90 mi. (28.0%)
*Valley bottom roads*: 2.17 mi. (20.9%)

System road density: 2.95 miles/sq.mile
ATM roads: none

## Long - 1710020615

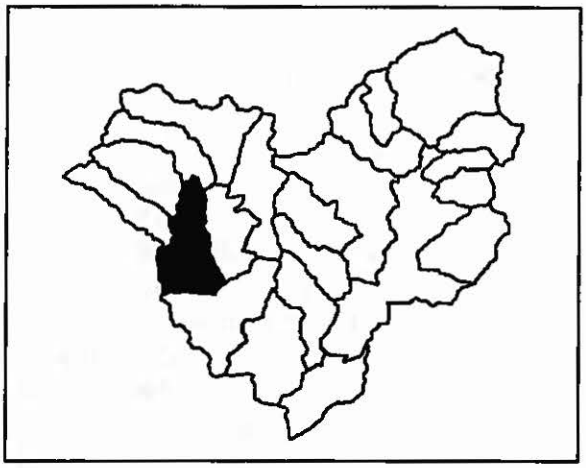
**At a Glance:**

*Sub-watershed size:* 5.45 sq. miles (3487 acres )

*Streams include:* West Fork Indian Creek; Pyle and Long Creeks, which are tributaries to W. Fk. Indian Creek

*Ownership:* Siuslaw N.F. (80.6%)
Private (19.4%)

*History:* There was one pre-1900 homestead on West Fork Indian Creek and grazing occurred all along West Fork Indian and lower Long Creeks in this subwatershed.



### Aquatics

Stream miles: 47.1
Stream density: 8.64 miles/sq.mile

Confinement & Gradient:

38.3 miles of *source* areas (confined and moderately confined, >8%)
.5 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
8.3 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Lower West Fork Indian Creek** - This section of West Fork Indian Creek is almost entirely on private ownership. Small alder-dominated strips line the banks throughout much of this section of creek. Other areas contain steep, actively eroding cutbanks where grazing has weakened the streambank and all woody vegetation has been removed. This section does provide a large amount of spawning habitat for chinook salmon. Rearing conditions for other salmonids is compromised by lack of wood , deep pools and potential temperature limitations caused by radiant heat warming the creek through sparse vegetation. If partnerships can be developed, improvement strategies would center around streambank stabilization and vegetation establishment along the creek to increase shade. Fencing to reduce impacts from grazing would speed up recovery of woody vegetation. Partnership with Davidson is first and foremost in this area. A large slide has blocked the road and entered the creek. Effects from this slide should be evaluated.

**Long Creek** - Level II stream habitat surveys indicate that Long Creek is partially functioning as anadromous fish rearing habitat. The addition of large wood to create deep complex pools would enable Long Creek to function better in the short term.

Survey information available: - Level II stream habitat surveys in Long Creek, July, 1990 and Pyle Creek, August, 1990
- 1990 water users inventory identified 7 water use permitees

## Long (continued)

Aquatic Priority for Restoration: **Moderate**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| RUSP - 40% | GASH - 26% |
| RUSP - 33% | RHMA - 2% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Preacher loam, Blachly silty clay loam
*Valley bottom* - Nekoma silt loam, Nehalem silt loam, Eilertsen silt loam, Meda loam,

## Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 11% of subwatershed
Moderate potential - 36% of subwatershed
Low potential - 53% of subwatershed

## Management

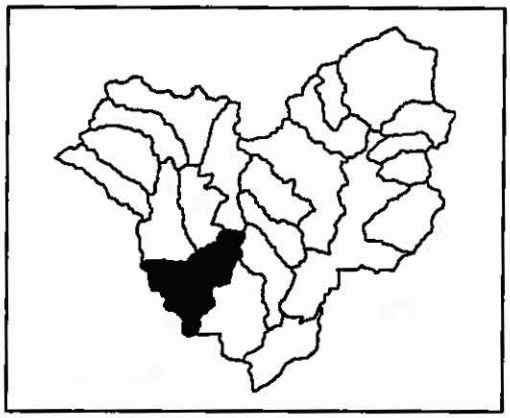
| | |
|---|---|
| *Natural acres:* | 2274 acres (65.2%) |
| *Managed acres:* | 1045 acres (30.0%) |
| *Non-timber land:* | 168 acres (4.8%) |

System road miles: 15.5
*Ridgetop roads*: 9.24 mi. (59.5%)
*Mid-slope roads*: 1.66 mi. (10.7%)
*Valley Bottom roads*: 4.64 mi. (29.8%)

System road density: 2.85 miles/sq.mile
ATM roads: lower 2500

## Elk2 - 1710020615

**At a Glance:**



*Sub-watershed size:* 7.43 sq. miles (4754 acres )

*Streams included:* Lower mainstem Indian Creek
Elk and Cremo, tributaries to
Indian Creek

*Ownership:* Siuslaw N.F. (63.2%)
Private (36.8%)

*History:* The lower mainstem of Indian Creek in this subwatershed includes two pre-1900 homesteads, historic grazing, two saw mills and one documented site where splash damming occurred in Indian Creek. There are also three historic Indian sites in this area.

### Aquatics

Stream miles: 59.4
Stream density: 8.00 miles/sq.mile

Confinement & Gradient:

45.4 miles of *source* areas (confined and moderately confined, >8%)
4.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
10.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream habitat surveys indicate that Elk Creek is providing partially functioning anadromous fish rearing habitat. There is potential to work with a local landowner to improve conditions at the mouth of Elk Creek. The addition of large wood further upstream to create deep complex pools would improve fish habitat.

Survey information available: - Level II stream habitat survey, August, 1990
- 1990 water users inventory identified 12 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Vegetation/Soils

Plant Association Groups:

| | |
|---|---|
| RUSP - 48% | POMU - 32% |
| GASH - 19% | RHMA - 1% |

## Elk2 (continued)

Land Type Association: 3C2, 3C

Dominant Soils:

*Ridgetops*: Bohannon gravelly loam with some Preacher loam
*Sideslopes*: Preacher-Bohannon-Slickrock complex with some Bohannon gravelly loam
*Indian Cr. Valley Bottom*: Nehalem silt loam
*Elk Cr. valley bottom*: predominately Preacher-Bohannon-Slickrock complex

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 10% of subwatershed
Moderate potential - 31% of subwatershed
Low potential - 59% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2551 acres (53.7%) |
| *Managed acres:* | 2032 acres (42.7%) |
| *Non-timber land:* | 158 acres (3.6%) |

System road miles: 16.6
*Ridgetop roads*: 6.65 mi. (40.0%)
*Mid-slope roads*: 4.25 mi. (25.6%)
*Valley Bottom roads*: 5.72 mi. (34.4%)

System road density: 2.24 miles/sq.mile
ATM roads: 5140, lower 3259 & 2500

## Lower Indian - 1710020615

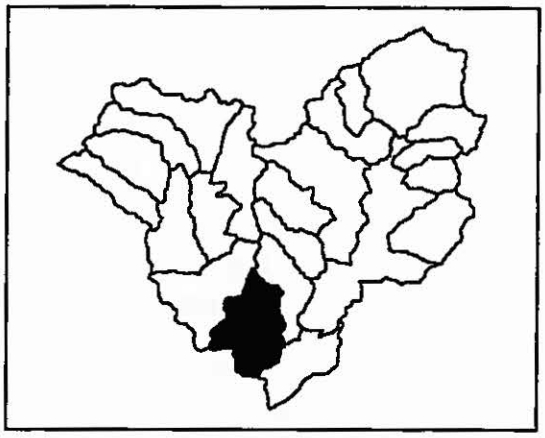
**At a Glance:**

*Sub-watershed size:* 6.63 sq. miles (4242 acres )

*Streams include:* Lower Mainstem Indian Creek
Velvet Creek, a tributary to Indian Creek

*Ownership:* Siuslaw N.F. (94.6%)
Private (5.4%)

*History:* The lower portion of Indian Creek in this subwatershed includes two areas of historic grazing.



### Aquatics

Stream miles: 59.0
Stream density: 8.90 miles/sq.mile

Confinement & Gradient:

49.6 miles of *source* areas (confined and moderately confined, >8%)
3.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
6.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

**Lower Mainstem Indian Creek** - This area is dominated by bedrock substrate with small stretches of deposited gravel and cobble. Some past habitat improvement projects have collected sediments to agrade the stream channel and reduce the amount of bedrock. There is potential to work with partnerships in this area to continue the improvements. Scattered conifer planting should be conducted in conjunction with instream work. By adding these improvements the fish habitat complexity will increase and reductions in water temperature in summer may be possible.

**Velvet Creek** - Level II stream habitat surveys indicate that Velvet Creek is partially functioning as anadromous fish rearing habitat. The addition of large wood to improve habitat complexity is recommended. Beaver activity is noted and should be promoted through hardwood and willow planting. Some conifer plantings could also be done .

Survey information available:
- Summer, 1995, stream temperature monitoring on lower Indian Cr. (Ryan #902523)
- Level II stream habitat survey in Velvet Cr., October, 1994
- 1990 water users inventory identified 3 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

## Lower Indian (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 41% | GASH - 24% |
| RUSP - 33% | RHMA - 2% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Blachly silty clay loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Preacher loam, Digger rock outcrop complex
*Valley bottom* - Nehalem silt loam, Meda loam,

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 12% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 48% of subwatershed

### Management

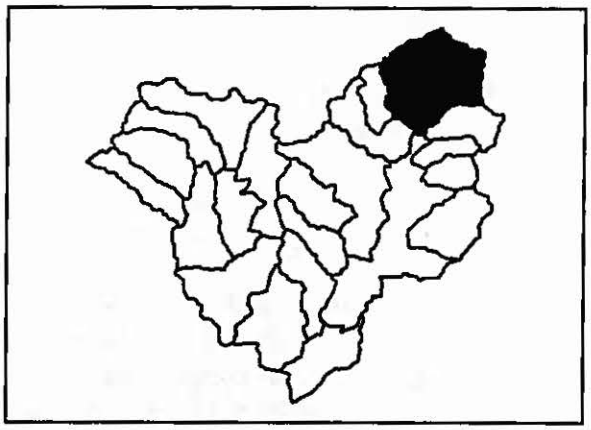
| | |
|---|---|
| *Natural acres:* | 2600 acres (61.3%) |
| *Managed acres:* | 1614 acres (38.1%) |
| *Non-timber land:* | 28 acres (0.7%) |

System road miles: 16.9
*Ridgetop roads*: 11.06 mi. (65.3%)
*Mid-slope roads*: 1.72 mi. (10.2%)
*Valley Bottom roads*: 4.15 mi. (24.5%)

System road density: 2.55 miles/sq.mile
ATM roads: 5130 & lower 3200

## Upper Deadwood - 1710020616

**At a Glance:**



*Sub-watershed size:* 10.34 sq. miles (6620 acres)

*Streams include:* The headwaters of Deadwood Creek

*Ownership:* Siuslaw N.F. (85.9%)
Industrial Private (7.0%)
Private (4.4%)
Bureau of Land Mgt. (2.7%)

*History:* There were two pre-1945 sawmills in the upper mainstem of Deadwood Creek and two documented locations where splash damming occurred in the same vicinity. Historically, grazing occurred on both mainstem Deadwood Creek and the lower portion of its western most tributary.

### Aquatics

Stream miles: 78.5
Stream density: 7.59 miles/sq.mile

Confinement & Gradient:

65.0 miles of *source* areas (confined and moderately confined, >8%)
6.1 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
7.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream surveys have indicated that some of the upper tributaries of Deadwood Creek are in properly functioning condition for rearing of anadromous salmonids. This concentration of functioning areas provides a good opportunity for creating refugia for anadromous salmonids even though this area was not designated a key watershed. The main emphasis for this area is to expand the properly functioning sections of this subwatershed to add security for the fish. Additional on-site evaluations are needed to determine how to best approach securing good habitat. Partnerships exist with private landowners for cooperative projects in 1996 and beyond. These projects include installation of instream structures to add large wood for promotion of stream habitat diversity. Instream large wood additions are needed in the mainstem to catch sediments moving out of the tributaries and to promote floodplain interaction. Currently, much of the mainstem is dominated by bedrock. Clumpy riparian planting of conifers on toe slopes is needed, especially on the mainstem. The west headwaters need scattered underplanting of shade tolerant conifers underneath mature hardwoods. There is potential for clumpy release in hardwood/mixed pole stands in the drainage as well.

Survey information available: - Level II stream habitat survey, Sept.-October, 1994
- 1990 water users inventory identified 8 water use permitees in this subwatershed

## Upper Deadwood (continued)

Aquatic Priority for Restoration: **High**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | RUSP - 25% |
| GASH - 34% | RHMA - 2% |

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam, Blachly silty clay loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam
*Valley bottom* - Meda loam (mainstem Deadwood), Bohannon gravelly loam (headwaters)

### Slope Stability

Predicted potential for slides and debris torrents:

High potential - 7% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 53% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 4185 acres (63.2%) |
| *Managed acres:* | 2407 acres (36.4%) |
| *Non-timber land:* | 28 acres (.4%) |

System road miles: 26.5
*Ridgetop roads*: 15.22 mi. (57.4%)
*Mid-slope roads*: 8.33 mi. (31.4%)
*Valley bottom roads*: 2.96 mi. (11.2%)

System road density: 2.56 miles/sq.mile
ATM roads: 6300

## North Panther (Cougar) - 1710020616

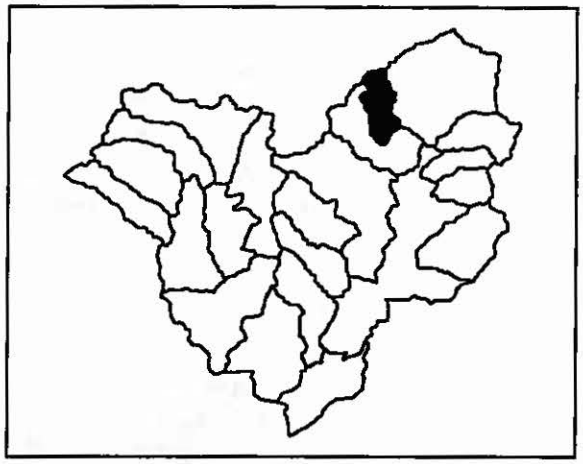
**At a Glance:**

*Sub-watershed size:* 2.16 sq. miles (1383 acres )

*Streams include:* North Fork Panther (Cougar) Cr.

*Ownership:* Siuslaw N.F. (93.7%)
Private (6.3%)

*History:* There was one pre-1945 sawmill in this drainage.



### Aquatics

Stream miles: 19.8
Stream density: 9.17 miles/sq.mile

Confinement & Gradient:

17.3 miles of *source* areas (confined and moderately confined, >8%)
.5 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
2.0 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

This drainage has high potential for enhancement of rearing habitat for anadromous salmonids. Beaver activity is high and should be promoted further. There is potential for obtaining large wood from upslope some of the mature conifer stands remaining in this drainage. Where little beaver activity exists, planting of conifers in clumps in hardwood dominated areas is recommended. Additionally, scattered planting of conifers could be done in beaver prone areas, but additional cost would be incurred for protection of these seedlings. There is also potential for cottonwood and willow plantings in this drainage.

Survey information available: - Level II stream habitat survey, August, 1992
- 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:
POMU - 40% RUSP - 19% GASH - 36% RHMA - 5%

**North Panther (continued)**

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock outcrop complex
*Valley bottoms* - Meda loam, Digger rock outcrop complex

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 16% of subwatershed
Moderate potential - 49% of subwatershed
Low potential - 35% of subwatershed

**Management**

| | |
|---|---|
| *Natural acres:* | 757 acres (54.7%) |
| *Managed acres:* | 626 acres (45.3%) |

System road miles: 4.6
Ridgetop roads: 4.53 mi. (98.3%)
Valley bottom roads: .08 mi. (1.7%)

System road density: 2.12 miles/sq.mile
ATM roads: 3500

## Panther2 (Cougar)- 1710020616

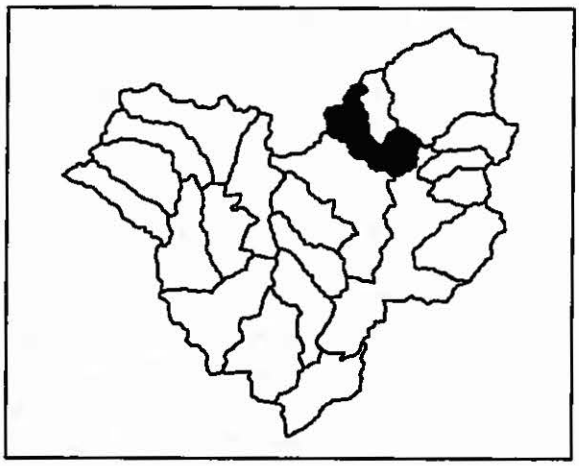
**At a Glance:**

*Sub-watershed size:* 4.49 sq. miles (2874 acres )

*Streams include:* Panther Creek

*Ownership:* Siuslaw N.F. (87.6%)
Private (11.3%)
Industrial Private (31.1%)

*History:* There was one pre-1945 sawmill in the upper portion of Panther (Cougar) Creek and grazing occurred in the lower two thirds of Panther Creek.



### Aquatics

Stream miles: 38.5
Stream density: 8.57 miles/sq.mile

Confinement & Gradient:
32.4 miles of *source* areas (confined and moderately confined, >8%)
.3 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.8 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
The bottom half of Panther Creek is primarily in private ownership which means that any enhancement will need to be through partnerships. The upper half of the creek is in partially functioning condition. Large wood and associated complex pools are lacking so enhancement should focus on incorporation of large wood into the creek. Adjacent hillslopes could be the potential source for immediate introduction of wood into the upper half of the creek. With partnerships, wood from outside sources could be used to introduce large wood complexes to the lower half as well. Planting of conifer in clumps within the hardwood dominated riparian communities is recommended for long-term potential recruitment of large wood. There is also some potential for release of existing small conifers.

Survey information available: 1990 water users inventory identifies 6 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

**Panther2 (continued)**

## Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 37% | RUSP - 26% |
| GASH - 32% | RHMA - 5% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Bohanon gravelly loam, Preacher loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock complex, Preacher loam
*Valley bottom* - Nekoma silt loam, Meda loam

## Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 11% of subwatershed
Moderate potential - 43% of subwatershed
Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1722 acres (60.1%) |
| *Managed acres:* | 1145 acres (39.9%) |
| *Non-timber land:* | 2 acres (0.1%) |

System road miles: 13.2
*Ridgetop roads*: 9.30 mi. (70.5%)
*Mid-slope roads*: 1.46 mi. (11.1%)
*Valley bottom roads*: 2.43 mi. (18.4%)

System road density: 2.94 miles/sq.mile
ATM roads: none

## Elk - 1710020616

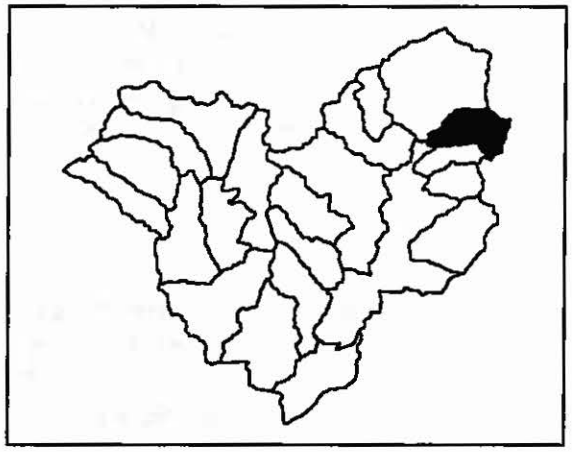
**At a Glance:**

*Sub-watershed size:* 3.15 sq. miles (2015 acres )

*Streams include:* Elk Cr.; tributary to Deadwood Creek

*Ownership:* Siuslaw N.F. (74.9%)
Private Industrial (17.0%)
Bureau of Land Mgt. (5.2%)
State & Other Private (2.9)

*History:* Includes an historic trail, early grazing on lower Elk Creek and a pre-1945 saw mill.



### Aquatics

Stream miles: 25.5
Stream density: 8.10 miles/sq.mile

Confinement & Gradient:

21.9 miles of *source* areas (confined and moderately confined, >8%)
2.4 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
1.2 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Elk Creek provides an opportunity to expand aquatic refugia already established on the upper section of Deadwood Creek. This creek has some mature natural stands that should supply some large wood to the stream and riparian zones in the future. Existing large wood on upslopes above Elk Creek could also be used for stream enhancement structures. Although the lower and probably most productive reach of the creek is in private ownership, the upper reaches could provide a large amount of productive salmonid habitat

Survey information available: 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Vegetation/Soil

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | RUSP - 22% |
| GASH - 37% | RHMA - 2% |

Land Type Association: 3F

**Elk (continued)**

Dominant Soils:

*Ridgetops* - Preacher loam

*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger rock outcrop complex

*Valley bottom* - Meda loam

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 10% of subwatershed

Moderate potential - 50% of subwatershed

Low potential - 40% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1558 acres (77.3%) |
| *Managed acres:* | 452 acres (22.4%) |
| *Non-timber land:* | 5 acres (0.3%) |

System road miles: 3.64

*Ridgetop roads*: 2.54 mi. (69.8%)

*Mid-slope roads*: .89 mi. (24.5%)

*Valley Bottom roads*: .21 mi. (5.8%)

System road density: 1.16 miles/sq.mile

ATM roads: none

## Buck - 1710020616

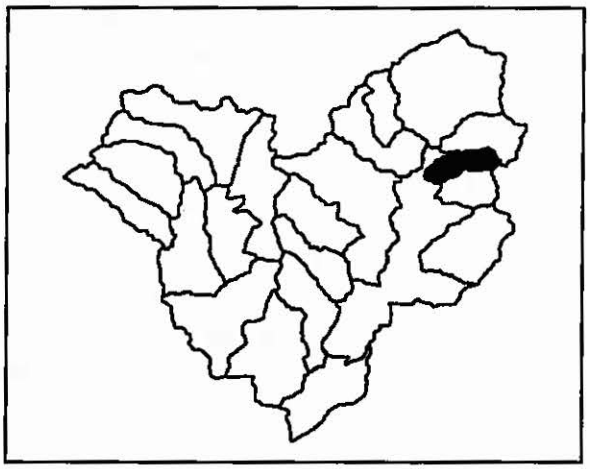
**At a Glance:**

*Sub-watershed size:* 1.74 sq. miles (1114 acres )

*Streams include:* Buck Creek, tributary to Deadwood Creek

*Ownership:* Siuslaw N.F. (82.8%)
Industrial Private (14.7%)
Private (2.5%)

*History:* Some grazing has occurred historically in the lower quarter of Buck Creek



### Aquatics

Stream miles: 13.1
Stream density: 7.53 miles/sq.mile

Confinement & Gradient:
11.0 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
2.1 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
This drainage provides an opportunity to expand the aquatic refugia in the Upper Deadwood subwatershed. The lower part of Buck Creek is in private ownership and has been fairly extensively logged. Planting of conifers in clumps where appropriate is recommended along the main stream. There are opportunities to add wood to Buck Creek from adjacent hillslopes. Buck Creek has substantial portion of the subwatershed in mature conifer that should act as good anchors for productive salmonid habitat.

Survey information available: 1990 water users inventory identifies no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 46% | RUSP - 21% |
| POMU - 30% | RHMA - 3% |

Land Type Association: 3F

## Buck (continued)

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam, Digger rock outcrop complex
*Sideslopes* - Bohannon gravelly loam
*Valley bottom* - Meda loam, Bohannon gravelly loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 6% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 56% of subwatershed

### Management

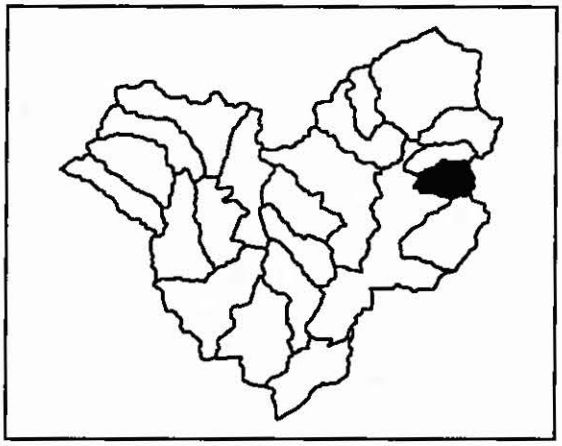
| | |
|---|---|
| *Natural acres:* | 585 acres (52.9%) |
| *Managed acres:* | 518 acres (46.9%) |
| *Non-timber land:* | 2 acres (0.2%) |

System road miles: 6.2
*Ridgetop roads*: 4.19 mi. (67.4%)
*Mid-slope roads*: 1.77 mi. (28.5%)
*Valley bottom roads*: .26 mi. (4.1%)

System road density: 3.56 miles/sq.mile
ATM roads: none

## Rock3 - 1710020616

**At a Glance:**



*Sub-watershed size:* 2.11 sq. miles (1349 acres )

*Streams include:* Rock Creek, tributary to Deadwood Creek

*Ownership:*
Siuslaw N.F. (37.6%)
Bureau of Land Mgt. (32.0%)
State (25.2%)
Private (3.3%)
Industrial Private (1.9%)

*History:* Some historic grazing in lower Rock Creek.

### Aquatics

Stream miles: 15.6
Stream density: 7.39 miles/sq.mile

Confinement & Gradient:
14.0 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
1.6 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:
This drainage is shared by the Forest Service and the Bureau of Land Management. Rock Creek supplies a large amount of gravel to mainstem Deadwood Creek. Some large pieces have accumulated in the creek after the February, 1996 storm. Evaluation of this material should be conducted to determine stability of the structure and whether it needs to be secured. Rock Creek is an important source of gravels to the mainstem Deadwood Creek and the mainstem should be managed to take advantage of this.

Survey information available: 1990 water users inventory identified no water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 43% | RUSP - 16% |
| POMU - 36% | RHMA - 5% |

Land Type Association: 3F

## Rock3 (continued)

Dominant Soils:

*Ridgetop* - Bohannon gravelly loam, Preacher loam
*Sideslope* - Digger rock outcrop complex, Bohannon gravelly loam
*Valley bottom* - Bohanon gravelly loam, Digger rock outcrop complex

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 17% of subwatershed
Moderate potential - 43% of subwatershed
Low potential - 40% of subwatershed

### Management

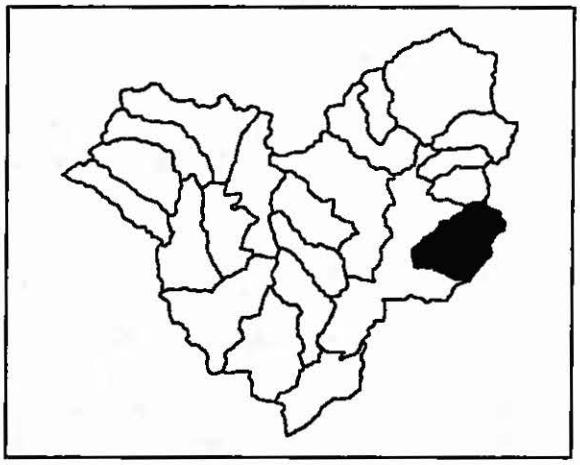
| | |
|---|---|
| *Natural acres:* | 1014 acres (75.7%) |
| *Managed acres:* | 322 acres (24.1%) |
| *Non-timber land:* | 3 acres (0.2%) |

System road miles: 3.0
*Ridgetop roads:* 2.48 mi. (82.9%)
*Mid-slope roads:* .41 mi. (13.7%)
*Valley Bottom roads:* .10 mi. (3.4%)

System road density: 1.42 miles/sq.mile
ATM roads: none

## North Bear - 1710020616

**At a Glance:**



*Sub-watershed size:* 5.08 sq. miles (3251 acres )

*Streams include:* Bear Creek and South Fork Bear Creek

*Ownership:* Bureau of Land Mgt. (79.1%)
Private (16.4%)
State (3.9%)
Industrial Private (0.6%)

*History:* There were four pre-1900 homesteads located at the bottom of Bear Creek and grazing occurred throughout Bear Creek and the lower portion of South Fork Bear. There is also an historic trail that loops around South Fork Bear Creek.

### Aquatics

Stream miles: 44.3
Stream density: 8.72 miles/sq.mile

Confinement & Gradient:

39.5 miles of *source* areas (confined and moderately confined, >8%)
.4 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.4 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The majority of this drainage is administered by the BLM with the lower sections in private ownership. This stream does contain some partially functioning stream which supports chinook, coho and steelhead. Large wood is lacking in this drainage and some structure work has been completed in the past. Additional structures and riparian plantings are planned for 1996 with ecosystem initiative funds. Beaver activity should be encouraged throughout this drainage.

Survey information available: 1990 water users inventory identified 1 water use permitee in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| GASH - 38% | RUSP - 24% |
| POMU - 34% | RHMA - 4% |

## North Bear (continued)

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Preacher loam
*Sideslopes* - Bohannon gravelly loam, Digger rock outcrop complex
*Valley bottoms* - Meda loam, Nestucca silt loam, Nehalem silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 14% of subwatershed
Moderate potential - 49% of subwatershed
Low potential - 37% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 2727 acres (83.9%) |
| *Managed acres:* | 380 acres (11.7%) |
| *Non-timber land:* | 54 acres (1.7%) |

System road miles: 4.4
*Ridgetop roads*: 2.74 mi. (61.7%)
*Valley Bottom roads*: 1.70 mi. (38.3%)

System road density: 1.15 miles/sq.mile
ATM roads: none

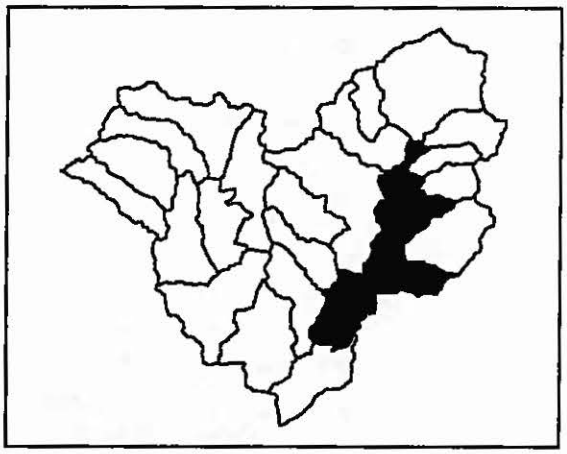
## Alpha - 1710020616

**At a Glance:**

*Sub-watershed size:* 12.57 sq. miles (8045 acres)

*Streams include:* Mainstem Deadwood Cr.
Deer, Raleigh, Shwartz & Alpha Creeks which are tributaries to Deadwood Cr.

*Ownership:* Private (30.7%)
Bureau of Land Mgt. (27.2%)
Siuslaw N.F. (26.6%)
Private Industrial (10.7%)
State (4.8%)



*History:* At least six pre-1900 homesteads on the mainstem of Deadwood which included grazing. Also, at least four documented splash dams at the upper end of this subwatershed on mainstem Deadwood Creek.

### Aquatics

Stream miles: 89.5
Stream density: 7.12 miles/sq.mile

Confinement & Gradient:

68.0 miles of *source* areas (confined and moderately confined, >8%)
2.6 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
18.9 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

ODF&W collected habitat information on the mainstem with the 'Hire the Fisherman' program in 1995. The data has not been made available at this time. Generally, the stream is bedrock dominated with isolated stretches of fair substrate accumulations. Stream temperatures high in the mainstem and in most areas are too high to rear salmonids through the summer. Partnerships are very important to the partial recovery of this mainstem area. Structure work should be done in areas to take advantage of inputs from tributaries (esp. Rock Creek). Fencing and riparian plantings are important throughout the mainstem area.

Survey information available:
- Summer, 1995, stream temperature monitoring in upper Mainstem and the mouth of Deadwood Cr. (Ryan #902520 @ the mouth; Ryan #902527 @ the Sundstrom residence).
- 1990 water users inventory identified 29 water use permitees in this subwatershed
- 1995 ODFW stream survey

Aquatic Priority for Restoration: **Low, unless partnerships are developed.**

## Alpha (continued)

### Vegetation/Soil

Plant Association Groups:

| | |
|---|---|
| POMU - 42% | GASH - 26% |
| RUSP - 29% | RHMA - 3% |

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Preacher loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Digger rock outcrop complex, Bohannon gravelly loam
*Deadwood mainstem* - Nehalem and Nekoma silt loams
*Valley bottoms of tributaries to Deadwood* - Meda loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 13% of subwatershed
Moderate potential - 40% of subwatershed
Low potential - 47% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 6408 acres (79.7%) |
| *Managed acres:* | 1637 acres (20.3%) |

System road miles: 23.2
*Ridgetop roads*: 4.28 mi. (18.4%)
*Mid-slope roads*: 3.07 mi. (13.2%)
*Valley Bottom roads*: 15.86 mi. (68.3%)

System road density: 1.85 miles/sq.mile
ATM roads: 5140 & lower 3259

## Misery - 1710020616

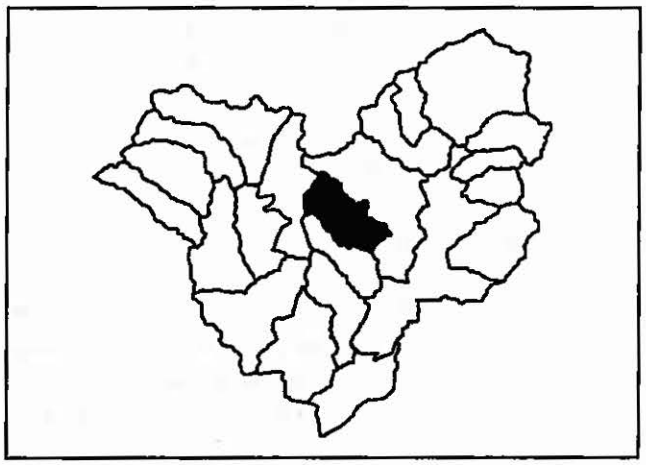
**At a Glance:**

*Sub-watershed size:* 4.04 sq. miles (2586 acres )

*Streams include:* Misery Creek

*Ownership:* Siuslaw N.F. (90.4%)
Private (5.8%)
State (3.8)

*History:* A pre-1945 sawmill was located half way up Misery Creek and grazing has historically occurred throughout this drainage up to the present day.



### Aquatics

Stream miles: 32.8
Stream density: 8.12 miles/sq.mile

Confinement & Gradient:

28.1 miles of *source* areas (confined and moderately confined, >8%)
.9 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.8 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The majority of the creek is in private ownership and therefore any improvements will have to be conducted through partnerships. Existing potential for partnerships is limited at this time but should they become available, they should be pursued.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 31% | RUSP - 27% |
| GASH - 28% | RHMA - 4% |

Land Type Association: 3C

**Misery (continued)**

Dominant Soils:

*Ridgetops* - Preacher loam, Bohannon gravelly loam

*Sideslopes* - Preacher-Bohannon-Siltrock complex, Preacher loam, Bohannon gravelly loam

*Valley bottoms* - Nekoma silt loam, Meda loam, Preacher-Bohannon-Slickrock complex

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 16% of subwatershed

Moderate potential - 38% of subwatershed

Low potential - 46% of subwatershed

## Management

| | |
|---|---|
| *Natural acres:* | 1336 acres (51.7%) |
| *Managed acres:* | 1216 acres (47.0%) |
| *Non-timber land:* | 34 acres (1.3%) |

System road miles: 10.3

*Ridgetop roads*: 4.29 mi. (41.5%)

*Mid-slope roads*: 2.82 mi. (27.3%)

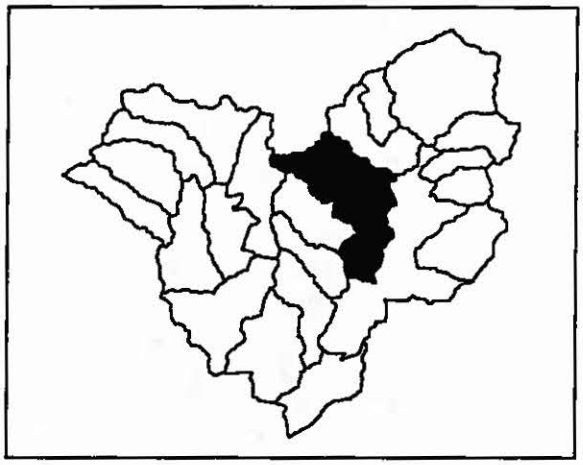
*Valley bottom roads*: 3.22 mi. (31.2%)

System road density: 2.55 miles/sq.mile

ATM roads: none

## West Deadwood - 1710020616

**At a Glance:**



*Sub-watershed size:* 9.67 sq. miles (6189 acres)

*Streams include:* The West Fork of Deadwood Creek which is a **Forest Key Watershed**

*Ownership:* Siuslaw N.F. (92.7%)
Private (6.5%)
State (0.8%)

*History:* There were two pre-1900 homesteads in the lower quarter of West Fork Deadwood Creek. In addition, there was a pre-1945 sawmill in the same area and historically, grazing occurred throughout the lower half of the subwatershed.

### Aquatics

Stream miles: 81.7
Stream density: 8.44 miles/sq.mile

Confinement & Gradient:

66.8 miles of *source* areas (confined and moderately confined, >8%)
2.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
12.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Level II stream habitat surveys indicate that the West Fork of Deadwood is partially functioning as rearing habitat for anadromous salmonids. Large wood is deficient in the system and therefore habitat complexity is low. There is good partnership potential with new landowners in this drainage and should be emphasized. Riparian woody vegetation is lacking in many areas and planting of conifers in clumps as well as willow plantings will improve streambank stability and increase shade. Acquisition of upper section of private inholding should be pursued if opportunity presents itself. This drainage is a Forest key watershed and has high potential for being a major contributor to the anadromous salmon populations in the Deadwood watershed.

Survey information available:
- Summer, 1995, bracketed stream temperature monitoring on West Fork Deadwood Cr. (Ryans #902518 and #902519)
- Level II stream habitat survey, August, 1992
- 1990 water users inventory identified 9 water use permitees in this subwatershed

Aquatic Priority for Restoration: **High**

## West Deadwood (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 37% | GASH - 30% |
| RUSP - 30% | RHMA - 3% |

Land Type Association: 3F

Dominant Soils:

*Ridgetope* - Preacher loam, Bohannon gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Digger outcrop complex
*Valley bottom* - Meda loam, Nekoma silt loam, Nehalem silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:
High potential - 12% of subwatershed
Moderate potential - 42% of subwatershed
Low potential - 46% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 3359 acres (54.3%) |
| *Managed acres:* | 2695 acres (43.5%) |
| *Non-timber land:* | 135 acres (2.2%) |

System road miles: 23.9
*Ridgetop roads*: 14.5 mi. (60.7%)
*Mid-slope roads*: 5.52 mi. (23.1%)
*Valley bottom roads*: 3.88 mi. (16.2%)

System road density: 2.47 miles/sq.mile
ATM roads: upper 3259

## Failor - 1710020616

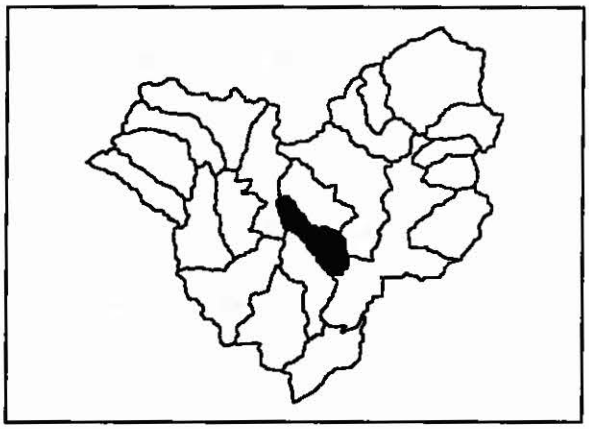
**At a Glance:**

*Sub-watershed size:* 3.16 sq. miles (2024 acres )

*Streams include:* Failor Creek

*Ownership:* Siuslaw N.F. (99.8%)
Other (0.2%)

*History:* There was one pre-1945 sawmill located just above the confluence with Deadwood Creek.



### Aquatics

Stream miles: 24.2
Stream density: 7.66 miles/sq.mile

Confinement & Gradient:

20.4 miles of *source* areas (confined and moderately confined, >8%)
.2 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
3.6 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Failor has been heavily harvested in the past but does not have an existing road on the valley bottom of the drainage. Level II fish habitat surveys indicate that the middle section of Failor Creek, associated with adjacent natural stands, is providing functioning rearing habitat for anadromous salmonids. The main emphasis in this drainage will be to expand existing functioning habitat. Upstream and downstream of the functioning section, the creek is only partially functioning as rearing, but these areas do meet some necessary requirements. Large wood needed to create deep complex pools is deficient, but addition of large wood from adjacent stands and wood accumulation from commercial thinning will help to remedy this deficiency. Riparian planting of conifers can be done throughout the length of the stream since historic photos show this area supported conifers throughout.

Survey information available:
- Summer, 1995, stream temperature monitoring at the mouth of Failor Cr. (Hobo #1933)
- Level II stream habitat survey, October, 1994
- 1990 water users inventory identified 1 water use permitee in this subwatershed
- **Good potential for monitoring at subwatershed scale**

Aquatic Priority for Restoration: **High**

## Failor (continued)

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 34% | GASH - 29% |
| RUSP - 34% | RHMA - 3% |

Land Type Association: 3C

Dominant Soils:

*Ridgetop* - Preacher loam, Bohannon gravelly loam
*Sideslope* - Preacher-Bohannon-Slickrock complex, Bohannon gravelly loam, Preacher loam
*Failor valley bottom* - Preacher-Bohannon-Slickrock complex, Meda loam near the mouth

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

Low potential - 20% of subwatershed
Moderate potential - 35% of subwatershed
High potential - 44% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 734 acres (36.3%) |
| *Managed acres:* | 1290 acres (63.7%) |

System road miles: 6.9
*Ridgetop roads*: 5.70 mi. (83.2%)

System road density: 2.17 miles/sq.mile
ATM roads: none
*Mid-slope roads*: 1.15 mi. (16.8%)

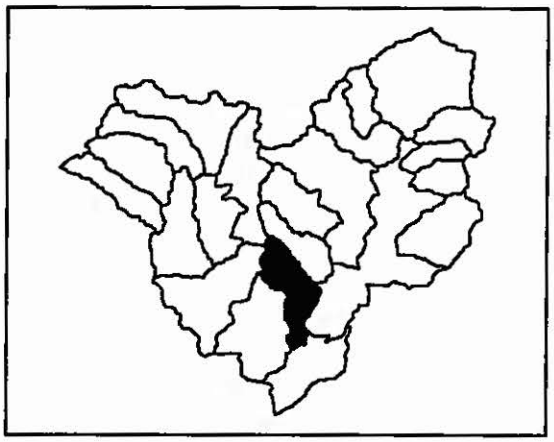
## Green Creek - 1710020616

**At a Glance:**

*Sub-watershed size:* 4.16 sq. miles (2661 acres )

*Streams include:* Green Cr.

*Ownership:* Siuslaw N.F. (90.2%)
Private (6.3%)
State (3.5%)



### Aquatic Statistics/Conditions

Stream miles: 34.2
Stream density: 8.22 miles/sq.mile

Confinement & Gradient:

29.4 miles of *source* areas (confined and moderately confined, >8%)
.1 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
4.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

The lower half of Green Creek is primarily in private ownership, and without partnerships little fish habitat improvement is likely here. The stream above the private ownership has good potential for rearing of anadromous salmonids with a low gradient and fairly unconfined channel. Extensive beaver activity has provided good rearing conditions for young salmonids and the beaver activity should be promoted by plantings of willow and deciduous trees. Some large wood instream complexes could be added where valley confinement and gradient are higher.

Survey information available: 1990 water users inventory identified 2 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Moderate**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 40% | GASH - 28% |
| RUSP - 29% | RHMA - 3% |

**Green Creek (continued)**

Land Type Association: 3C

Dominant Soils:

*Ridgetops* - Bohannon gravelly loam, Blachly silty clay loam, Digger gravelly loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex (upper Green Cr.), Digger rock outcrop complex (lower Green Cr.), Bohannon gravelly loam
*Valley bottom* - Meda loam

**Slope Stability**

Predicted potential for slides and debris torrents based on land form:

High potential - 12% of subwatershed
Moderate potential - 41% of subwatershed
Low potential - 47% of subwatershed

**Management**

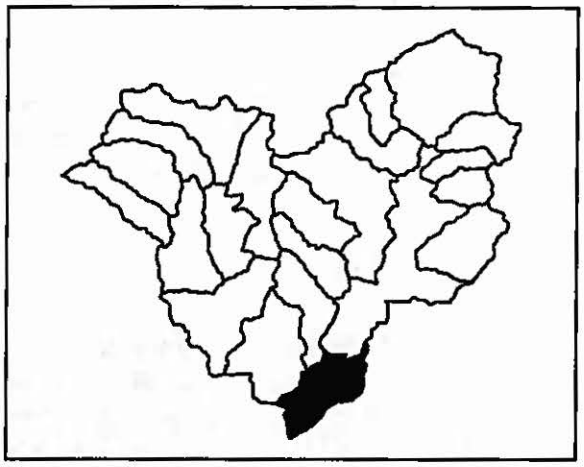
| | |
|---|---|
| *Natural acres:* | 1259 acres (47.3%) |
| *Managed acres:* | 1402 acres (52.7%) |

System road miles: 17.2
*Ridgetop roads*: 9.01 mi. (52.3%)
*Mid-slope roads*: 3.77 mi. (21.9%)
*Valley Bottom roads*: 4.45 mi. (25.8%)

System road density: 4.13 miles/sq.mile
ATM roads: none

## Lower Lake - 1710020617

**At a Glance:**



*Sub-watershed size:* 4.24 sq. miles (2710 acres )

*Streams include:* Lower Mainstem Lake Creek

*Ownership:* Siuslaw N.F. (67.1%)
Private (23.2%)
Industrial Private (4.0%)
Oregon State Fish and Wildlife (3.3%)
State (2.4%)

*History:* There were two pre-1900 homesteads right at the confluence of Deadwood and Lake Creeks.

### Aquatics

Stream miles: 31.8
Stream density: 7.50 miles/sq.mile

Confinement & Gradient:

26.1 miles of *source* areas (confined and moderately confined, >8%)
0.0 miles of *transport* areas (confined, 2-8% and moderately confined, 4-8%)
5.7 miles of *deposition* areas (moderately confined and unconfined, < 4%)

Fish habitat:

Lower Lake includes Lake Creek from just upstream of the confluence with Deadwood Creek to the confluence with the Siuslaw River. Lake Creek is wide ( average over 200 feet) and is bordered by deciduous trees, primarily alder. There is a large amount of bedrock in this portion of Lake Creek and solar heating is a concern. There are scattered areas of chinook spawning habitat through this reach. Highway 36, which is directly adjacent to the creek, limits floodplain interaction and impacts the creek. There is little emphasis planned here for fish habitat restoration. There has been discussion about a possible land exchange in this area, but from a fisheries standpoint land exchanges elsewhere should be sought first.

Survey information available: 1990 water users inventory identified 14 water use permitees in this subwatershed

Aquatic Priority for Restoration: **Low**

### Soils/Vegetation

Plant Association Groups:

| | |
|---|---|
| POMU - 39% | GASH - 27% |
| RUSP - 30% | RHMA - 4% |

## Lower Lake (continued)

Land Type Association: 3F

Dominant Soils:

*Ridgetops* - Digger rock outcrop complex, Digger gravelly loam, Hembre silt loam
*Sideslopes* - Preacher-Bohannon-Slickrock complex, Digger rock outcrop complex
*Valley bottom* - Nehalem silt loam, Meda loam, Nekoma silt loam

### Slope Stability

Predicted potential for slides and debris torrents based on land form:

High potential - 17% of subwatershed
Moderate potential - 38% of subwatershed
Low potential - 45% of subwatershed

### Management

| | |
|---|---|
| *Natural acres:* | 1740 acres (64.2%) |
| *Managed acres:* | 944 acres (34.8%) |
| *Non-timber land:* | 27 acres (1.0%) |

System road miles: 8.21
*Ridgetop roads*: 1.31 mi. (16.0%)
*Mid-slope roads*: .29 mi. (3.5%)
*Valley Bottom roads*: 6.61 mi. (80.5%)

System road density: 1.94 miles/sq.mile
ATM roads: none

## Appendix L. Landscape Block Data

Table 1. Landownership by Landscape Block (acres)

| Landscape Block | Federal | % fed. | State | Private, nonindustrial | Industrial | TOTAL |
|---|---|---|---|---|---|---|
| A | 5780 | 90% | - | 621 | - | 6,401 |
| B | 3204 | 82 | - | 693 | - | 3,897 |
| C | 7175 | 89 | - | 376 | 466 | 8,017 |
| D | 3493 | 77 | 354 | 121 | 540 | 4,508 |
| E | 7289 | 69 | - | 3257 | - | 10,546 |
| F | 2610 | 79 | 137 | 532 | 20 | 3,299 |
| G | 6891 | 57 | 623 | 3421 | 1161 | 12,096 |
| H1 | 5721 | 92 | 94 | 396 | - | 6,211 |
| H2 | 2020 | 99 | - | 4 | - | 2,024 |
| H3 | 2337 | 90 | 99 | 151 | - | 2,587 |
| H4 | 5816 | 91 | - | 137 | 454 | 6,407 |
| H5 | 5743 | 93 | 50 | 402 | - | 6,195 |
| H6 | 1803 | 97 | - | 58 | - | 1,861 |
| **TOTAL** | **59,882** | **81** | **1357** | **10,169** | **2641** | **74,049** |

Table 2. Vegetation Condition by Landscape Block (acres)

| Block | Managed | Natural | % Nat. | Mature & L-S [2/] | % mature | Late-succ.[2/] | % L-S | Other | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **A** | 1730 | 4638 | 73% | 3058 | 48% | 1381 | 22% | - | 6,368 ac. |
| **B** | 1374 | 2491 | 64 | 1539 | 40 | 227 | 6 | - | 3,865 |
| **C** | 3032 | 4941 | 62 | 3240 | 40 | 976 | 12 | 28 | 8,001 |
| **D** | 1292 | 3157 | 71 | 2055 | 46 | 1082 | 24 | 10 | 4,459 |
| **E** | 3653 | 6333 | 60 | 3778 | 36 | 1201 | 11 | 542 | 10,529 |
| **F** | 380 | 2817 | 87 | 1206 | 37 | 303 | 9 | 54 | 3,251 |
| **G** | 1770 | 8764 | 74 | 2950 [1/] | 32 [1/] | 854 [1/] | 7[1/] | 1266 | 11,800 |
| **H1** | 2846 | 3298 | 53 | 1970 | 32 | 521 | 8 | 28 | 6,172 |
| **H2** | 1290 | 734 | 36 | 400 | 20 | 176 | 9 | - | 2,024 |
| **H3** | 1216 | 1336 | 52 | 872 | 34 | 317 | 12 | 34 | 2,586 |
| **H4** | 3136 | 3224 | 51 | 1929 | 30 | 445 | 7 | 20 | 6,380 |
| **H5** | 2695 | 3359 | 54 | 2307 | 37 | 324 | 5 | 135 | 6,189 |
| **H6** | 848 | 1006 | 54 | 237 | 13 | 1 | <.1 | - | 1,854 |
| **TOTAL** | 25,262 | 46,098 | 63 | 25,541 | NA | 7,808 | NA | 2117 | 73,478 |

[1/] Based on 9,090 total acres in Landscape Block G, which excludes Lower Lake.

2/ If the Sect. 318 sales are harvested, the percent Mature/Late-Successional vegetation will drop to 43% in Block A and 35% in Block B. (500 acres of mature vegetation will be harvested, including 236 acres of late-successional vegetation.)

Table 3. Interior Forest Habitat by Landscape Block, in acres

| Block | Mature/L-S | % mature | Late-succ. | % L-S | Interior - all mature | % of mature in interior | Interior - late-succ. | % of L-S in interior |
|---|---|---|---|---|---|---|---|---|
| A | 3058 | 48% | 1381 | 22% | 367 | 12% | 59 | 4 |
| B | 1539 | 40 | 227 | 6 | 148 | 10 | - | - |
| C | 3240 | 40 | 976 | 12 | 282 | 9 | 34 | 3 |
| D | 2055 | 46 | 1082 | 24 | 442 | 22 | 186 | 17 |
| E | 3778 | 36 | 1201 | 11 | 360 | 10 | 6 | <1 |
| F | 1206 | 37 | 303 | 9 | 4 | <1 | - | - |
| G | 2950 [1/] | 32 | 854 [1/] | 7 | 58 [1/] | 2 | 4 [1/] | <1 |
| H1 | 1970 | 32 | 521 | 8 | 215 | 11 | - | - |
| H2 | 400 | 20 | 176 | 9 | 31 | 8 | 22 | 12 |
| H3 | 872 | 34 | 317 | 12 | 31 | 4 | 2 | <1 |
| H4 | 1929 | 30 | 445 | 7 | 415 | 21 | 3 | <1 |
| H5 | 2307 | 37 | 324 | 5 | 179 | 8 | - | - |
| H6 | 237 | 13 | 1 | <.1 | - | - | - | - |
| TOTAL | 25,541 | NA | 7,808 | NA | | | | |

[1/] Based on 9,090 total acres in Landscape Block G, which excludes Lower Lake.

Interior forest: Forest areas that are greater than 500 feet from an edge.
The following categories of vegetation were selected to assess current acres of interior mature conifer forest:

1. Stands of single-storied or multi-storied mature conifer or conifer-mix (at least 50% conifer) with and without remnants.
2. Stands > 80 years old or > 18" diameter at breast height.
3. Habitats > 500' from stand edge.

Interior late-successional forest ("biodiversity hotspots) were selected using the same categories, except the stands also had to contain multiple-stories and/or old growth remnants.

Table 4. Riparian Reserve Vegetation Characteristics by Landscape Block, in acres

| Block | Managed Stands | Natural Stands | % Natural | Other Veg. | TOTAL |
|---|---|---|---|---|---|
| A | 1585 | 3949 | 71% | - | 5,534 |
| B | 1136 | 1872 | 62 | - | 3,008 |
| C | 2744 | 3625 | 57 | - | 6,369 |
| D | 981 | 2128 | 68 | 1 | 3,110 |
| E | 2712 | 4403 | 62 | 26 | 7,141 |
| F | 238 | 2147 | 90 | - | 2,385 |
| G | 1125 | 3460 | 75 | 9 | 4,594 |
| H1 | 2740 | 2899 | 51 | - | 5,639 |
| H2 | 1290 | 729 | 36 | - | 2,019 |
| H3 | 1148 | 1183 | 51 | 5 | 2,336 |
| H4 | 3027 | 2663 | 47 | 9 | 5,699 |
| H5 | 2367 | 2939 | 55 | 32 | 5,338 |
| H6 | 774 | 896 | 54 | - | 1,670 |
| TOTAL | 21,867 | 32,893 | 60 | 82 | 54,842 |

## Appendix M. Priority Management Recommendations by Landscape Block

High priority projects are identified for each Landscape Block. In addition, each Landscape Block has been prioritized for terrestrial and aquatic resource management needs. The highest priority projects for the watershed are, therefore, those identified in the highest priority Landscape Blocks, e.g., Block A, C and H2.

The projects listed below are broken into two time periods--those that are recommended for early management (years 1-3) and those that could be implemented after the third year (e.g., years 4-10).

Each project has a purpose code identified:

T (terrestrial) = to improve vegetation for LSR conditions

R (Riparian Reserve) = to improve connectivity for terrestrial species thru Riparian Reserves.

A (aquatic resource) = to improve streamside vegetation and in-stream conditions for aquatic resources, to reduce risk of adverse impact to aquatic resources from roads.

M = miscellaneous purpose

The list of silvicultural treatments includes plantation units that meet criteria for terrestrial and /or aquatic objectives, as described in Chapter 6. In addition, units identified for precommercial thinning are currently age 10-18 years; units identified for commercial thinning are 25 years or older. The units selected for precommercial thinning need to be further screened to eliminate those already thinned. Units selected for commercial thinning were screened and those units already thinned are noted with an *.

Some of the plantation opportunities listed below may not appear to be high priority from a silvicultural perspective, i.e., they may be older than recommended for thinning or they may be at suitable stocking levels. However, the units have been identified as important for either aquatic or terrestrial objectives and should be evaluated during project planning stage to determine if they could be included for treatment along with other project work.

Appendix I lists all the Forest Service and county roads in the watershed. Each road has been rated (from 1 to 5, low to high respectively) for its potential to adversely impact aquatic resources. Criteria used to rate roads included slope position, slope stability, whether or not the road was sidecast built, risk to known quality habitat, presence of known problems, and ATM status. All roads rated 3-5 are considered high priority to stabilize and are included in each block's early management time period. The roads appear in order of priority based on their rating. At a minimum, all non-ATM roads that are listed should be waterbarred and closed in the first 3-year period. Additional operator spurs that were identified in the road assessment to be waterbarred and closed are included in the roads database with the associated road segment.

**Landscape Block A** (Mariah, Rogers)
Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:
The objective is to thin and underplant plantations to accelerate late-successional conditions by favoring late-successional species. The recommended levels of thinning and species to underplant varies by Plant Association Group. See Table 6.1.

| Commercial thinning | Precommercial thinning |
|---|---|
| 2133 004 (A/T) | 2133 032 (A) |
| 2133 017 (T) * | 2133 035 (A) |
| 2133 067 (A/T) | 2133 036 (A) |
| 2133 056 (T) | 2133 037 (A) |
| 2133 058 (A/T) | 2133 040 (A/T) |
| 2133 060 (A/T) | 2133 044 (A\T) |
| 2133 063 (A/T) | 2133 054 (T) |
| 2133 064 (A/T) | 2133 069 (T) |
| 2133 065 (A/T) | 2133 089(T) |
| | 2133 097 (T) |

Roads to stabilize (A)

- (5) FR 2500B (upper 2.6 miles) - large amount of sidecast pullback and deep patching
  - waterbar and close two operator spurs off 2500
- (5) FR 5800 has chronic stability problems above Rogers and Maria; Close if monies to maintain road are unavailable and aquatic resources would be degraded.
- (4) FR 2100639
- (3) FR 2100640 - '96 storm - road slump with slide beneath @ m.p. 2.0; sidecast problems above Rogers Cr.
- (3) FR 5800637
- (3) FR 5840622
- (3) FR 5840624
- (3) FR 5840625
- (3) FR 5840633 - identified sidecast pullback
  (3) FR 5840637

The following roads should be stabilized and closed as soon as any necessary management activities are completed. Closing these roads will further the management objectives of: 1) protecting the Key Watershed and 2) restoring part of a secure, isolated area for wildlife:

- (2) FR 2500643
- (2) FR 5840626
- (2) FR 5840631
- (2) FR 5840636
- (1) FR 5840
- (1) FR 5840627
- (1) FR 5840630 - waterbar and close operator spur off this road
- (1) FR 5840632

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- Rogers Cr. - 40 fish structures (1997)
- Mariah Cr. - locate opportunities to add large wood.
- W.Fk. Indian - KV work (1996/1997), and locate opportunities to add large wood.

Riparian Vegetation (A)

- Rogers Cr. - plant in and upstream of functioning stretches, especially where alders are in late-successional stands. Maintain existing riparian vegetation diversity.
- Rogers Cr. - plant clumps of trees in areas of sparse vegetation below functioning portion of Rogers Cr.
- W.Fk.Indian - plant clumpy patches of trees where vegetation sparse.
- Maria Cr. - make scattered plantings under old alders.

Miscellaneous (A)

- Control and reduce noxious weeds in old pasture lands along Rogers Cr.
- Explore partnership opportunity with Davidson for stream restoration work.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2133 005 (A/T) | 2133 033 (T) |
| 2133 021 (T) | 2133 034 (T) |
| 2133 049 (A/T) | 2133 077 (T) |
| 2133 055 (T) | 2133 078 (T) |
| 2133 068 (A) | 2133 081 (T) |
| | 2133 0_5 (T) - 1985 unit |

**Landscape Block B** (N.Indian--upper portion, Upper Indian)
Priorities: H - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2131 001 (A) | 2131 103 (A) |
| 2131 004 (A/T) | 2131 104 (A) |
| 2131 034 (A) | 2131 105 (A) |
| 2131 038 (A) | 2131 146 (T) |
| 2131 042 (A) | |
| 2131 144 (A) | |

Roads to stabilize (A)
- (5) FR 2116617 - 4 bad culverts, road washed out @ m.p. .5, private access
- (4) FR 5800680 - sidecast pullback, waterbar and close at least 3 spurs off 680
- (4) FR 5840628 - sidecast pullback throughout
- (4) FR 2100 - '96 storm - 5 moderate to large failures affecting road bed, 2 small cutbank failures and 1 blocked culvert
- (4) FR 3700573
- Waterbar and close 2 operator spurs off 3250

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Riparian vegetation (A)
- Upper Indian - release existing plantings.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2131 001 (A) | 2131 103 (A) |
| 2131 006 (A/T) | 2131 104 (A) |
| 2131 007 (R/A) | 2131 105 (A) |
| 2131 009 (T) | |
| 2131 018 (A/T) | |
| 2131 023 (R/T) | |
| 2131 024 (R/A) | |
| 2131 025 (A/T) | |
| 2131 026 (T) | |
| 2131 028 (A/T) | |
| 2131 031 (T) | |
| 2131 059 (T) | |
| 2131 085 (A) | |

In-stream projects (A)

- N.Indian Cr. - consider adding LWD to create complex pools; repair bank instability. (Beaver are prevalent in area.)

Riparian vegetation (A)

- N.Indian Cr. - high potential for willow planting in areas needing vegetation.
- N.Indian Cr. - plant clumpy patches of conifer along upper 2/3 of mainstem.
- Upper Indian Cr. - make clumpy plantings along 3/4 mile stretch on national forest land.

Miscellaneous (A) -

- Control and reduce noxious weeds along roadsides.

**Landscape Block C** (N.Panther--upper portion, Upper Deadwood)

Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 3505-2C1 (A/T) | 3504-5C3 (A) |
| 3505-1C1 (A/T) | 3504-94D3 (A) |
| 3504-40C3 (A/T) | 3505-96D7 (A) |
| 6160-7044 (A/T) | 3505-153B1 (A) |
| 3505-15B2 (A/T) | 3505-39C2 (A) |
| 3504-36D2 (A/T) | 3505-154C3 (A) |
| 3505-19B3 (A/T) | 3505-53C1 (A) |
| 6160-7024 (A/T) | 3505-90B1 (A) |
| | 3505-139D2 (A) |
| | 6160-7005 (1985 unit at headwater) |

Road to stablilize (A)

- (5) FR 6300118 - repair drainage problems (culverts and waterbar)
- (4) FR 6300 - at least 3 undersized culverts need replacing; partially plugged culvert @ mp 4
- (4) FR 3500 - partially plugged culvert @ 4.6; 2 sidecast pullbacks; deep patching needed throughout; '96 storm - 1-350 cy slide closed rd
- (4) FR 3515
- (4) FR 3515115
- (4) FR 3515118
- (4) FR 3515122
- (4) FR 3515127
- (4) FR 6300119
- (4) FR 6300122
- (4) FR 6300126
- (3) FR 3515117
- (3) FR 3315111
- (3) FR 3315112
- (3) FR 3500111
- (3) FR 3511112 - fix large slump @ .4
- (3) FR 3515114
- (3) FR 3515116
- (3) FR 3515126
- (3) FR 3515130
- (3) FR 3515200
- (3) FR 6300110 - culvert removal needed @ .3; possible obliteration
- (3) FR 6300UK1

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- Mainstem Deadwood - look for opportunitites to add large woody debris and to include side channels. Note: On-site evaluation needed to determine how to secure good habitat.
- Pursue opportunities for partnerships

Riparian vegetation (A)
(Potential for clumpy release in deciduous/mixed pole stands; potential for cottonwood and willow throughout.)

- West headwaters - underplant with shade tolerant species scattered in mature deciduous.
- Plant conifers along toeslopes where potential for conifer survival is high.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 1960 unit (Fawn Cr.) | 3504-5C3 (A) |
| 3504-44C4(A) | 3505-90B1 (A) |
| 3505-154C3(A/T) | 3505-139D2 (A) |
| 3505-39C2(A/T) | |
| 3505-12C2(A/T) | |
| 3505-9C2(A/T) | |
| 3505-5B1(A/T) | |
| 3505-10C2 (A) | |
| 6160-7008 (1977 unit) (A) | |
| 6160-7021 (1961 unit) (A) | |
| 3505-4C1 (A) | |
| 3505-3B1 (A) | |
| 6160-7019 (1973 unit) (A) | |
| 6160-7043 (A/T) | |
| 1974 unit (A) | |

Riparian vegetation (A)

- Plant clumps of conifer on Upper Cougar Cr.
- Encourage private landowners to plant shade tolerant species under mature deciduous trees.

Miscellaneous

- Promote beaver habitat in N. Panther.

**Landscape Block D** (Elk, Buck, Rock3)
Priorities: H - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
3505-23C4 (T)
3505-2204 (A) (6160-8002)

Roads to stabilize (A)
- (3) FR 3525 - repair partially plugged culverts and slide associated with a culvert.
- (3) FR 3526113
- BLM 16-8-35.10 - 2 sidecast failures.

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event, especially wood additions.

Miscellaneous
- Assist Deadwood community group in layout and construction of Elk Cr. trail.
- Explore opportunity to acquire state-owned land in lower portion of watershed to enhance opportunity to manage LSR. (Note: part of the parcel is in Landscape Block F. State is interested in exchanging this parcel.)

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 3505-35D3 (A) | 3505-142B5 (A) |
| 1964 unit (A) | 3505-114C5 (A) |
| 3505-78C5 (A) | 3505-29D4 (A) |
| 3505-32C5 (A) | 6 units in Rock Cr. (1983-1992) |
| 3505-30C4 (A) | |
| 3505-24D4 (A) | |
| 3505-35D3 (A) | |
| 3505- (1963 unit) | |

Riparian Planting (A)
- Plant clumps of riparian species along Buck and Rock Creeks.

**Landscape Block E** (mainstem Indian Cr., including Elk2, Herman--SW portion, Long--lower portion)
Priorities: M - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2154 040 (T-eagle)

Roads to stablilize (A)
- (5) 3278663 - sidecast pullback throughout; oblit. - no access needed
- (4) 3278000 - ATM
- (4) FR 2170UK1 (T17S, R10W, NE corner of S14) - Sidecast pullback and waterbar
- (4) FR 3200000 - Deep patching needed in several places, slump at mp .2 from '96 storm
  (See Block H4 for more storm info for FR 3200000)
- (4) FR 3278666
- (4) FR 3200759 - several sidecast failures
- (3) FR 3200672 - '96 storm - 20 cy rock slide @ 1.8, shoulder failure with pipe end exposed @ 2.4
- (3) FR 3200672UK1 (T16S, R9W, SE S30)
- (3) FR 2500000 (bottom portion = ATM)
- (3) FR 2500650
- (3) FR 2500654
- (3) Old spur off 3278 (T16S, R9W, S30) - remove wooden culverts and decommission
- (3) CO 5130

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2154 041 (T-eagle) | 2154 101 (T-eagle) |
| 2154 043 (T-eagle) | 2134 10 ? (T-eagle) |
| 2154 045 (T-eagle) | 2134 040 (A) |
| 2134 004 (A) | 2134 043 (A) |
| 2134 005 (A) | 2134 044 (A) |
| 2134 006 (A) | 2134 107 (A) |
| 2134 007 (A) | 2134 109 (A) |
| 2134 019 (A) | 2134 112 (A) |
| 2134 036 (A) | 2134 114 (A) |
| 2134 038 (A) | 2134 123 (A) |
| 2134 042 (A) | |
| 2154 006 (A) | |
| 2154 007 (A) | |
| 2154 035 (A) | |
| 2154 039 (A) | |
| 2154 040 (A) | |
| 2154 042 (A) | |

In-stream projects (A)
- Evaluate opportunity to remove partial fish barrier on Smoot Cr.
- Elk Cr. - enhance deep pools with large woody debris.

- Explore partnership potential for in-stream work in mainstem Indian Cr.
- Explore opportunity for partnership with new landowner on mainstem Indian Cr.

Riparian vegetation (A)
- Elk Cr. - do clumpy planting along creek.
- Encourage private landowners to plant some conifer along streambanks.

Miscellaneous (A)
- Evaluate culvert fish passage capacity at mouth of Elk Cr.

**Landscape Block F** (N.Bear)
Priorities: L - terrestrial
M - aquatic

First 3 years -

Road work (A)
- BLM 16-8-20.00 - sidecast failure

In-stream projects (A)
- Raleigh Cr. - add wood structures to improve pool habitat and increase cover
- Rock Cr. - add wood and rock structure complexes.
- S.Fk. Bear Cr. - locate opportunities to add additional wood structures.
- Continue partnership with Howard Pazdral in 1996 for in-stream structures and riparian planting

Riparian vegetation (A)
- Plant scattered shade-tolerant species, e.g., cedar, in deciduous-dominated areas.

Later time period -

Silvicultural treatments:
Precommercial thinning
1987 unit
1988 unit
1990 unit
1992 unit

**Landscape Block G** (mainstem Deadwood, Lower Lake)
Priorities: L - terrestrial
M - aquatic

First 3 years -

Roads to stabilize (A)
- (3) FR 3259645
- (3) FR 3279750 - priority to waterbar and close
- (3) FR 3259 (lower portion)
- Initiate development of cooperative relationship with county road maintenance department. Encourage county to begin culvert replacements/road relocations, etc. as needed to reduce impact of road on stream function.

In-stream projects (A)
- Participate in stream structure projects planned for 1996 with Deadwood residents.
- Pursue project planning with landowners interested in stream restoration for future years.
- Evaluate effects of Feb. 1996 storm event.

Riparian vegetation (A)
- Initiate project planning with private landowners interested in planting scattered conifer and deciduous trees, e.g., willow, along stream.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2141 074 (A) | 1986 unit (BLM) |
| 1956/58 units (A) | |
| 1952 unit (A) | |

Miscellaneous (T)
- Explore opportunity to acquire state-owned land parcels (2 in northern porion) to improve LSR conditions. (State is interested in exchanging these parcels.)

**Landscape Block H1** (Lower Indian, Green Cr.)
Priorities: M - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2143 091 (R/A)
2143 095 (R/A)
2143 137 (R/A)

Road to stabilize (A)
- (4) FR 2170764 - sidecast pullback and waterbar
- (4) FR 3289000 - 2 cutbank failures and a road slump from '96 storm; additional culvert work
- (4) FR 3279000 - sidecast pullback, waterbar and close
- (3) FR 3200742
- (3) FR 3279669 - priority to waterbar and close
- (3) FR 3279747 - priority to waterbar and close
- (3) FR 3289UK1 (T17S, R9W, NW corner of S4) - waterbar and close riparian road

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.
- Dismantle Green Cr. bridge and place in stream as fish structures.

Riparian vegetation (A)
- Plant willow in middle section of Green Cr. to encourage beaver activity.

Miscellaneous (T)
- Explore opportunity to acquire state-owned lands to improve ability to manage for bald eagle nesting habitat. (State is interested in exchanging property.)

Later time periods -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2143 012 (A) | 2143 011 (A) |
| 2143 026 (A) | 2143 017 (A) |
| 2143 027 (A) | 2143 032 (A) |
| 2143 028 (A) | 2143 036 (A) |
| 2143 029 (A) | 2143 052 (A) |
| 2143 030 (A) | 2143 053 (A) |
| 2143 031 (A) | 2143 055 (A) |
| 2143 033 (A) | 2143 074 (A) |
| 2143 045 (A) | 2143 078 (A) |
| 2143 047 (R) | 2143 081 (A) |
| 2143 054 (A) | 2143 098 (R) |
| 2143 057 (A) | 2143 127 (A) |
| 2143 058 (A) | 2143 158 (A) |
| 2143 078 (A) | |
| 2143 082 (A) | |
| 2143 086 (A) | |
| 2143 087 (A) | |
| 2143 091 (A) | |

2143 092 (A)
2143 095 (A)
2143 097 (A)
2143 099 (R)
2143 102 (A)
2143 137 (A)
2143 143 (A)
2143 ? (1959 unit)(A)
2154 006 (A)
2154 007 (A) *
2154 008 (A) *
2154 035 (A)
2154 039 (A)
2154 040 (A)
2154 042 (A) *

In-stream projects (A)

- Pursue partnership with private landowners in lower mainstem of Indian Cr. to assist with in-stream structures.

Riparian vegetation (A)

- Velvet Cr. - plant clumps of riparian vegetation and possibly release conifers.
- Green Cr. - plant clumps of vegetation on toeslopes at top and bottom of drainage.

Miscellaneous (A)

- Lower Indian Cr. dispersed camping sites - manage erosion problems or consider removal of sites.
- Participate in riparian research project (S.Chan's plots)

**Landscape Block H2** (Failor)
Priorities: H - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 012 (A/R) | 2142 053 (A/R) |
| 2142 051 (A/R) | 2142 058 (A/R) |
| 2142 054 (A/R) | 2142 059 (R) |
| 2142 057 (A/R) | 2142 106 (R) |
| 2142 060 (A/R) | |
| 2142 061 (A/R) | |
| 2142 062 (A/R) | |

Roads to stabilize (A)
- (4) FR 3279668 - priority to waterbar and close
- (3) FR 3279667 - priority to waterbar and close
- (3) FR 3279670 - priority to waterbar and close
- (3) FR 3279748 - priority to waterbar and close
- (3) FR 3269000
- (3) FR 3269662

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.
- Failor Cr. - locate opportunities to add large woody debris

Riparian vegetation (A)
- Plant clumps of vegetation and release conifers in upper Failor first.

Miscellaneous
- Initiate subbasin monitoring of effects of management activities on stream conditions.

Later time period -

Silvicultural treatments:

Commercial thinning
2142 008 (A) *
2142 010 (A)
2142 011 (A)
2142 052 (A)
2142 054 (A) *
2142 055 (A) *
2142 060 (A)
2142 065 (A)

Riparian vegetation (A)
- Plant clumps of vegetation along lower Failor Cr.

**Landscape Block H3** (Misery)
Priorities: M - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 004 (A/T/R) | 2142 078 (A/R) |

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2142 002 (A) | 2142 047 (A) |
| 2142 003 (A) | |
| 2142 004 (A) | |
| 2142 016 (A) | |
| 2142 025 (A) | |

Roads to stabilize (A)
- (4) FR 3269UK1(T16S, R9W, NW corner S27) - sidecast pullback and possible decommission.
- (4) FR 3500612 - '96 storm - 400 cy slide blocking rd. @ .8, rd. slump @ 1.3, sidecast pullback @ 1.75, huge sidecast blowout @ 1.85 where 1/2 of road bed is gone, sidecast problems from 2-2.75
- (4) FR 3200650
- (3) FR 3269660
- (3) FR 3500615
- (3) FR 3500616

Riparian Vegetation (A)
(Note: limited opportunity due to private land ownership)
- Small section below private - make clumpy planting of shade tolerant conifer under deciduous species.

Miscellaneous (A/T)
- Explore opportunities for land acquisition along Misery Cr.
- Explore opportunity to acquire state-owned land parcel between Misery Cr and W.Fk. Deadwood Cr.. (State is interested in exchanging the property.)

**Landscape Block H4** (Herman)

Priorities: M - terrestrial
M - aquatic

First 3 years -

Silvicultural treatments:

Commercial thinning

2132 026 (A/T)
2132 029 (A/T)
2131 050 (R/A) *
2131 069 (R/A) *

Roads to stabilize (A)

- (5) FR 2160 -sidecast pullback, replace culverts, waste removal, waterbar
- (5) FR 3200647 - sidecast pullback, waterbar, fix other drainage problems
- (5) FR 5800681 - sidecast pullback throughout
- (4) FR 2116618
- (4) FR 3200646 - sidecast pullback near jct with 647
- (3) FR 3200UK5 (T16S, R9W, SE S6)
- (3) FR 3200628
- (3) FR 3200629
- (3) FR 3200654

In-stream projects (A)

- Evaluate effects of Feb. 1996 storm event.
- N.Fork Indian - maintain existing structures.

Riparian Vegetation (A)

- Plant conifers along N. Fork Indian.
- Establish riparian vegetation in open meadow areas along N. Fk. Indian Cr. to restore lands within grazing allotment.

Later time period -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2132 002 (A) | 2132 009 (A) |
| 2132 003 (A) | 2132 095 (A) |
| 2132 006 (A) | 2131 041 (A) |
| 2132 007 (A) | 2131 042 (A) |
| 2132 011 (A) | 2131 071 (A) |
| 2132 021 (A) | 2131 072 (A) |
| 2132 026 (A) | 2131 086 (A) |
| 2132 046 (A) | 2131 130 (A) |
| 2132 048 (A) | 2131 134 (A) |
| 2131 049 (A) | 2131 140 (A) |
| 2131 070 (R) | |
| 2131 073 (A) | |
| 2131 074 (A) | |
| 2131 075 (A) | |
| 2131 080 (A) | |
| 2131 081 (A) | |
| 2131 087 (A) | |
| 2131 088 (A) | |
| 2131 090 (A) | |

2131 091 (A)
2131 092 (A)
2131 093 (A)

Instream projects (A)

- Herman, Gibson, Taylor Creeks - explore opportunities to add large woody debris to streams.

Riparian vegetation (A)

- Herman - do clumpy plantings along creek above private land.
- Gibson - do clumpy plantings along creek above private land

Miscellaneous (A/T)

- Identify management strategy for accommodating grazing on FS allottment along N. Fk. Indian (Mann Creek).
- Control and reduce noxious weeds along N. Fk. Indian (Mann Creek).

**Landscape Block H5** (W.Fk. Deadwood)

Priorities: M - terrestrial
H - aquatic

First 3 years -

Silvicultural treatments:

| Commercial thinning | Precommercial thinning |
|---|---|
| 2141 007 (T) | 2141 012 (T) |
| 2141 010 (A) | 2141 042 (A) |
| 2141 011 (A) | 2141 135 (A) |
| 2141 016 (A) | 2141 137 (A) |
| 2141 038 (A) | 2141 138 (A) |
| 2141 039 (A) | |
| 2141 040 (A) | |
| 2141 046 (A/R/T) | |
| 2141 047 (A/R/T) * | |
| 2141 053 (A) | |
| 2141 061 (A) | |
| 2141 080 (A) | |
| 2141 098 (A) | |
| 2141 108 (T) | |
| 2141 149 (A) | |
| 2142 023 (A) | |
| 2142 026 (A) | |

Roads to stabilize (A)

- (4) FR 3200 - '96 storm - 4 major slumps barely passable, 2 smaller cutbank failures
- (4) FR 3200UK4 (T16S, R9W, S8 - down to 35-acre unit)
- (4) FR 3259632
- (4) FR 3259637 - '96 storm - 400' of slumping road bed - old hillside instability - major reconstr.
- (4) FR 3259640 - '96 storm - 20 cy cutbank failure closing road @ .1
- (3) FR 3259 (upper portion) - '96 storm - 2 sidecast failures affecting road bed, 1-10 cy cutbank failure
- (3) FR 3259618 - culvert needed @ mp .5, slide @ mp 2.85; '96 storm - sidecast failure @ 1.1 (from CO 5142) that went 1000' to the creek; 100 cy cutbank failure at 2.7 from 5142
- (3) FR 3259620
- (3) FR 3259621
- (3) FR 3259631
- (3) FR 3259633
- (3) FR 3259635 - waterbar and close spurs here
- (3) FR 3259636
- (3) FR 3259638
- (3) FR 3259642

In-stream structures (A)

- Evaluate effects of Feb. 1996 storm event.
- Work with new landowner in lower W. Fork Deadwood.

Riparian vegetation (A)

(High potential for willow.)

- Make clumpy planting in upper portion of watershed.
- Release existing young conifer throughout middle section.
- Work with new landowner in lower W. Fork Deadwood.

Later time period -

Silvicultural treatments:

Commercial thinning

2142 024 (A)
2141 041 (A)
2141 049 (A)
2141 058 (A)
2141 063 (A)
2141 064 (A)
2141 083 (A)
2141 106 (A)

In-stream projects (A)

- Add large woody debris complexes.

Riparian vegetation (A)

- Make scattered planting of conifer in middle section.

Miscellaneous (A)

- Explore opportunities for land acquisition in upper portion of drainage.

**Landscape Block H6** (Panther)
Priorities: L - terrestrial
L - aquatic

First 3 years -

Silvicultural treatments:
Commercial thinning
2141 005 (A/R/T)

Road projects (A)
- (4) FR 3510 - slide @ .1 plugging culvert; waterbar and close 2 spurs off this road.
- (3) FR 3511 - massive slump @ 2.1
- (3) FR 3520

In-stream projects (A)
- Evaluate effects of Feb. 1996 storm event.

Later time period -

Silvicultural treatments:
Commercial thinning
2141 001 (A)
2141 006 (R/T)
2141 085 (A)
2141 107 (A)

In-stream projects (A)
- Locate opportunities to add large woody debris to Panther Creek.

Riparian vegetation (A)
- Make clumpy planting of conifers along creek.
- Explore possibility of planting willows to encourage beaver activity.

## Appendix N. Subwatershed Priorities for Restoration

Team members involved with the aquatic resources devised a systematic approach to rate subwatersheds in the Indian and Deadwood drainages according to their potential for successful restoration (High rating = high potential to restore). In most cases this strategy sought to locate the best existing aquatic habitat in an attempt to focus restoration efforts and dollars in areas where refugia, that may buffer existing habitat from disturbances, can be maintained and enhanced. In some cases a somewhat longer timeframe for restoration was considered in the potential. The ten criteria devised consider natural characteristics and managed conditions (criteria 1-6) as well as the potential to influence conditions (criteria 7-10) within the 22 subwatersheds in the Indian/Deadwood watershed. The following descriptions outline the thinking behind each criterion:

**1. Northwest Forest Plan or Forest Key Watershed**

**0 = No**
**2 = Yes**

The Aquatic Conservation Strategy of the Northwest Forest Plan designated key watersheds where special attention must be given to the management of at-risk fish populations (tier 1) and high water quality (tier 2). Three subwatersheds in the Indian Creek drainage were designated as tier 1 watersheds and should be considered priority areas for restoration. In addition, West Fork Deadwood is a subwatershed that is highlighted as "key" by the Forest.

**2. Percent natural stands in watershed**

**0 = Low percentage (< 55%)**
**1 = Medium percentage (55-75%)**
**2 = High percentage (> 75%)**

Subwatersheds with a higher percentage of natural stands were considered somewhat more stable because of root strength in established natural stands. Natural stands include sources of large wood that could either fall into the stream over time or could be used in stream habitat improvement projects. In general natural stands would provide more shading to the stream where conditions are within reach of the stream channel. Subwatersheds with a higher percentage of natural stands will also have riparian areas and stream courses that are less impacted by management activities than a subwatershed with a low percentage of natural stands.

**3. Number and position of roads under County and Forest Service control**

**0 = Dominated by ridgetop roads**
**1 = Dominated by midslope/valley bottom roads**
**2 = Dominated by midslope/valley bottom roads with known problems**

This criterion attempts to identify subwatersheds that have a high incidence of roads that are identified as higher risk to failure based on slope position, construction method and known problems in need of repair. The assumption made is that ridgetop roads are generally more stable and less likely to negatively impact aquatic resources ,whereas, midslope and valley bottom roads would be more likely to deter proper riparian and instream function (i.e. slides during intense storm events, interception and rerouting of subsurface flow, stream crossings that may hinder fish passage or disruption of connectivity between the hillslope and valley bottom).

4. **Potential aquatic habitat on federal lands in unconfined and moderately confined channels, < 4% gradient.**
   - **0 = Private dominated**
   - **1 = 50/50 Private/USFS**
   - **2 = USFS dominated**

This criterion gives preference for restoration to subwatersheds that include longer, more continuous instream and riparian areas within federal management. The confinement and gradient limitations within this criterion are based on the assumption that unconfined and moderately confined stream segments less than 4% gradient are generally where the best anadromous fish habitat is located. Fragmented ownership of a stream channel makes it more difficult to implement restoration strategies, especially where segments adjacent to federally managed reaches have been degraded and cumulative effects of negative impacts influence the entire stream. A higher rating implies higher likelihood of intact aquatic refugia and better accessibility for riparian and instream restoration projects.

5. **Current aquatic habitat condition**
   - **0 = Very poor condition; no functioning habitat**
   - **1 = Habitat partially functioning**
   - **2 = Presence of functioning habitat**

Based on Level II stream surveys, this criterion helps to define where functioning salmonid rearing habitat can be maintained, enhanced and expanded. Information used to rate each subwatershed included percentage of each stream reach in pools, percentage of deep pools, percentage of complex pools, amount of large wood in streams, known locations of anadromous fish spawning and rearing, locations of high beaver activity and riparian condition throughout the Indian and Deadwood drainages.

6. **Presence or absence of large woody debris in the stream based on management practices.**
   - **0 = Pre-buffer with cleanout (pre-1980)**
   - **1 = Buffer with cleanout (1980-1985)**
   - **2 = Buffer and no cleanout (post-1985)**

This criterion looked at managed areas near streams in each subwatershed and used plantation age to determine how buffers and stream cleanout practices may have affected amounts of large woody debris in these streams during three distinct periods. This criterion assumes the following practices took place during each period:

1. Before 1980, assume no riparian buffers were left and stream cleanout was the norm.
2. Between 1980 and 1985, assume buffers were left but some stream cleanout continued.
3. After 1985, assume buffers were left and stream cleanout was no longer being practiced.

7. **Riparian function in terms of influence on stream temperature, wood supply and floodplain condition.**
   - **0 = Low (function)**
   - **1 = Moderate (function)**
   - **2 = High (function)**

Where mature conifers naturally occur in the riparian area, they provide more long-term sources of shade and large woody debris than deciduous riparian trees for both instream and floodplain function. Current seral stage and species composition were used to locate areas that are dominated by deciduous or deciduous/conifer mix . In addition, stand age was used to identify areas where average stand diameter is insufficient to serve as large woody debris in the floodplain and in-stream. Large woody debris was assumed to begin to reach a functional diameter from plantation age = 30 years. Examples of high and low end criteria are as follows:

Low Functioning = Plantation < 30 years, Hardwood dominated and/or meadow dominated.

High Functioning = Natural late/mature conifer dominated or mature conifer/hardwood mix.

**8. Percent federal lands in watershed**

**0 = Low percentage (< 75% Federal)**

**1 = Medium percentage (75-85% Federal)**

**2 = High percentage (> 85% Federal)**

This criterion attempts to give a higher rating to subwatersheds that are dominated by federal ownership. A higher rating implies more ability to influence management practices and potential to create or enhance late successional conditions. Higher percent federal ownership also allows more accurate estimation of future management and the effects that management may have on stream function.

**9. Potential for private landowner cooperation**

**0 = Low**

**1 = Moderate**

**2 = High**

Where stream and riparian work is dependent on private landowner cooperation, subwatersheds were rated on potential for this cooperation. The subwatersheds rated highest include those private landowners that are either currently working with the Forest Service to improve aquatic conditions, or have indicated a willingness to cooperate in the near future.

**10. Potential for influencing riparian area by thinning (time to LSR condition, distance of unit from stream, potential to create habitat [i.e. LWD availability] and proximity to known functioning fish habitat).**

**0 = Low potential**

**1 = Moderate potential**

**2 = High potential**

This criterion sought to identify plantations with the highest potential to affect riparian character through thinning. Factors included distance of units from streams, proximity to known functioning fish habitat, potential to create or enhance complex fish habitat in stream and time required to reach LSR conditions

The following table gives criterion numbers for each subwatershed, its cumulative total score and the resulting rating based on the final score. Map 6.2, Aquatic Priorities, displays this rating.

| Criteria => | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total | Rating |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sub-Watershed | | | | | | | | | | | | |
| N. Indian | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | 2 | 9 | MOD |
| Up. Indian | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | LOW |
| Herman | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 0 | 1 | 2 | 12 | HIGH |
| M.S. Indian | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | LOW |
| Maria | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 14 | HIGH |
| Rogers | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 0 | 13 | HIGH |
| Long | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 | 8 | MOD |
| Elk2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 5 | LOW |
| L. Indian | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 1 | 1 | 11 | HIGH |
| Up. Dead | 0 | 1 | 2 | 1 | 2 | 0 | 2 | 2 | 1 | 2 | 13 | HIGH |
| N. Pan | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 2 | 1 | 7 | MOD |
| Pan2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | LOW |
| Elk | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 8 | MOD |
| Buck | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 7 | MOD |
| Rock3 | 1 | 2 | 1 | 2 | 0 | 0 | 1 | 1 | 1 | 0 | 9 | MOD |
| N. Bear | 1 | 2 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 8 | MOD |
| Alpha | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 | LOW |
| Misery | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 5 | LOW |
| W. Dead | 0 | 0 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 12 | HIGH |
| Failor | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 11 | HIGH |
| Green Ck | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 6 | MOD |
| L. Lake | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | LOW |

**Rating Key:** Total Score: 1-5 = Low Priority
6-10 = Moderate Priority
11-14 = High Priority

The final step taken to complete the aquatic restoration strategy was to identify restoration projects by subwatershed. These projects fell into five different categories related to their importance in terms of watershed restoration: road work, riparian vegetation, in-stream work, upland thinning and miscellaneous projects. Concepts behind the objectives of these categories of projects are discussed in Chapter 6. This project list has been incorporated into Appendix M, which lists priority projects by landscape block.