SMITH RIVER

WATERSHED ANALYSIS

FOREST SERVICE
U S
DEPARTMENT OF AGRICULTURE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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CHAPTER I: INTRODUCTION

Watershed Analysis is one of the key components of the Aquatic Conservation Strategy (ACS) developed for the Northwest Forest Plan (NFP) (USDA-USDI 1994). The analysis is intended to facilitate watershed planning that:

- achieves Aquatic Conservation Strategy objectives,
- provides the basis for restoration and monitoring programs for terrestrial and aquatic species,
- provides the foundation from which Riparian Reserves can be delineated.

The Smith River watershed analysis is the fourth watershed analysis effort completed by either the Siuslaw National Forest and/or Bureau of Land Management (BLM) on federal lands in the Smith River Basin. With the completion of this analysis, most of the federal lands in the Smith River Basin, have been included in a watershed analysis. Small acreage of BLM managed land, east of the Oxbow assessment area remain for analysis. In addition, several larger scale assessments, including the Assessment Report for Federal Lands in and Adjacent to the Oregon Coast Province and a Late-Successional Reserve Assessment for the Oregon Coast Province - Southern Portion (R0267 & R0268) have been completed. The LSR Assessment for LSR # RO265 which occupies most lands involved in this analysis is currently under way.

This watershed analysis follows the outline described in the updated Federal Guide for Watershed Analysis - Ecosystem Analysis at the Watershed Scale (Version 2.2, August 1995). In this document, however, reference conditions are depicted before current conditions. Natural disturbances are discussed as part of the understanding of the reference conditions section, while non-native settlement-related activities are discussed under current conditions.

This chapter provides the location of the analysis area in relation to the rest of the Smith River Basin, the Southwest Oregon Province and the State of Oregon. Private and federal ownerships are delineated. NFP objectives, regulatory constraints and land allocations are identified. Natural resource characteristics are also briefly characterized.

DISTINGUISHING FEATURES OF THIS WATERSHED

The Smith River Analysis Area is a truly unique area within the Oregon Coast Range. Several factors combine to make this landscape contrast with many of the surrounding areas.

The steep, highly dissected terrain which is extremely susceptible to landslide activity has caused the area to remain somewhat isolated even as surrounding areas were being developed. Internal reviews of forest management practices in the late 1960's initiated special harvest techniques in an attempt to mitigate resource degradation which resulted from timber harvest, road building, and associated site preparation activities (Appendix B2). Even so, continued degradation of in-stream fish habitat from landslide activity resulted in a lawsuit on this portion of the Mapleton Ranger District in 1984 which prohibited further logging activity.

Due to the restricted logging, this area contains portions of two of the largest contiguous blocks of mature forest habitat in the Oregon Coast Range. These areas are critical to the recovery of late-successional forest associated species including the northern spotted owl and the marbled murrelet. These contiguous mature forested areas are in a critical position to provide refuges for species migrating from or to the Cascade Range where genetic transfer will prohibit isolation of Coast Range species.

In addition, the relatively intact portions of the terrestrial and aquatic environments within this analysis area, has led to the designation of the North Fork Smith River and the Wassen Creek sub-watersheds as "Key Watersheds" in the Northwest Forest Plan (NFP). Healthy populations of Coho and Chinook are noted throughout the watershed. National Marine Fisheries Service (NMFS) had noted that this analysis area significantly contributes to the rearing of the Umpqua cutthroat trout which is currently listed as an endangered species.

Although much of the upslope habitat is intact, much of the aquatic habitat has been altered from its historic condition. Bedrock channels dominate in many of the streams and quality spawning and rearing habitat is lacking.

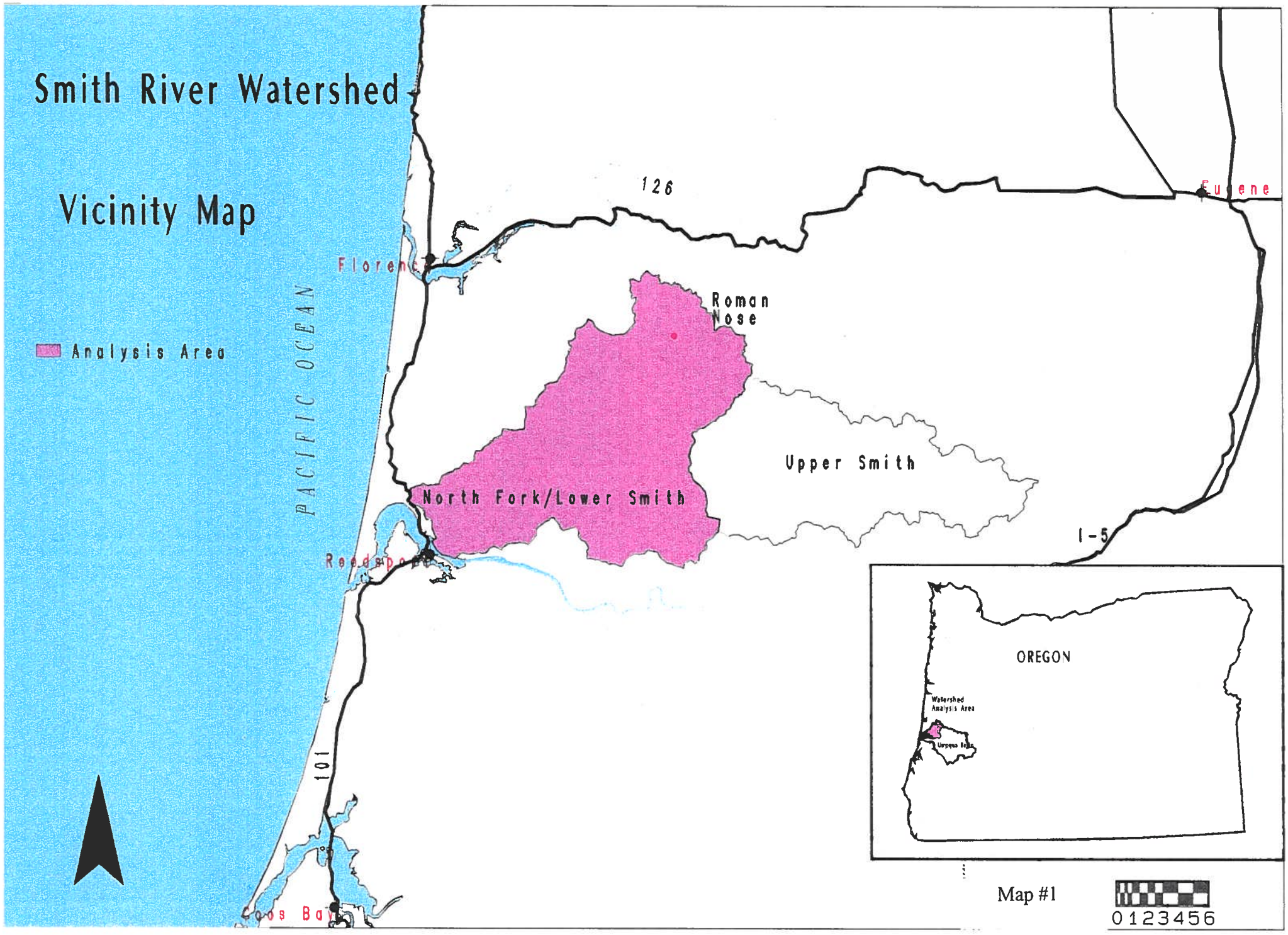
The rugged secluded landscape attracts residents and visitors both of whom are committed to the area and reside for generations or visit the area repeatedly. The scenic quality and seclusion of the area is highly sought. The North Fork, mainstem of the Smith River, and Wassen Creek are all proposed as Wild and Scenic Rivers. There are two specially designated areas, one in the North Fork and one in Wassen Creek, both with management direction which preserves the isolated scenic qualities.

LOCATION AND SIZE

The Smith River watershed lies in the northwest portion of the Southwest Oregon. The western boundary of the analysis area is about 4 miles inland from the ocean about 2 miles northeast of Reedsport. The eastern boundary is about 24 miles inland from the ocean (Map 1). The analysis area is within portions of both Lane and Douglas Counties. The watershed occupies 139,567 acres of land.

Smith River Watershed

Vicinity Map



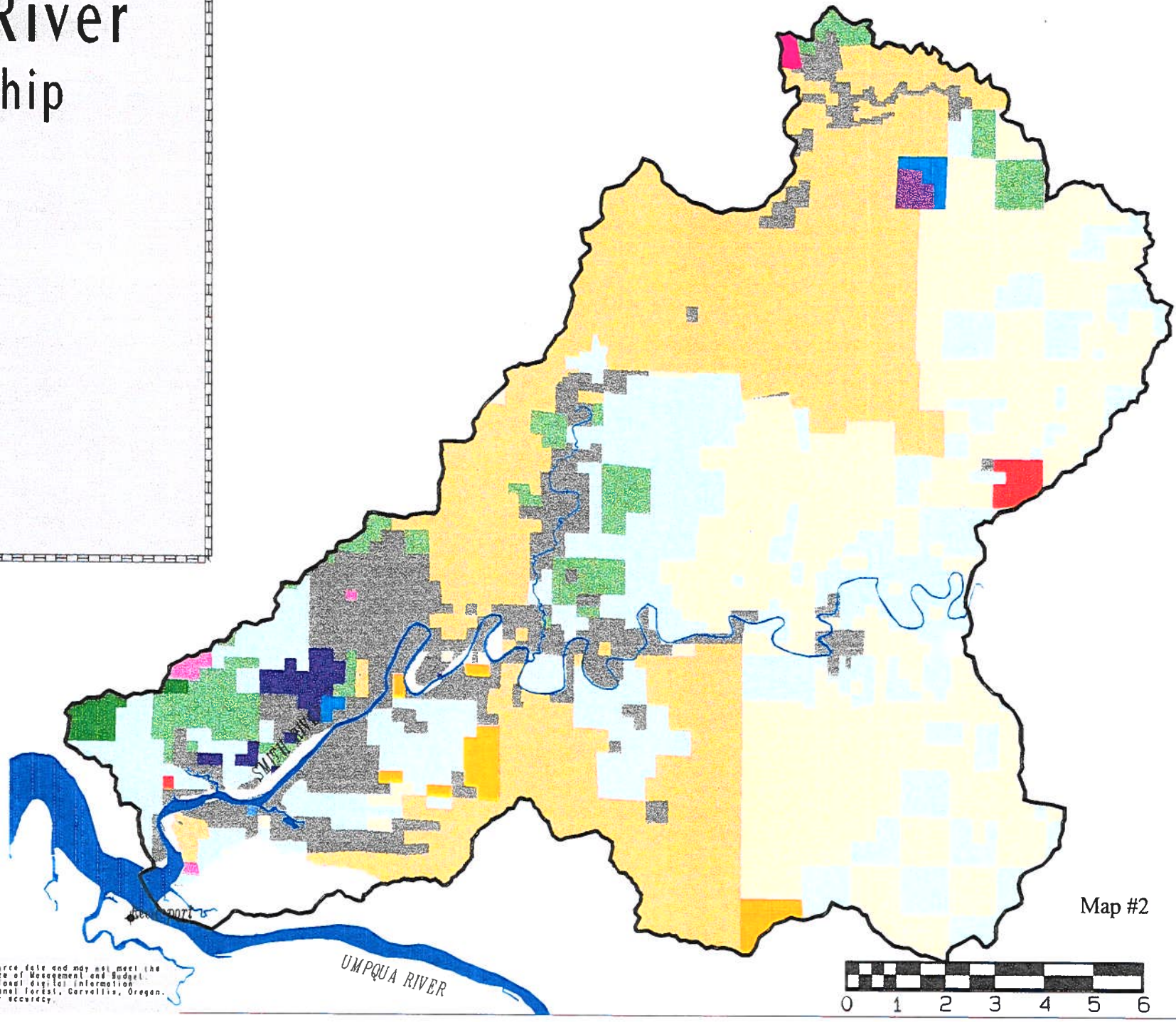
Map #1

Smith River

Ownership

- USFS Lands
- BLM Lands
- Handcock
- County
- Davidsons
- Roseburg
- MNSHA
- Private Lands
- Seneca
- SPARO
- State
- WESTB
- Chead
- OFED

July 17, 1997



Map #2

0 1 2 3 4 5 6

MILES

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The watershed is bounded on the north by a series of high ridges from Goodwin Peak (elevation 1826') on the northwest corner through Mt. Grayback (elevation 2255') to Roman Nose (elevation 2856') on the northeast corner. From there, the analysis area boundary follows a low ridge system that forms the east boundary of the West Fork of the Smith River and up the ridge system on the east boundary of Vincent Creek to Fern Top (elevation 1896') on the southeast corner. The southern boundary is on the ridge system above the Umpqua River and follows that ridge to where it crosses the Smith River. The lowest elevation is where the analysis area boundary crosses the mainstem of the Smith River (elevation approximately 150') just west of Hudson Slough. The western boundary follows the ridge system west of Hudson Slough to Goodwin Peak.

LAND OWNERSHIP

Fifty-six percent of the watershed is managed under federal ownership. Thirty percent of that federal land is managed by the USDA - Forest Service and 26% is managed by the USDI - Bureau of Land Management. Two percent of the area is managed by other government agencies including the State, County other Federal Lands. The remaining 42% of the watershed is under private ownership with 71% of the private land in private industrial forest land use (Map 2, Table 1).

Table 1: Land Ownership

	BLM	USFS	Total Federal	Other Government	Private Industrial Forest	Other Private	Total Private	Grand Total
Acres	36,959	41,553	78,512	2,118	41,879	17,058	58,937	139,567
% of Federal	47	53	100	n/a	n/a	n/a	n/a	n/a
% of Private	n/a	n/a	n/a	n/a	71	29	100	n/a
% of Total Landbase	26	30	56	2	30	12	42	100

LAND USE ALLOCATIONS - NORTHWEST FOREST PLAN OBJECTIVES

Key Watersheds

Wassen Creek and the North Fork of the Smith River are designated as Key Watersheds by the Northwest Forest Plan. Key Watersheds are a component of the Aquatic Conservation Strategy and focus restoration of aquatic habitat in these areas.

Administratively Withdrawn

5878 acres of the analysis area are administratively withdrawn. 1683 acres in the North Fork of the Smith River are withdrawn as the Kentucky Falls Special Interest Area due to the concentration of waterfalls and scenic features in the area. 3944 acres in the Wassen Creek area are withdrawn as Undeveloped Recreation (USDA 1990). This area was part of the original RARE II roadless area designation. In addition, 251 acres are withdrawn along the mainstem of the Smith River as Bald Eagle Management areas (USDA 1990).

Late-Successional Reserves

The majority, 76%, of the federally managed land in the watershed is allocated to Late-Successional Reserve (LSR) based on the Northwest Forest Plan (Map 3, Table 2). The objective of this land use allocation is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. Occupied marbled murrelet sites are also included in this land use allocation. These areas protect all existing and recruitment habitat (i.e. stands capable of becoming marbled murrelet habitat within 25 years) within a 0.5 mile radius of documented occupation areas.

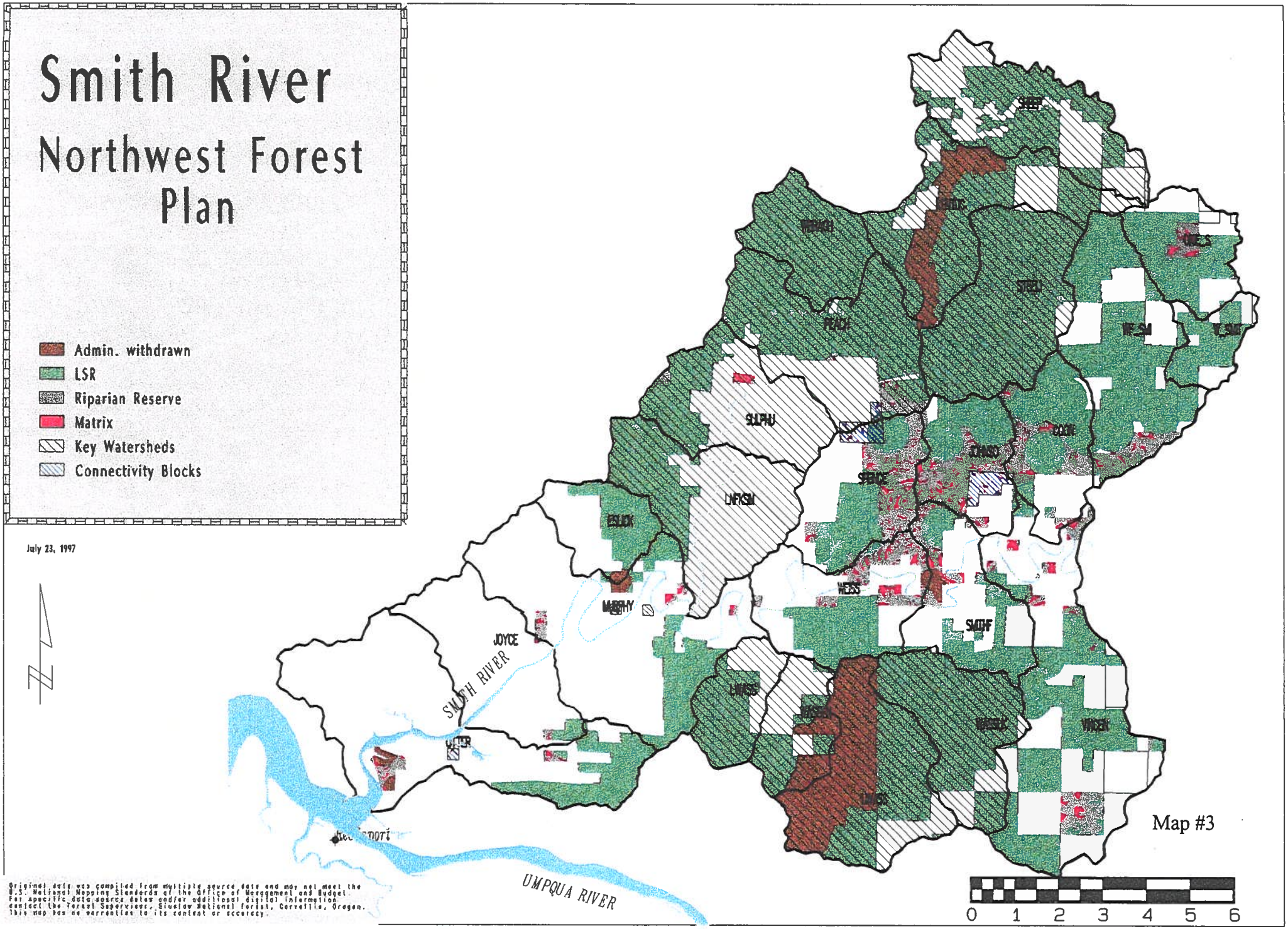
Riparian Reserves

Approximately 85% of federal lands are within Riparian Reserve Boundaries. Riparian Reserves overlie all land use allocations. Outside of Late-Successional Reserves, 14% of the federal land base is in Riparian Reserve (Map 3, Table 2).

Riparian Reserves include those portions of a watershed directly adjacent to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecological processes that directly affect standing and flowing waterbodies. In addition to strictly aquatic resources, Riparian Reserves were established

Smith River

Northwest Forest Plan



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to benefit other riparian-dependent species and to retain adequate habitat conditions for dispersal of late-successional forest species throughout the LSR network.

Table 2: Land Use Allocation

LAND USE ALLOCATION	BLM Acres (%)	USFS Acres (%)	Total Federal Acres (%)
Administratively Withdrawn	n/a	5,878 (14%)	5,878 (8%)
LSR	24,476 (66%)	34,877 (84%)	59,353 (76%)
Riparian Reserve outside LSR	10,687 (29%)	571 (1.5%)	11,258 (14%)
Matrix	1,723 (5%)	227 (0.5%)	1950 (3%)
Matrix (150 year rotation) in Connectivity / Diversity Blocks	73	n/a	73

Matrix

In this watershed, 1950 acres or 2% of the federal lands in the watershed have been allocated to Matrix by the Northwest Forest Plan (Map 3, Table 2). Matrix consists of those federal lands outside of other land use allocations. All timber harvest and other silvicultural activities would be conducted in that portion of the matrix with suitable forest lands, according to standards and guidelines of the NFP. Most scheduled timber harvest takes place in the matrix. On BLM lands in the eastern portion of the watershed, some lands have been allocated as Connectivity/Diversity Blocks. The Matrix portion of these blocks will be managed on a 150 year rotation.

or 227 Acres!

CHAPTER II: ISSUES AND KEY QUESTIONS

Identification of issues and key questions helps to focus the analysis on the elements of the ecosystem that are currently most relevant to management, social values, or resource conditions within the watershed.

Four issues critical to the future management of this watershed were identified by the watershed analysis team with input from local residents, BLM staff, and Mapleton Ranger District staff. They are:

- **Protection or enhancement of late-successional wildlife habitat**
- **Protection or enhancement of salmonid fisheries and aquatic species habitat**
- **Maintaining resource values by recognizing the inherent instability in the landscape**
- **Providing quality recreation while maintaining the Aquatic Conservation Strategy objectives.**

The following is a broader description of each issue and the key questions that pertain to each of the issues. Expected outcomes from this analysis, that result from each of the key questions, are intended to provide continuity from this step in the process to the remainder of the analysis.

ISSUE 1: QUALITY WILDLIFE HABITAT MUST BE MAINTAINED AND/OR ENHANCED IN DESIGNATED AREAS OF THE WATERSHED TO SUPPORT LATE-SUCCESSIONAL AND OTHER SPECIES OF CONCERN.

Portions of two of the largest, most contiguous patches of late-successional forest habitat on federal lands in the Coast Range are found in this analysis area. These areas are critical to the recovery of late-successional associated species both for rearing and as a refuge area for species migrating to and from the Cascade Range. Although large patches of mature forests occur, their ability to function is somewhat reduced by the surrounding heavily fragmented forest. This raises concerns about maintaining the species which are associated with this habitat type. Improving the amount and distribution of this habitat type and maintaining or enhancing connectivity to areas outside of the watershed has been identified as a primary issue.

KEY QUESTIONS: What types (seral classes) and patch sizes existed historically on this landscape? Was it different for different areas within this analysis area? What natural disturbances led to those conditions?

OUTCOMES: An understanding of the types of disturbances that operated in this area and the effect on vegetative patterns.

KEY QUESTIONS: What are the current seral conditions and patch sizes? What disturbances have led to those conditions?

OUTCOMES: An understanding of current seral stages of vegetation and the processes that led to those conditions .

KEY QUESTIONS: What is the acreage and spatial distribution of mature forest habitat? Interior forest habitat? Are there key areas for refugia? Are there critical migration corridors that must be maintained? What role does this area play in the larger late-successional reserve system? Where and how can late-successional habitat within the watershed be improved in order to hasten the development of suitable habitat?

OUTCOMES: Map depicting mature and interior forest habitat. Determination of the best remaining habitat areas. Delineation of critical connectivity corridors. Narrative of the role of this area within the larger late-successional reserve system. Delineation of priority areas for late-successional habitat restoration and ecological guidance to achieve those goals.

KEY QUESTION: What is the current condition of habitat within the provincial home range of Northern Spotted Owl and Marbled Murrelet activity centers? Is existing habitat suitable?

OUTCOME: Percentage of habitat within activity areas that is considered suitable, prioritization of restoration of habitat within activity areas.

KEY QUESTIONS: What is the trend for future condition of late-successional species and their habitat in the watershed based on current standards and guidelines outlined in the Northwest Forest Plan? How will management objectives for the different land allocations affect habitat conditions in the future within the watershed? Are there areas of potential conflict with current land management allocations and future objectives within the watershed (i.e. allocation trade opportunities)?

OUTCOMES: Determination of management objectives for different areas. Projection of future habitat condition based on management objectives. Delineation of conflict areas. Identification of priority land acquisition, allocation changes, exchanges to secure better habitat or critical connectivity functions.

KEY QUESTIONS: What is the current status of other than late-successional listed species of concern, including botanical species, within the watershed? How is this watershed functioning for these species, i.e. what is the current habitat condition for species of concern?

OUTCOMES: Delineation of priority treatment areas and identification of treatment techniques to improve current conditions of the watershed to meet the needs of species of concern.

ISSUE 2: SALMONID FISHERIES AND AQUATIC SPECIES VIABILITY DEPENDS ON THE PROTECTION AND OR ENHANCEMENT OF AQUATIC HABITAT CAPABILITY.

Habitat for aquatic species has been altered in this watershed. Results of research and stream surveys, (USDA 1993, USDA 1995) indicate that most streams on federal land, including those in this watershed, are deficient in large woody debris and that riparian areas harvested in the past lack large conifer trees to supply LWD to the stream channels over time.

Loss of quality spawning and rearing habitat is one of the reasons that anadromous fish species populations are depressed. Restoration of in-stream habitat is the responsibility of federal forest land managers in the Oregon Coast Range. During the status review of the Umpqua cutthroat trout by the National Marine Fisheries Service, the Smith River was identified as one of the areas where cutthroat populations were thought to be in a more stable condition. Two subwatersheds, North Fork Smith and Wassen Creeks have been designated as Key Watersheds in the Northwest Forest Plan. Habitat restoration at the watershed scale is critical to protect or enhance anadromous fish runs and critical habitat.

KEY QUESTION: What are the current habitat conditions and trends for the species of concern?

OUTCOME: A determination of appropriate restoration activities and where they are most effective based on dominant processes and human needs. Identification of opportunities to manage habitats in order to maintain or enhance desired future conditions.

KEY QUESTION: What is the current and historic relative abundance and distribution of species of concern in the watershed (i.e. threatened or endangered species, special status species, species emphasized in other plans)?

OUTCOME: General trends of anadromous fish populations and their distribution.

KEY QUESTIONS: What contributions does the watershed make to the viability of at risk fish stocks? Is it a significant fish producer within the basin?

OUTCOME: Understanding of importance of existing fish stocks in this watershed.

KEY QUESTION: Which streams or reaches within the watershed contain relatively intact, functioning systems or serve as critical habitat for anadromous fish species?

OUTCOME: Identification of biological "hot spots" and potential watershed scale refuge areas.

KEY QUESTIONS: Do the riparian areas currently provide for stability of stream adjacent slopes, provide shade to reduce stream temperature increases and supply large woody material to the stream channels? What types of restoration efforts should be focused in riparian areas?

OUTCOMES: Delineation of priority areas for riparian restoration. Delineation of areas with the potential to provide shade to stream channels. Determination of areas lacking large woody debris (logs >24" dbh and >50' long) in the streams and identification of areas lacking the ability to provide for future LWD. Determination of where and what type of restoration efforts are appropriate.

KEY QUESTIONS: Are the NFP designated watersheds providing quality anadromous fish habitat? Are anadromous fish capable of using them?

OUTCOME: Assessment of the quality and extent of habitat provided by Key Watershed designations.

KEY QUESTIONS: What role has channelization (diking) in the Lower Smith River played on fish distribution and habitat quality? Where does tidal influence affect fish habitat?

OUTCOME: Understanding of the effects of diking. Delineation of the tidal influence area.
KEY QUESTION: What is the current status of stream temperature and stream shade?

OUTCOME: Determination of areas contributing to thermal loading and cooling. Restoration efforts suitable to avoid increases in, or decrease existing stream temperatures. A prioritization of the most effective treatments by area.

ISSUE 3: RESOURCE VALUES CAN BE MAINTAINED BY RECOGNIZING AND MANAGING FOR THE INHERENT INSTABILITY IN THE LANDSCAPE.

This area is noted for its steep , highly dissected landforms and its high natural instability. Natural rates of landslide activity are difficult to verify. Past management activities, including timber harvest and road construction have increased the rate of landsliding relative to the rate of landsliding in the unmanaged forested landscape. The composition of the landslide debris has also been changed. The resultant degradation of both on-site and off-site resources has lead to both internal reviews and external lawsuits which affected forest management practices. Recognition of the instability inherent in this landscape, and application of appropriate forest management activities is critical to maintenance of on-site productivity and controlling levels of large woody debris and substrate inputs, and aquatic habitat quality of the stream systems.

KEY QUESTION: How does stability and expected debris torrents influence placement of fish habitat structures?

OUTCOMES: Landslide susceptibility delineations, determination of stream reaches prone to debris torrent activity, potential of area to receive LWD sources from upslope.

KEY QUESTIONS: How does slope stability affect the delivery of LWD? What role does the road system play in affecting delivery of that material to the stream system?

OUTCOMES: Identification of LWD source areas, determination of road sections impairing delivery, if they do.

KEY QUESTIONS: How are substrates delivered and redistributed in stream channels? What is the influence of log drives, splash dams, dikes?

OUTCOME: An understanding of the substrate delivery and routing regimes.

KEY QUESTION: How does landslide susceptibility relate to plantation treatment prescriptions?
OUTCOME: Delineation of existing plantations where slope stability concerns may affect treatment prescriptions.

KEY QUESTIONS: How have roads influenced stability? Where are the problem areas and what can be done for restoration?

OUTCOME: Delineation of midslope roads and other road segments of concern based on the landslide susceptibility determination.

ISSUE 4: PROVIDE FOR QUALITY RECREATION WHILE MAINTAINING THE AQUATIC CONSERVATION STRATEGY OBJECTIVES

The Smith River watershed is a dramatic landscape. Steep, mostly forested slopes descend into scenic river valleys. River valley roads provide access to and scenic vistas from bridges that cross the streams. Visitors to this area return year after year to seek recreation in a secluded setting. Undeveloped recreational areas can be found along portions of the mainstem of Smith River but mostly along the North Fork. New, undeveloped campsites are found in areas where equipment access for placement of fish habitat structures have opened access roads. Managers need to determine where riparian based recreation activities are appropriate based on the function of different areas, and the sensitivity of the resources to human impacts.

KEY QUESTIONS: What are the wild and scenic qualities that need to be protected? How can they best be protected? How do fish habitat structures relate to Wild and Scenic objectives?

OUTCOMES: Description of wild and scenic qualities and designation objectives. Proposal for protection or restoration of critical wild and scenic qualities. Identification of existing fish habitat structures.

KEY QUESTIONS: Where are critical fish habitat areas (hot spots)? What is the effect of undeveloped recreation use in those areas? Are there detrimental impacts from uncontrolled use of the area i. e. garbage, human waste, poaching?

OUTCOMES: Delineation of existing undeveloped recreation areas. Determination of areas of conflict. Restoration strategy for recreation areas.

KEY QUESTION: What is the condition of recreation access roads?

OUTCOME: Identification of recreation access roads and suspected problem areas.

KEY QUESTION: Are ATV trails appropriate in this area?

OUTCOME: Determination of appropriate ATV use.

KEY QUESTION: How should increased recreation demands be managed?

OUTCOME: Projection of recreation demands, determination of appropriate management areas and techniques.

CHAPTER III: HISTORICAL RESOURCE CHARACTERIZATION

In this chapter separate ecological components are characterized to provide an understanding of what types of physical and biological resources can be expected in the area, what types of disturbance events help to shape vegetative patterns on the landscape, and how various terrestrial and aquatic resources are expected to respond to the conditions. An understanding of how physical and biological conditions effect the processes and functions that operate within various areas of the watershed will help managers in the determination of appropriate management activities.

This chapter will provide a characterization of the resources one could expect to find in this watershed under natural conditions. Biophysical Units, outlined in Table 3, provide a quick reference to some of the critical components of specific areas of the watershed. The components identified, may influence many of the ecological processes expected to occur in this area. Many of these components may have been altered through human influences on the landscape. Table 15 in Chapter V highlights the main differences in expected versus current condition of resources in various areas of the watershed.

BIOPHYSICAL UNITS

There are several components of the ecosystem that operate throughout the whole landscape irrespective of other environmental conditions. The overall climate and major stream systems, including sub-watershed boundaries, cut across the various landscape features that help to differentiate other resources.

Many physical features of the landscape can be better understood if portions of the watershed are delineated separately. This is especially true of hydrologic and erosion processes. Landtype Associations (LTAs) stratify the landscape into areas of similar geology and soils which influence landforms, stream channel form and process, and vegetation characteristics (Ellis, et. al, 1996). Landtype associations provide a larger landscape perspective that helps set a context for understanding the types of processes that are operating in various areas.

Through this watershed analysis, the Landtype associations originally described by Maxwell and Berry (1984) and refined by Ellis (1996) have been further refined based on topography, geology, and the related effects on hydrologic and erosion processes. Physical processes, for example, are delineated based on seven biophysical units (BUs) within this watershed boundary. In addition, soil/climate zones (USDA, 1995) which, in this watershed, show a gradation of moisture from east to west helped to delineate the landscape further into biophysical units (Table 3, Map 4).

Biological attributes also follow patterns. Our understanding of biological components, however, is on a somewhat broader scale. Vegetative characteristics have been separated into only three broad areas. Drier Plant Association groups of the western hemlock series, are found in the northern and southern portions of the watershed and the Sitka Spruce Series dominates in the Coastal Influence zone.

Fire as a disturbance process varies in only two areas of the watershed controlled predominately by the soil climate zones. The moist, coastal influence creates a weather pattern which is much less prone to fires, while variable fires sizes and intensities are expected throughout the interior zone.

Table 3 displays a quick comparison of both physical and biological resource components as well as disturbance processes as they relate to the biophysical Units that have been delineated. The remainder of this chapter is a detailed explanation of the individual resource components and how they relate individually to the biophysical units which have been delineated. These resource components, and our understanding of how they operated and influenced the functions and process of different areas of the landscape will be utilized as ecological guidance in the final chapter of this report.

PHYSICAL COMPONENTS

Climate

The Smith River watershed area experiences cool, wet winters and relatively warm dry summers. On the top of Goodwin Peak, air temperatures average 60°F in the summer months (June, July, August) and 42°F in the winter months (Dec., Jan., Feb.). Normal annual precipitation for the last 35 years ranges from 85-115 inches. Precipitation records from Goodwin Peak during the 1995-96 water year reported a total of 112.3 inches. Annual precipitation is concentrated between December and February (40-50%) with the rest distributed between fall and spring (20-25% each) and only a small percentage in summer (6%). Precipitation is subject to orographic effects that are quite pronounced in this area with major ridges receiving substantially more precipitation than nearby lowlands. Periodically, intense winter rainstorms occur, accompanied by winds ranging from 75-100 miles per hour. Occasionally, arctic air meets an onshore flow, producing snowfall which may accumulate on the higher peaks. Prevailing winds are strong southwesterly in the winter and moderate northwesterly in summer. Dry easterly winds can occur for 2-3 days at a time at any time of the year.

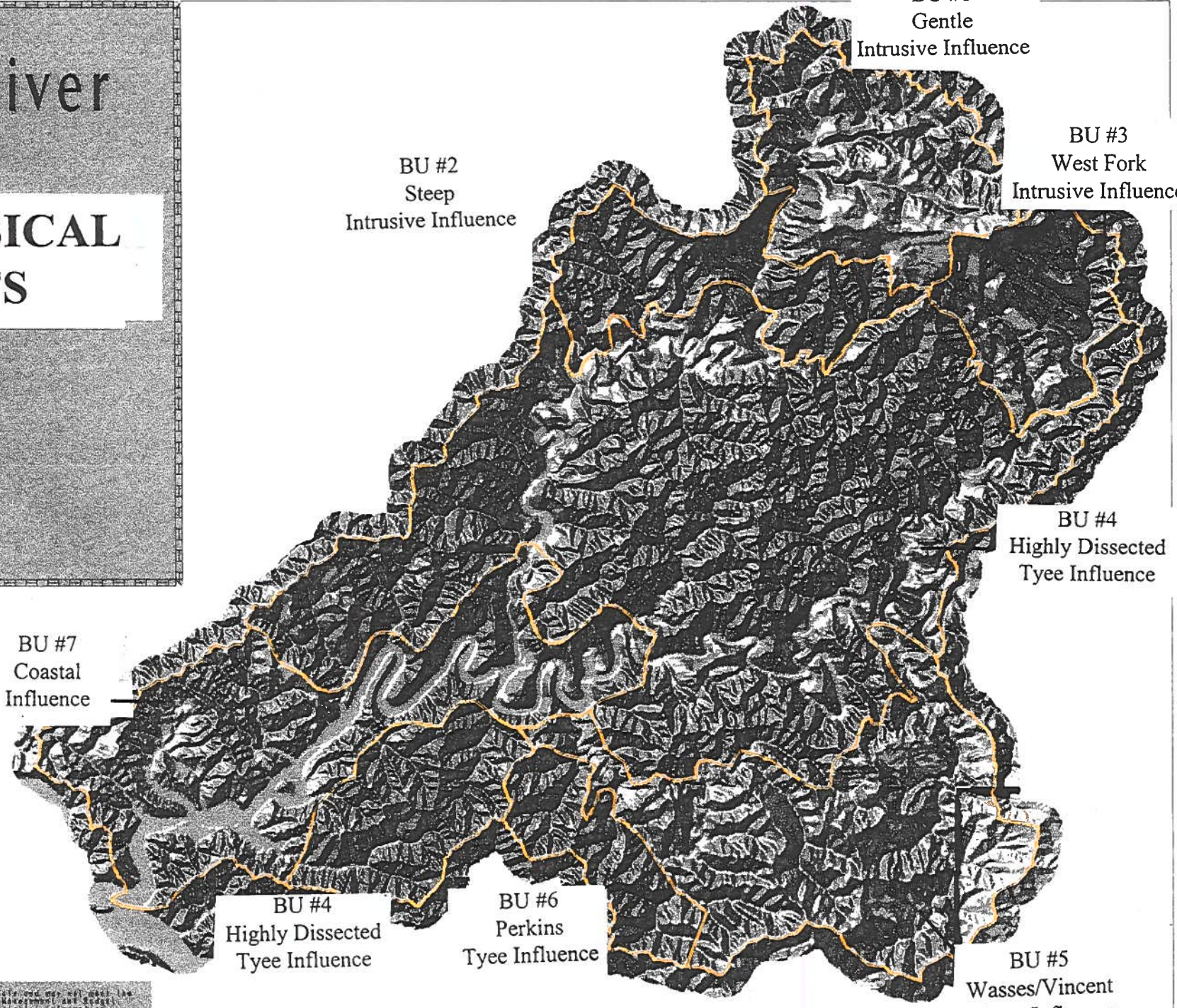
The proximity to the ocean and a major river system, exposes the southwestern portion of the watershed to the influence of a cool, damp fog belt (BU#7). The resulting vegetation, and the use of this area by different wildlife and aquatic species is significant enough to influence the delineation of this area into a separate biophysical Unit.

Smith River

BIOPHYSICAL UNITS

Ecological Units

July 17, 1997



Map #4

Table 3: Characterization of Resource Components By Biophysical Units

BU #	BIOPHYSICAL UNIT 1	2	3	4	5	6	7
PHYSICAL OR BIOLOGICAL ELEMENT	**Gentle Intrusive Influence LTA 4R**	**Steep Intrusive Influence LTA 4G**	**West Fork Intrusive Influence LTA 4G**	**Highly Dissected Tyee Influence LTA 4F,4G**	**Wassen / Vincent Elkton Influence LTA 4H**	**Perkins Highly Dissected Tyee Influence LTA 4G**	**Coastal Influence LTA 4F**
Geology	Volcanic intrusive and coarse grained sedimentary rock and	Volcanic intrusive and coarse grained sedimentary rock and	Volcanic intrusive and coarse grained sedimentary rock and	Coarse grained sedimentary rocks	Fine grained and coarse grained sedimentary rocks	Coarse grained sedimentary rocks	Coarse grained sedimentary rocks
Geomorphology	Moderate relief, flat to moderately steep slopes, lower drainage density	High relief, extremely steep slopes, high drainage density	High relief, moderately steep slopes, long straight drainages	Moderate relief, steep slopes, high drainage density	Low relief, flat to steep slopes, moderate drainage density	Moderate relief, extremely steep slopes, high drainage density	Low relief, flat to steep slopes, moderate drainage density
% by slope class							
0-35%	58	27	50	33	57	20	47
36-55%	31	39	36	40	33	38	35
56-75%	11	28	13	25	10	34	17
76-90%	1	5	2	2	0	6	2
>90%	0	1	0	0	0	2	0

Table 3 cont.: Characterization of Resource Components By Biophysical Units

BU #	BIOPHYSICAL UNIT 1	2	3	4	5	6	7
PHYSICAL OR BIOLOGICAL ELEMENT	**Gentle Intrusive Influence LTA 4R**	**Steep Intrusive Influence LTA 4G**	**West Fork Intrusive Influence LTA 4G**	**Highly Dissected Tyee Influence LTA 4F,4G**	**Wassen / Vincent Elkton Influence LTA 4H**	**Perkins Highly Dissected Tyee Influence LTA 4G**	**Coastal Influence LTA 4F**
Soil Water Holding Capac	Low	Very Low	Low	Low	Moderate	Very Low	Moderate
Erosion Processes	Unstable on lower midslopes above incised channels	Debris torrents and slides. Extremely high risk of debris slides	Debris torrents and slides. high risk of landslides	Debris torrents and slides. High risk debris slides	Unstable on lower mid-slopes above incised channels - deep-seated landslides	Debris torrents and slides. Extremely high risk of landslides	Unstable on lower midslopes above incised channels
Landslide Susceptibility:							
Low	56	33	48	38	53	29	51
Moderate	31	35	35	34	35	30	30
High	13	32	17	28	12	41	19
Stream density (mi/sq.mi.)*	7.1	9.8	7.4	9.4	7.4	8.9	10.2

* Assume 75% accuracy overall on stream mapping. Stream density mapping is also influenced by vegetation age in each area (visibility).

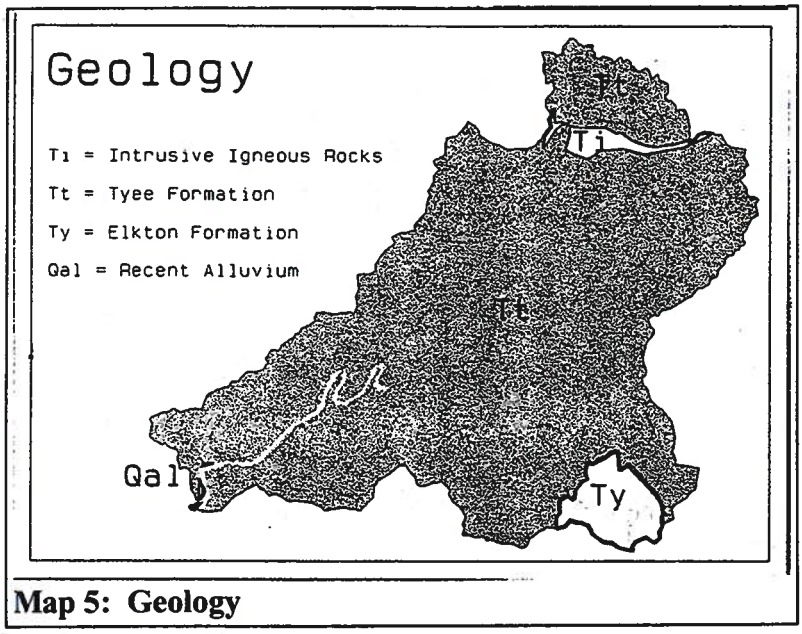
Table 3 cont.: Characterization of Resource Components By Biophysical Units

BU #		BIOPHYSICAL UNIT 1	2	3	4	5	6	7
PHYSICAL OR BIOLOGICAL ELEMENT		**Gentle Intrusive Influence LTA 4R**	**Steep Intrusive Influence LTA 4G**	**West Fork Intrusive Influence LTA 4G**	**Highly Dissected Tyee Influence LTA 4F,4G**	**Wassen / Vincent Elkton Influence LTA 4H**	**Perkins Highly Dissected Tyee Influence LTA 4G**	**Coastal Influence LTA 4F**
Geomorphic Segments								
% Source		72	87	86	84	81	89	Mainstem Smith Only
% Transport		12	6	8	6	7	7	
% Slow Transport		<1	1	<1	1	2	1	63
% Moderately Confined Depositional		7	5	5	6	7	3	7
% Unconfined Depositional		8	1	1	3	3	<1	30
% of area analyzed for above analysis		100	100	100	38	58	100	7
Soil/Climate Zone		← Southern Interior →						Coastal Fog
Fire Disturbance Regimes		← Moderate frequency, mixed severity →						Infrequent Stand Replacing
Potential Vegetation Series		← Western Hemlock →						Sitka Spruce
Potential Plant Assoc. Groups (% of BU	TSHE/RHMA	35	21	16	5	5	10	1
	TSHE/GASH	30	12	39	6	18	5	0
	TSHE/POMU	29	39	40	35	52	44	7
	TSHE/RUSP	6	28	5	52	25	41	35
	PICI/GASH	0	0	0	0	0	0	21
	PICI/POMU	0	0	0	1	0	0	13
	PICI/RUSP	0	0	0	1	0	0	23

Geology

The Smith River watershed analysis area is dominated geologically by the Tyee Formation with a small area of Elkton Formation in the southeast (Map 5, Appendix A). These formations were deposited in shallow seas over a basalt basement (Siletz River Volcanics) about 40-60 million years ago (Eocene). Recent gas and oil exploration in the area has led to identification of a separate subbasin in the Smith River area, distinct from the Umpqua basin. Drilling and seismic-reflection showed a significant dip in the underlying basalt basement and an extra siltstone layer above the basalt not found in the adjacent Umpqua basin (Niem, pers. comm.).

Between 25-40 million years ago (Oligocene), a number of basalt intrusive bodies from batholith sources below the Tyee basin invaded these softer marine sediments. As weathering and downcutting of the sandstone occurred, these more resistant basalt sills and dikes remained to form many of the highest peaks. Goodwin, Grayback, Baldy and Roman Nose are prominent peaks in the analysis area which resulted from these intrusives. This sill strongly exerted influence on the landform, drainage patterns, and supply of sediment and debris to stream channels in the north half of the analysis area (BU#1,#2,#3).



Map 5: Geology

The Tyee Formation that dominates the Smith River subbasin (BU#4, #6, #7) is composed of thick, indurated (tightly cemented) sandstone rhythmically interbedded with thin siltstone layers. The sandstone in this area has very low permeability. Extremely small pore size and the cemented nature of this sandstone lead to this low permeability. A result of this bedrock character is that significant water movement downward only occurs through joints (fractures) in the bedrock. Given the existence of a shallow, highly permeable soil mantle coupled with fairly impermeable bedrock, water from rainstorms or snowmelt is transported to the stream channel very efficiently in this terrain.

The siltstone layers of the Tyee formation are permeable and are composed of expandable smectite clays which shrink and swell. When winter rains cause these layers to expand, internal shear stress can be weakened, especially in areas where sandstone bedding is parallel to the slope. Expansion and contraction as well as different

weathering rates of these siltstone interbeds lead to a natural instability of slopes in this area. This condition has presented significant problems for forest management activities associated with timber harvest, road building and road maintenance in this area.

While the Tyee formation is composed of 90% sandstone, the Elkton formation is 95% siltstone and mudstone (Ryu 1996). Although siltstones and mudstones are made up of finer grained materials, the Elkton formation does not have the highly cemented character found in the Tyee Sandstone. Porosity is slightly higher in the Elkton bedrock and it is three times as permeable. The southeastern portion of the watershed where this formation occurs (BU #5) has lower relief and is subject to deep seated earth flows rather than the shallow debris torrent activity found in the Tyee formation areas. Slump-earthflow topography such as this takes on a smoother, less dissected appearance.

Soils

Much of the Smith River area contains thin, erodable soils formed in residuum and colluvium derived from sedimentary rock (Appendix B1). Seventy three percent of the analysis area contains soils less than 3 feet in depth. (In comparison, 38% of the Indian Deadwood Watershed Analysis area north of the Siuslaw River had soils less than 3 feet.) Soils in the analysis area contain moderate to high amounts of gravel and cobble with the exception of the southwest portion of the analysis area (Lower Smith River) and valley bottoms of the major river systems and tributaries.

Soil productivity south of the Siuslaw River is generally considered, on the average, to be one site index class lower than ground north of the Siuslaw by silviculture personnel on the Mapleton District. This was confirmed by comparisons made between soils of the Lane County Soil Survey on the north half of the District and recently completed site index information from the Douglas County Soil Survey for the south half of the District. Analysis of predominate soils in both areas showed that generally, soils in the Indian Deadwood area fell into McArdle's Douglas-fir site index class II and most soils in the Smith River WA area fell into class III. However, this generalization should not preclude the fact that there are scattered, higher site areas in the Smith River area with very fast growing plantations. Organic matter accumulation is also lower in this watershed than in areas north of the Siuslaw River. The dominance of salal and rhododendron plant communities and chlorotic plantations also indicate lower productivity.

Hydrology

Stream flow reflects precipitation events with an annual cycle of high, flashy flows during the winter and low baseflows during the summer months when most of the flow from channels is derived from emerging groundwater. Probability of flooding where waters exceed the channel is once every two years with large floods occurring less frequently. Notable flood years in the Coast Range include 1861, 1890, 1909, 1927, 1953, 1955, 1964, 1974, 1982, 1983 and 1996 (Appendix C1).

Five distinct drainages make up the sixth-field watersheds within this analysis area boundary (Map 6). These include the North and West Forks of the Smith River in the northern half of the analysis area, and mainstem Smith River and its tributaries, Wassen Creek and Vincent Creek in the southern portion of the analysis area.

Stream densities in this watershed area extremely high generally ranging from 7 to 10 miles per square mile (Map 7). These drainage densities are a result of the steepness of the slope and the thin soils over impermeable bedrock.

Where major watercourses had formed wide meanders in flat topography prior to geologic uplift, a distinctive entrenched meander pattern formed. This pattern can be seen in the Main Fork, North Fork and West Fork of the Smith River. Some of the steepest sandstone faces occur on both inside and outside bends of these meanders. Other geologic controls of drainage pattern include basaltic intrusives, faults, zones of weakness, bedrock joints (fractures) and plunges in folds (anticlines) of the underlying sandstone bedrock. Wassen Creek is an example of these forces at work with its 180° direction change in its mid section.

The processes that affect stream function are directly related to channel gradient and confinement of that channel by the surrounding geomorphic features. Using six classes of stream gradient and three classes of confinement (Montgomery and Buffington, 1993), some of the streams in the analysis area were separated into geomorphic segments that help to explain how water, wood and substrates move through the watershed (Map 8). In general, source reaches are where material is coming from, transport reaches move material through and deposition reaches represent areas where material is deposited. The functions of each segment are described more fully below.

Source reaches have gradients greater than 8% and are either confined or moderately confined. These reaches are generally 1st and 2nd order streams (class 4) that flow intermittently but respond quickly to storm events and are subject to periodic scour by debris torrents. Being confined and moderately confined, adjacent hill slopes are directly connected to the channel. These segments are important sources of cool water and pulses of substrates and wood to the rest of the stream system. Riparian vegetation typically occurs in narrow bands along these streams and may be dominated by coniferous or deciduous overstory. Aquatic habitat is limited due to the steep, episodic nature of disturbance events in these stream segments. Cutthroat trout and steelhead do use lower portions for spawning and cutthroat trout may remain as residents in some of these areas. Over 80% of streams in the analysis area are classified as source segments.

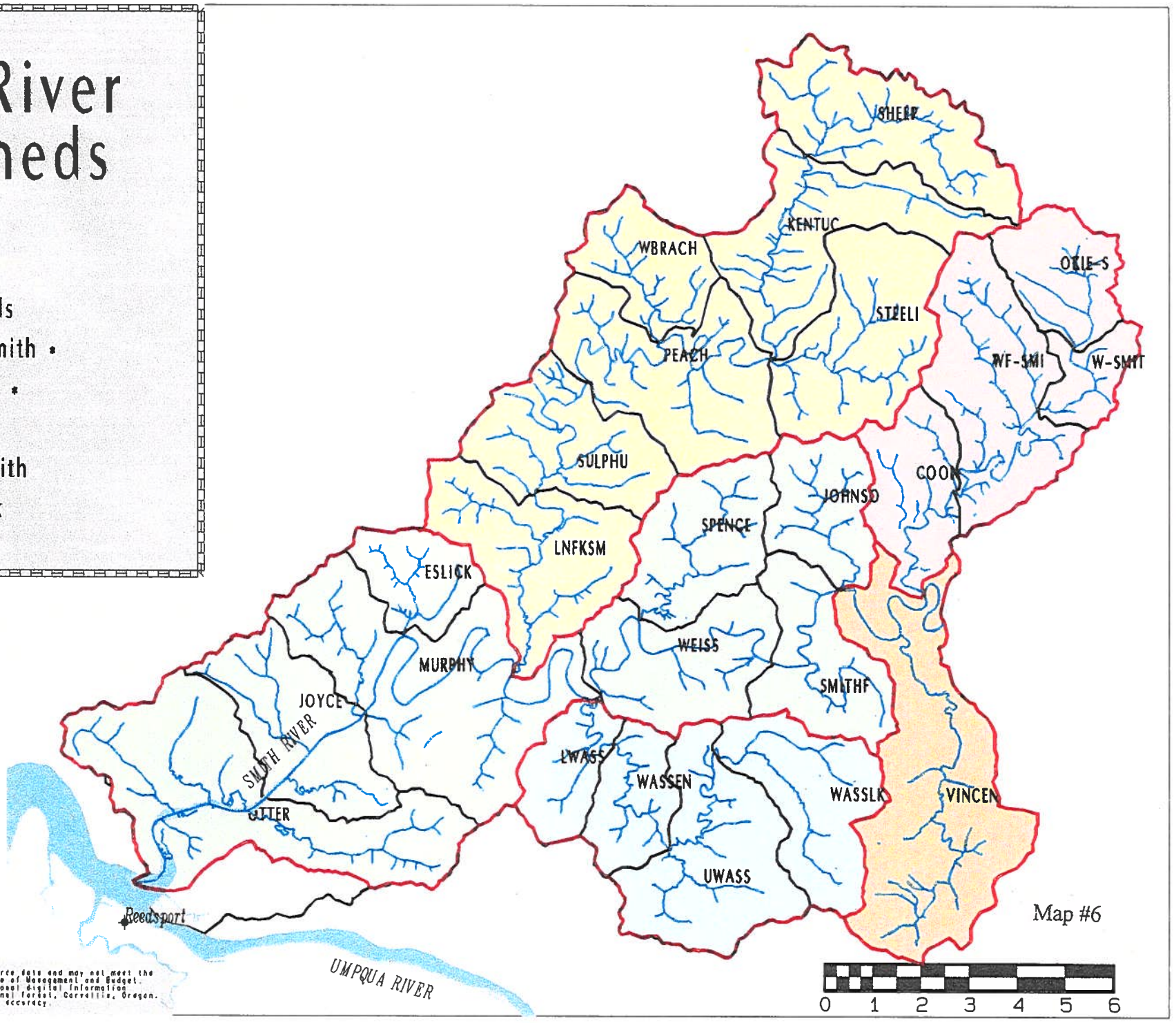
Transport reaches range from 4-8% and are confined or moderately confined. They are generally 2nd and 3rd order streams (classes 2 and 3) with perennial flow. Storage of substrates and wood in these reaches is only temporary until the next high intensity storm produces flow sufficient to move material to segments lower in the system. These reaches are relatively resistant to long term geomorphic change caused by wood and

Smith River Watersheds

- Sub-watersheds
- North Fork Smith *
- Wassen Creek *
- Lower Smith
- West Fork Smith
- Vincent Creek

* Key Watersheds

July 17, 1997



Map #6

0 1 2 3 4 5 6
MILES

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Smith River
Stream Network

- Key Watersheds
- Sub-watersheds
- Federal Lands

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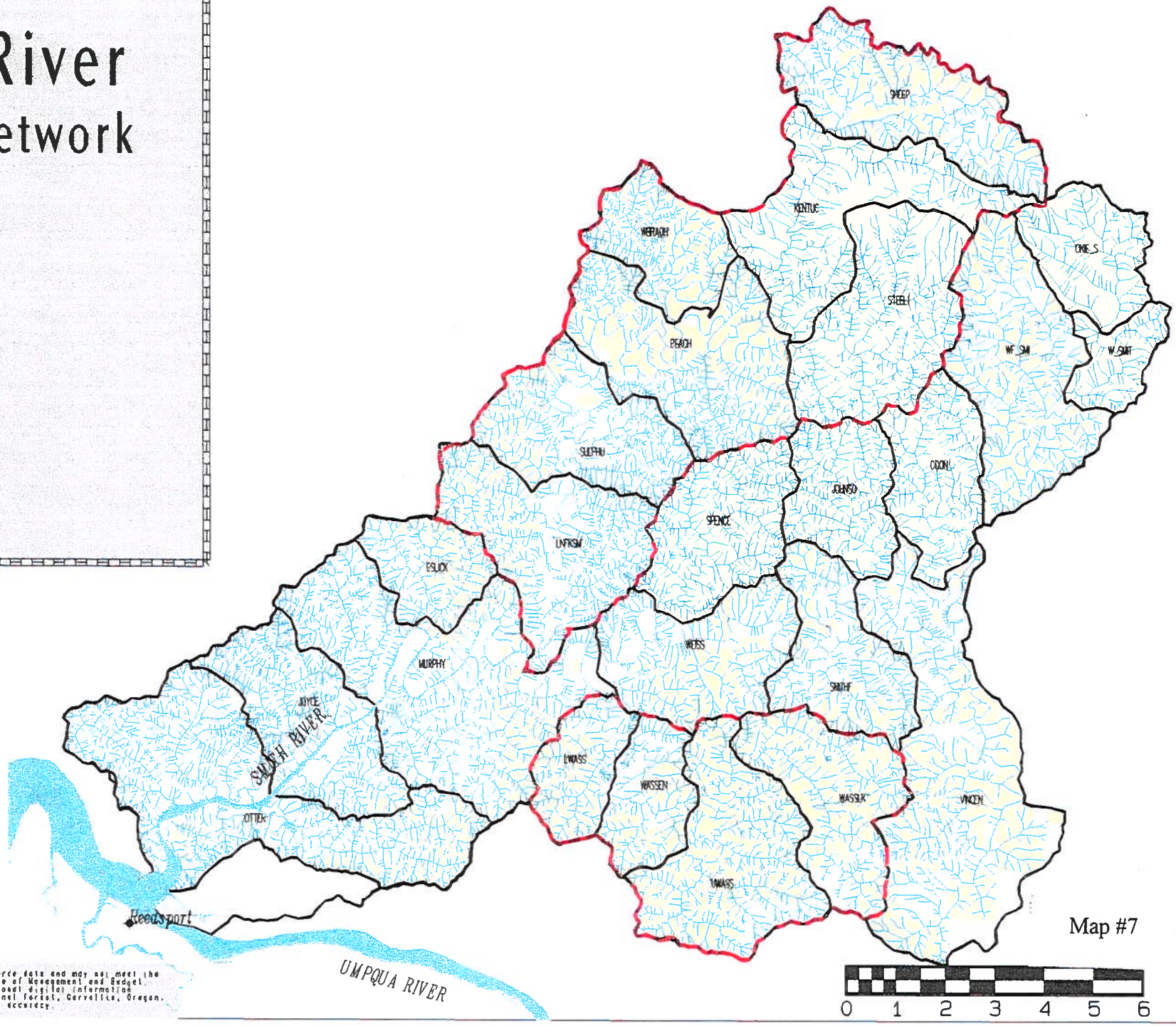

Map #7

0 1 2 3 4 5 6
MILES

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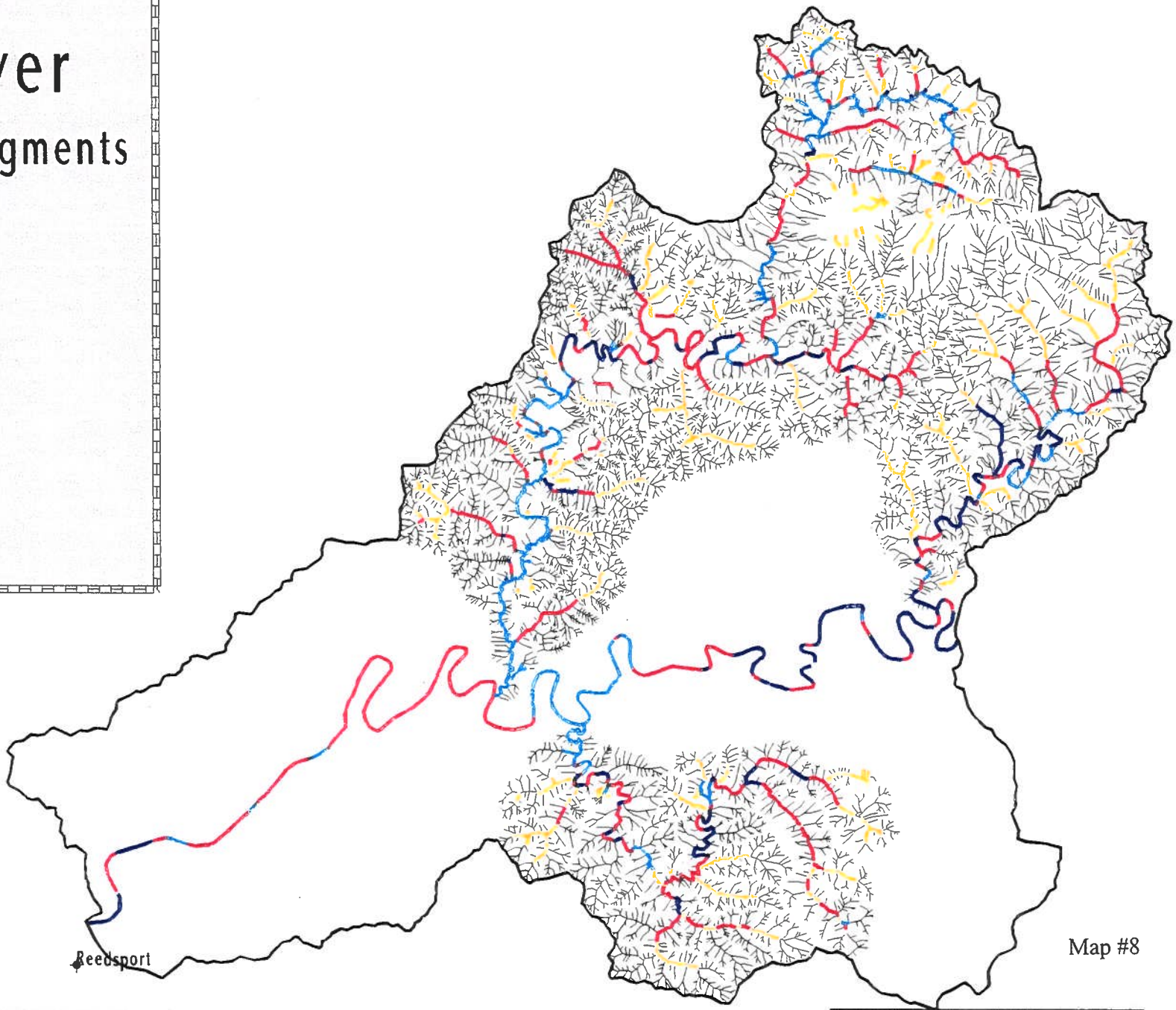
Smith River

Geomorphic Segments

- Source
- Transport
- Slow Transport
- Moderate Deposition
- Unconfined Deposition

July 17, 1997



Map #8

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substrate inputs because of the transitory nature of this material. Aquatic species tend to respond to these temporary accumulations. Riparian vegetation occurs in wider bands here than in source segments and contains a predominance of deciduous trees with clumps of conifers. These areas are most frequently utilized by cutthroat and steelhead, although coho will spawn and rear here as long as jams exist to trap gravel and provide cover.

Deposition reaches have gradients less than 4% and are moderately confined (moderate deposition) or unconfined (unconfined deposition). Although most typical deposition reaches are less than 2%, deposition areas from 2-4% serve as transitional areas from transport reaches. Found lower in the watershed in both tributaries and mainstems, these deposition reaches are usually greater than 3rd order (classes 1 and 2) and experience significant changes in morphology as wood and substrates are deposited from upstream. If functioning properly, moderate deposition reaches have good interaction with their floodplain during high flow events and can shift laterally to create long term storage areas for substrates and wood. Gravels accumulated in these areas can provide excellent spawning and rearing habitat for coho, chinook and steelhead. 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.

Unconfined deposition reaches have wider valley bottoms where more meander occurs. These are the primary chinook spawning areas, as well as places where oxbows and braided channels occur, usually serving as excellent coho and steelhead rearing and cover. Floodplains of these reaches also provide refuge areas for juvenile fish during flood events. Riparian vegetation in unconfined deposition reaches is likely to be dominated by deciduous stands with areas of scattered large conifers and occasional pockets of conifer approaching the stream.

Continuous lengths of both moderate and unconfined deposition occur most prominently in the lower mainstem of Smith River and North Fork Smith River. Of particular interest is the existence of nearly 2 miles of low gradient, unconfined deposition on the North Fork above North Fork Falls brought about by the basalt intrusive influence in this area. Longer reaches of moderate deposition occur in West Branch, Sheepherder, North Branch to the Middle Fork of North Fork Smith, Johnson (N. Fork), upper West Fork, lower Beaver, lower Gold and upper Wassen. With the exception of Sheepherder Creek, each of these streams has significant source and transport areas above moderate deposition which would indicate that historically, wood and gravel settled here and created quality habitat with some longevity. A huge debris jam that currently exists with enormous amounts of gravel behind it in the West Branch confirms this assumption for that particular stream.

An additional category was added to the geomorphic segments defined by Montgomery and Buffington to represent a fairly unique occurrence. **Slow Transport** describes

reaches that are confined but very low gradient. These areas are most often associated with the entrenched meanders seen in the upper mainstem Smith, North and West Forks of the Smith River as well as in Wassen Creek. Wood and substrates would most likely accumulate here for longer periods of time than standard transport areas and would require higher flows to move material to deposition areas below. These stream lengths are generally interspersed between deposition segments.

Low stream gradients characterize the mainstems of most channels (Map 8). Typical of stream patterns in sandstone topography, low gradient, unconfined stream channels extend almost to the headwaters of the tributary streams. In the West Fork of Smith River, the basaltic intrusive controls the gradient and longer transport sections are found (BU #3). Most tributaries into the North Fork of the Smith River are shorter and display a more highly dissected dendritic pattern (BU #4).

Several sloughs and brackish slack water areas occupy much of the lower tributaries to the Smith River, these wide estuarian wetlands help to regulate flows into the mainstem (BU#7).

DISTURBANCE PROCESSES

Erosion

Siuslaw National Forest Soil Resource Inventory (SRI) mapping for this area shows a predominance of SRI type 47 (Table 4). This mapping unit is used to describe steep, highly to extremely dissected slopes where surface soils are thin, gravely sandy loams and loams, and subsoils are thin gravely and cobbly loams. The soils of this unit are also described as having rapid to moderately rapid permeability through both surface and subsurface soils.

Other SRI units included in the area are 14 (river bottoms), 41, 42, 43, 44, and combinations of these main mapping units. Although landslide potential is rated as high in some of these other SRI units, SRI #47 is the most prone to landslide events (Badura, Legard and Meyer 1974).

As shown by landslide surveys taken after major storms on the Mapleton District, landslides are closely tied to intense storm events, especially when there is high soil moisture prior to the event (Appendix B2). In the Smith River area, dissected topography can funnel localized storm cells into subwatersheds resulting in short term, high intensity rainfall at the subwatershed scale. A study done after a high intensity event on November 30, 1975, estimated that the threshold storm intensity value needed to cause wide spread sliding was approximately 5 to 5.5" of rain in 24 hours (Pierson 1977). Intense rainfall can add water to soils already saturated leading to an increase in soil

Table 4: Characteristics And Management Recommendations For Soil Type 47

Mapped acres of SRI type 47	30,816 [1/] 1/ Approximately 50% of the WA area has mapped SRI units (USFS and some private)
Surface soil texture Subsurface soil texture	Gravelly, sandy loams and loams Gravelly and cobbly loams
Soil depth	< 3 ft
Surface soil erosion potential	Severe
Sediment yield potential	Moderate to high
Considerations for road location and construction	Steep, extremely dissected slopes; poor alignment, channel scouring, debris slides; potential damage to soil and other resources from sidecast material
Failure and erosion potential on road waste and fills	High
Potential impact from cable yarding: - no suspension - partial suspension - full suspension	 High High Moderate
Potential for regeneration	Low to moderate

water pore pressure. When downslope shear stress exerted by the weight of the saturated slope exceeds soil shear strength, the force of gravity moves material downhill. The Mapleton District puts its Flood Emergency Road Maintenance (FERM) plan into effect after 4" of rain in 24 hours.

Landslides are usually categorized as either deep seated mass movements (slump-earthflows) or shallow-rapid failures (debris slides and torrents). In the Smith River WA area, debris slides and torrents are the dominant upslope erosional process, driven primarily by the presence of steep slopes and thin soils overlaying impermeable bedrock. Because these slides occur in the rooting zone, the role of vegetation in anchoring slopes is a key factor. Debris torrents, which are confined to channels, usually start in intermittent headwater stream channels and flow rapidly downstream with tremendous force. They 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). Both debris slides and torrents may either be triggered at the top of the slope, creating an instantaneous flow of material down a track to the bottom, or they begin mid-slope and the head of the track will work its way up slope over a longer time frame. The recurrence interval for these debris slides and torrents from a single location in the Central Coast Range is on the order of hundreds to thousands of years, but intermittent pulses down previously formed tracks may occur much more frequently. Debris torrents in the Tyee Basin generally produce deposits ranging from 500 to 5000 cubic yards in size, averaging about 2000 cubic yards.

Valley width, channel gradient and tributary angle influence how far a debris torrent travels and where it will deposit its load. Periodically, large torrents will enter lower mainstems from steeper side tributaries and will set up at the confluence. Remnants of these fan-shaped deposits can be seen throughout the Coast Range at tributary mouths. Depending on the volume of material, the sudden introduction of a debris torrent can permanently shift the flow direction of an unconfined mainstem stream, forcing flow into the flood plain. Torrents deposited in more confined mainstems can result in a dam break flood that temporarily impounds water and sediment, but then breaks through to create a large flood wave down the stream channel (Montgomery and Buffington, 1993). Presence of large conifers in the mainstem riparian zone have an important buffering effect on the torrent impact as it reaches the confluence. Standing large conifers can often dissipate the massive force of a torrent, lessening its effect to the mainstem. All of these processes operate as part of the natural erosion regimes in this analysis area.

Lower reaches impacted by large torrents will be aggraded by an influx of sediment, especially where large wood sets up in a complex arrangement. Gradually the deposit that forms behind this complex will degrade as the stream downcuts through the deposit. This cycle of aggrading and downcutting may take anywhere from tens to thousands of years in a single location depending on the size of the deposit and the flow regime of the channel. In addition, there may be several deposits at various nick points along a healthy stream, each at a different stage of downcutting or aggrading. This creates a pulsing effect of wood and substrate down through the system, fed by upslope erosional processes.

Slump-earthflow terrain also exists in this watershed, most prominately in the southeastern portion of the analysis area (Upper Wassen and Vincent Creeks) where slopes are smoother, lower gradient and less dissected. They generally occur in deeper, finer textured soils, are often related to geologic faults and joints and usually form landscapes described as "hummocky". These larger, deep seated movements tend to rotate around a curved plane of weakness, often forming a crescent-shaped scarp at the upslope end, cracks on the sides and a bulging toe at the downslope end. Ponds occasionally form just below the head scarp. Subsurface hydrology of these earthflows is extremely complex and difficult to predict. Like shallow rapid landslides, they are susceptible to increased pore water pressure from intense storms that provide rapid influx of water, but their movement is usually characterized by intermittent surges of movement caused by peaks in subsurface water level as opposed to one time shots down the hill. Where shallow rapid landslides are characterized by movement on the order of feet per second, active earthflows move on the order of feet per year.

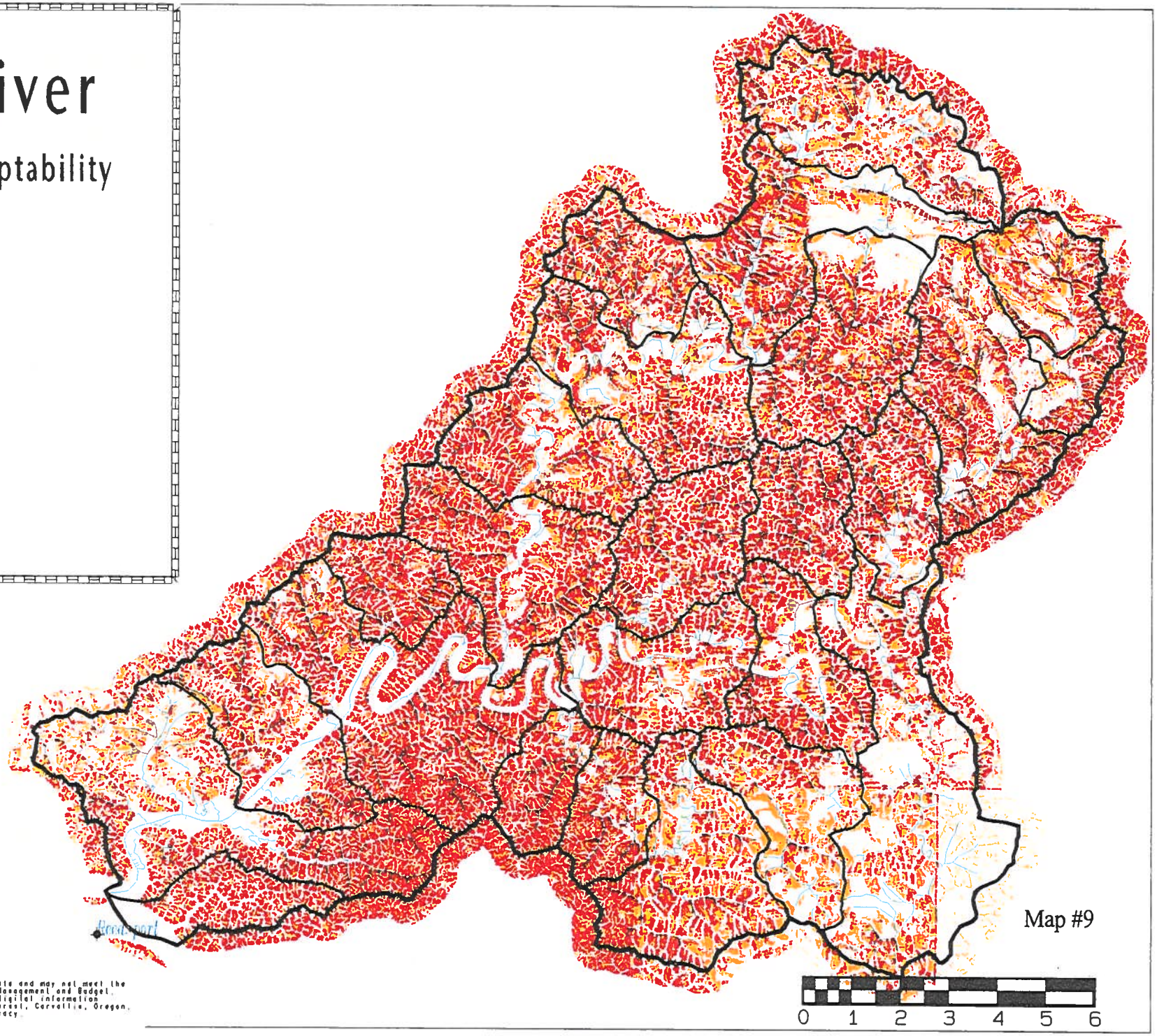
Map 9 shows the results of a model used to estimate shallow-rapid landslide susceptibility in the Smith River watershed. This landslide susceptibility model is based on relationships between slope form and slope gradient (Appendix B3). Areas in red (Map 9) represent planar and concave slopes greater than 65% which have the highest susceptibility for failure. It should not be assumed that slides will occur only in marked

Smith River

Landslide Susceptability

- Low Risk
- Moderate Risk
- High Risk

June 25, 1997



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areas of this map. However, this information, coupled with data from past landslide surveys and stream surveys, provides 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 analysis of slope stability should occur at the project level. This map does not identify areas of possible slumps.

Fire

This portion of the Coast Range has the highest potential for lightning caused fires. Three fires earlier this century have been documented (Juday 1976, Price 1996), the Smith River Fire (1938), Vincent Creek Burn (1951), and Oxbow Burn (1966) with at least the Smith River Fire caused by lightning.

Fire history maps from 1840 indicate less patchy vegetation than the mid 1900s (Teensma, 1991). The vegetation pattern in this area consists of a mosaic of stands of a variety of size classes in patches less than 100 acres. Historic aerial photos from the 1940s and 1950s indicate that fires tended to move rapidly across the landscape jumping the creeks and burning south facing slopes and ridgetops. Photos following the Smith River Fire show south facing slopes regenerating in even aged Douglas-fir and north facing slopes and riparian areas unburned with mature trees of at least 100 years age.

A fire history analysis was completed (Price 1996) to support the West Fork Smith River Watershed Analysis. Ring counts from 51 stumps in five plantations document fire scars back to 1769 and regeneration dates back to 1641. The evidence was supplemented by cadastral survey notes and historical records. Periods between fire ranged from 7 to 123 years. The average time between fires for individual sites ranged from 22 to 123 years. When data from all sites are pooled, the average time between fires was 48 years. Evidence of underburns was considerable. It is unknown if the fires were lightning or human caused. No information is available to support either native or non-native American fire use in the fire history analysis area.

Fire history maps from 1840 indicate less patchy vegetation than the mid 1900s (Teensma, 1991). The vegetation pattern in this area consists of a mosaic of stands of a variety of size classes in patches less than 100 acres. Historic aerial photos from the 1940s and 1950s indicate that fires tended to move rapidly across the landscape jumping the creeks and burning south facing slopes and ridgetops. Photos following the Smith River Fire show south facing slopes regenerating in even aged Douglas-fir and north facing slopes and riparian areas unburned with mature trees of at least 100 years age.

Wind

Wind which causes blow down of forest trees, is less important as a disturbance agent in this watershed than fire. Watersheds with a northeasterly orientation, such as the North and West Forks of the Smith River tend to receive significant winter storm events and the windward slopes are subject to significant blowdown events.

The Columbus Day Storm (Hurricane Frieda) of Oct. 1962 brought hurricane force winds from the SW, causing blowdown on thousands of acres of forest land. A major windstorm in the 1950's, on mostly BLM managed areas in the West Fork of Smith River, also resulted in significant blowdown. Both of these storms had their worst impacts up major tributary streams which had a SW-NE orientation and blew down timber on the dominant windward slopes.

Insect and Disease

Laminated root rot, caused by the fungus *Phellinus weirii*, is found lightly scattered throughout the analysis area. Intensified outbreaks of this naturally occurring pathogen, may be associated with periods of drought. Dense, pure Douglas-fir stands are more prone to this disease.

Swiss Needle Cast (*Phaeocryptopus gaumanni*) is on the increase in coastal forests, possibly as a result of several years with above average precipitation. It is expected that Douglas-fir within a few miles from the ocean (possibly within the Sitka spruce zone) are more at risk for defoliation and growth loss. (Hansen 1997).

Douglas-fir beetle (*Dendroctonus peudotsuga*) is endemic to the Coast Range and can be expected to operate in areas where trees are weakened or killed such as around windthrow pocket and in patches infected by *Phellinus weirii* (Hostetler 1996). Photos from 1936 from fire look out show that Baldy Mountain was a carpet of mature conifer with patches of fresh snags and note on photo says Douglas-fir bark beetle documentation (district historic photos file).

BIOLOGICAL COMPONENTS

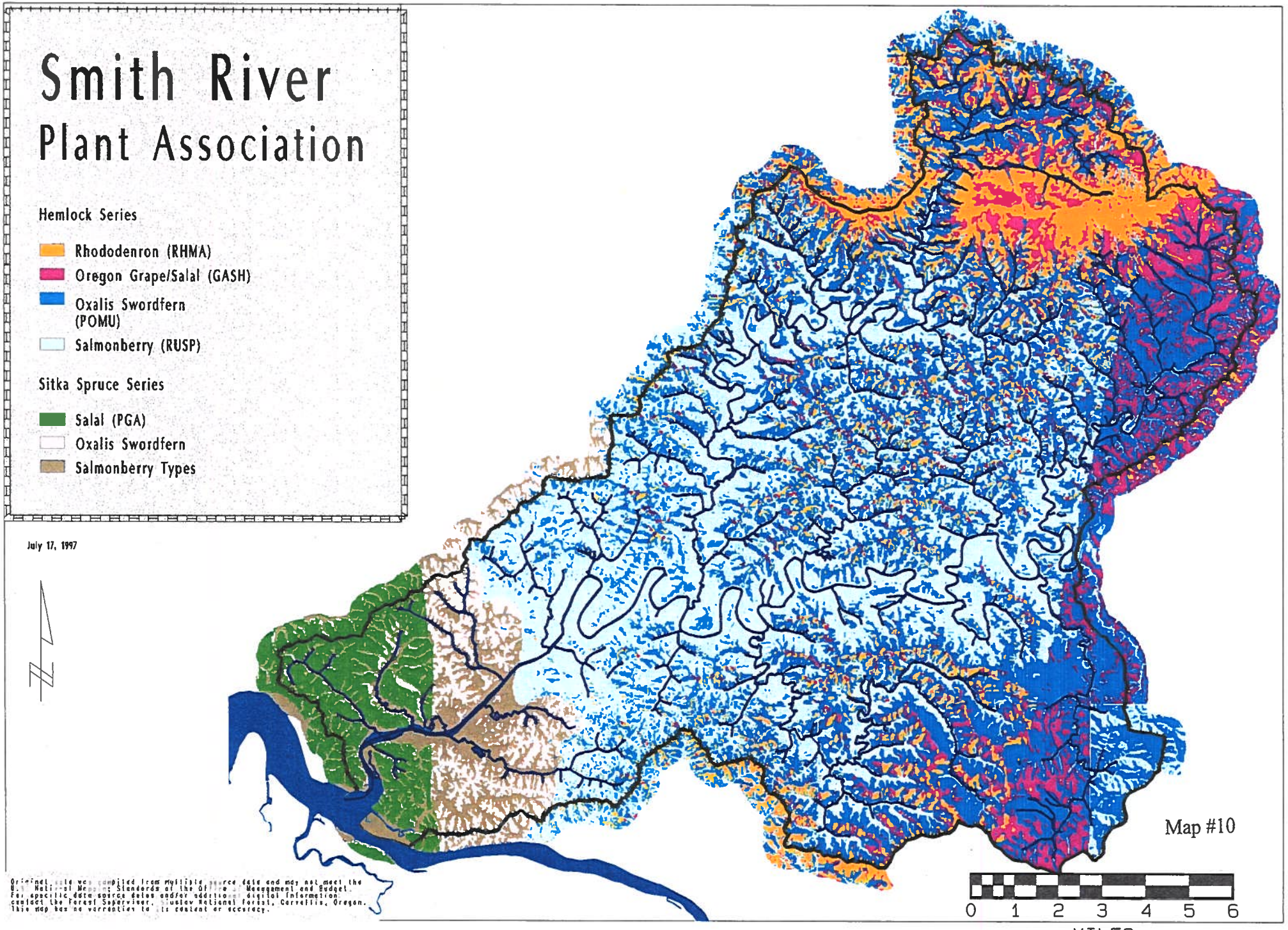
Vegetation

The majority of the watershed is a western hemlock climax plant series. The southwest portion of the watershed, however, is a Sitka spruce climax plant series.

A model of the potential natural plant association groups (PAGs) that are expected to occur in this analysis area display a spatial arrangement of plant groups on the landscape (Map 10). The model represents an initial attempt to map PAGs in the Coast Range. However, for this analysis, little field verification of the model was done. Site adjustments were made based on one field trip. With more field work, the PAG map would be refined and better understood.

The Smith River watershed is considered one of the driest areas on the Siuslaw National Forest. The impression is that the vegetation represents dry plant communities. The

Smith River
Plant Association



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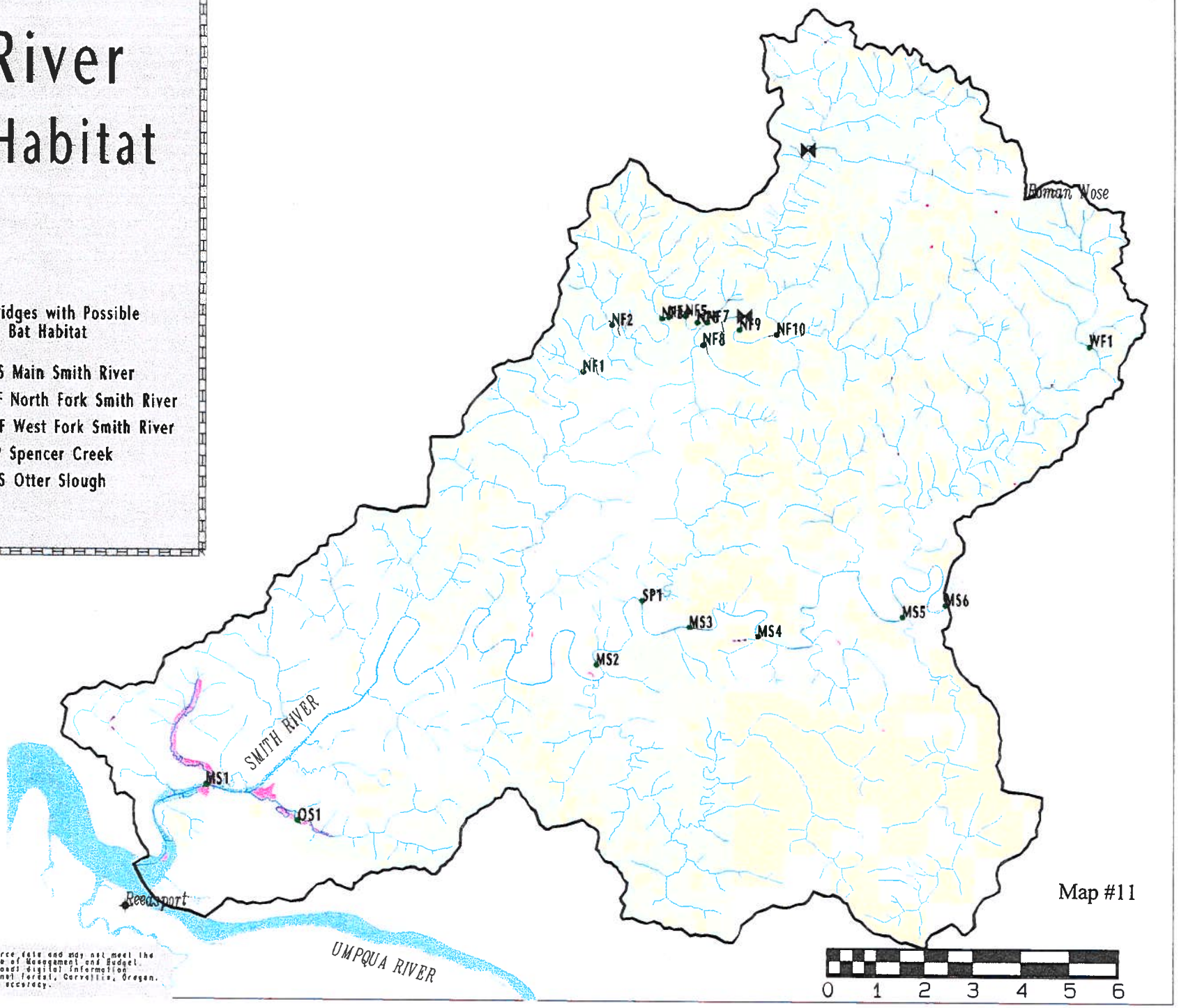
Smith River Special Habitat

- Vole Habitat
- Federal Lands
- Ponds
- Marshes
- Rock Outcroppings
- Bridges
- Poalaxaflora Sites

Bridges with Possible Bat Habitat

MS Main Smith River
NF North Fork Smith River
WF West Fork Smith River
SP Spencer Creek
OS Otter Slough

July 17, 1997



Map #11

PAG model, however, indicates that by far the most common environments in the Smith River watershed are the western hemlock wet and moist environments (Table 5). Although the area seems dry when compared to the rest of the Forest, the PAGs indicate the Smith River watershed is a relatively moist forest ecosystem.

The high ridges have rhododendron and salal plant associations while the midslope positions are dominated by swordfern communities. Repeated burns may decrease nutrients and encourage rhododendron but it is unknown if that applies in this topography. The sharp ridges are accompanied by shallow soils and high temperatures. Many individual rhododendrons grow in the southern part of the Forest, but to be typed a dry environment, rhododendron must be greater than 5 percent of the vegetation cover. Dry PAGs actually cover a small portion of the analysis area and occur primarily on ridgetops at the top and flanks of Baldy Mt. (Map 10, Table 5).

Table 5: Distribution of PAGs in the Watershed

PLANT ASSOCIATION GROUP	PERCENT OF AREA
Western hemlock -wettest	33
Western hemlock -moist	38
Western hemlock -dry	13
Western hemlock -very dry	10
Sitka Spruce -wettest	1
Sitka Spruce -moist	1
Sitka Spruce -driest	4

The drier PAGs correspond to some of the biophysical delineations that help to describe the watershed. BUs #1, #2, and #3 around the higher peaks, show rhododendron understory communities dominating. The SE portion (BU #5) also is dominated by rhododendron PAGs. Whether the east-west moisture gradient or the difference in geologic type or landform results in this change in plant community is not known. In addition, the Sitka Spruce Series resulting more than anything from the coastal climate influence, dominates much of BU # 7.

Vegetation throughout the watershed is unusual for the western hemlock series in the central and southern portions of the Siuslaw: First, hemlock is more abundant in the understory (Table 5), while north of the Siuslaw River, hemlock is generally rare in the understory. Second, multiple age cohorts are common over natural stands in the watershed (especially north of the Smith River) resulting from mixed fire severity. North and east aspects commonly have older age cohorts and larger trees which survived the last fire. South and west aspects have even aged forests with smaller trees. This results from a combination of a fire and moisture patterns. The oldest trees are found in the northern portions of the watershed in the Kentucky and Sheep sub watersheds. A third more common but striking element is the abundance of cedar on north aspects and moist environments, but almost absent elsewhere.

Table 6: Average Trees Per Acre By Species

Tree Species	One storied stands	Two-storied stands
Douglas-fir	69	24
Western hemlock	25	40
Western Redcedar	9	25
Red alder	13	19

The Forest has sampled approximately 100 stands in the Smith River watershed for vegetation structure. Relative to most of the district (e.g. the North Fork Siuslaw and Indian-Deadwood watersheds), the data indicate that the western hemlock and red cedar component is high (Summary of Inventory Data -VRS, Ecoplots) (Table 6).

Succession and Stand Development

Forest stand structure and composition are a function of topographic condition, fire frequency and severity, seed source availability, brush competition and insects and disease. This section describes some of these factors that influence natural vegetation patterns in the watershed.

The succession and stand development differs somewhat from other areas of the District, because mixed severity fires resulted in partial mortality in many stands across the watershed. Unlike a stand replacement fire, this intermediate disturbance set succession only part way back and created an excellent seedbed for western hemlock. Partial mortality created many two-age cohort and multiple age cohort stands, by passing the early seral stage.

The wet environments (salmonberry PAGs) have an elongated early seral (shrub) stage. This may be related to steep topography of the Smith River Analysis area. A study on the Mapleton district used 9,400 plots to examine the competitive interactions between Douglas-fir and salmonberry. The study revealed that topographic variants of salmonberry-dominated plant association that result in stands where salmonberry excludes Douglas-fir indefinitely exist. They occurred when topographic shading in narrow drainage bottoms reduces photosynthetic output of Douglas fir during winter when salmonberry has lost its leaves. Winter photosynthesis may be critical for conifer growth in situations where salmonberry competition is severe (Hemstrom and Frazier 1987, Frazier 1986).

Coarse Woody Debris (Snags and Downed Logs)

The Smith River watershed is part of the Southern Interior/Valley Margin Zone (CWD Group 4) in Coarse Woody Debris Groups for the Siuslaw National Forest, (Wright, 1997) and has naturally low amounts of CWD compared to the rest of the Forest. These areas have a complex disturbance regime, and therefore the story of CWD is complex. The live volume and site productivity are lower than elsewhere on the Forest. The

watershed is primarily site class 3 and 4, based on silviculture exams completed primarily by the Coos Bay BLM. Decay rates may also be lower due to prolonged periods of drought in the summer. The CVS and ecoplot field data indicate a wide range of CWD, 4,500 to 5,800 cu.ft./ac., which could be due to the patchy effects of the mixed fire severity or to the small sample size.

This area is also the most variable in CWD levels described for the Forest. Field data indicates CWD amounts had the highest variability among sampling sites. The Southern Interior Zone has more frequent fires and younger, smaller trees. The area has a mixed severity fire regime that leaves a patchy mosaic on the landscape. In some places, fires are low severity leaving considerable surviving remnants, while in other places the fires are almost stand replacement. This fire-coarse woody debris cycle would produce smaller pulses of woody input, and more rapid recovery of the live biomass. We expect smaller pieces, and a more frequent supply of CWD with faster nutrient cycling and snag and log recruitment than most of the Forest which has more infrequent, stand replacement fires.

Wildlife

The species which evolved in the Coast Range environment were primarily forest-dependent species. Many species, particularly large carnivores such as the grizzly bear, wolverine and wolf, inhabited the watershed prior to non-native American settlement, but have since been extirpated from the Coast Range.

Species which are strongly associated with old growth forest ecosystems were likely at stable population levels during the early 1800's. Following major disturbance events, such as fire, these species would have been displaced to adjacent unburned areas, which acted as refugia while the burned areas recovered. Patch sizes were sufficient in size to support stable populations for relatively long time periods. Map 16 shows the vegetation types and their distribution in the watershed in 1940. Although the map shows some settlement-related fires, it gives us an indication of the patch sizes on the landscape prior to non-native American settlement.

Wetlands are associated with the tidal influence zone in the lower portions of the watershed . These areas (Map 11) are dominated by grass and forb vegetation and support a variety of species such as songbirds, waterfowl, amphibians, bats and aquatic species. Since the Coast Range lies along the Pacific Flyway, these wetlands were likely used extensively for overwintering and breeding.

Early seral habitat types were relatively short-lived following a large fire event and generally converted back to a forested condition within 30 years. During this time period, populations of edge-associated species, such as deer, elk and grouse, likely increased and then returned back to stable levels as the forests regenerated. Historic records indicate that Roosevelt elk were abundant throughout western Oregon in the early 1800's, prior to the arrival of settlers.

Many early seral associated species, as well as non-native species (plant and animal) and species which have expanded their ranges westward with settlement (i.e. opossums, barred owls, cowbirds), were uncommon or absent from the watershed prior to the mid-1800's.

Fisheries

Boulders, cobbles, and gravels derived from rocks of the Tyee Formation, break down in streams in tens to hundreds of years, depending on the rate of bedload movement. Larger sediment sizes are generally found in the source reaches, or near where they enter the stream if they were deposited by debris torrents from side channels. Substrate material of gravel size or larger that is derived from igneous intrusive materials is slow to weather and break down, so stream sediments in these areas have large substrate sizes, particularly in the headwaters of the West Fork of the Smith River.

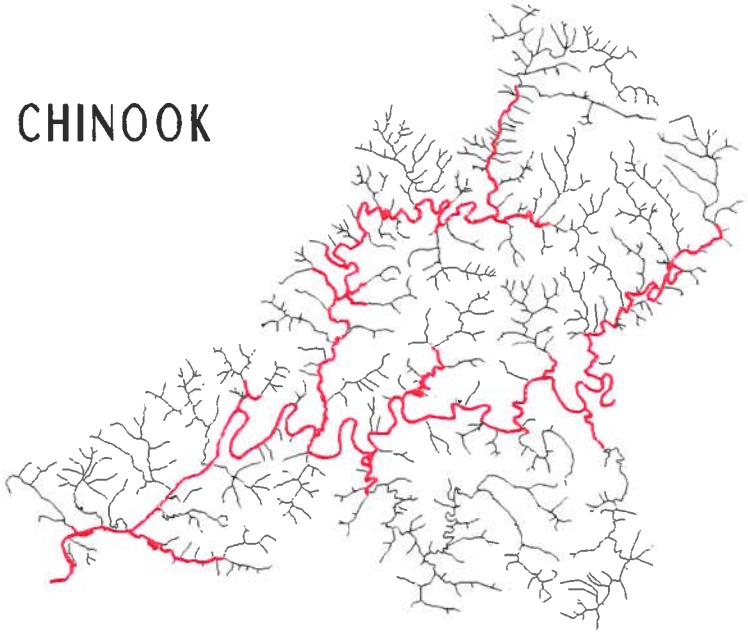
Riffle substrates in moderately confined and unconfined depositional reaches in a reference condition are dominated by gravels and cobbles with small amounts of fine sediments, sands and silts. This provides a quality environment in which fish can spawn and leads to more successful egg development. Substrates in the stream channel also trap detritus and thereby increase food production. Gravels and cobbles also help to maintain cool water temperatures by allowing groundwater in the substrates to mix with surface waters.

In a reference condition, abundance of large woody debris (LWD) varies through time across the landscape as a function of disturbances in both stream channels and LWD source areas on hillslopes and streambanks (Appendix D1). Following wildfires, levels of large wood available for introduction into stream channels were high and would provide significant recruitment in the short-term. In the reference condition, many channels already contained high levels of persistent large woody debris where fire introduced wood would have accumulated. In the long-term, until source areas recover, following a wide-scale wildfire, levels of large wood in stream channels may decline to levels approaching that of terrestrial coarse woody debris.

In a reference condition, a relatively continuous riparian canopy shaded the stream channels, maintaining cool stream temperatures, optimal for native aquatic communities. Stream temperature is similar to the groundwater temperature, possibly in the 50-55 degree F range. Riparian groundwater recharge and release, aided by beaver activity and substantial large woody debris loading of the channel and floodplains, prevents large temperature fluctuations on a daily and seasonal basis.

Native fish species known to occur in the Smith River Watershed include: Chinook salmon; coho salmon; steelhead; Umpqua cutthroat trout; four species of sculpin; speckled dace; long-nosed dace; Pacific lamprey; western brook lamprey; redside shiner;

CHINOOK



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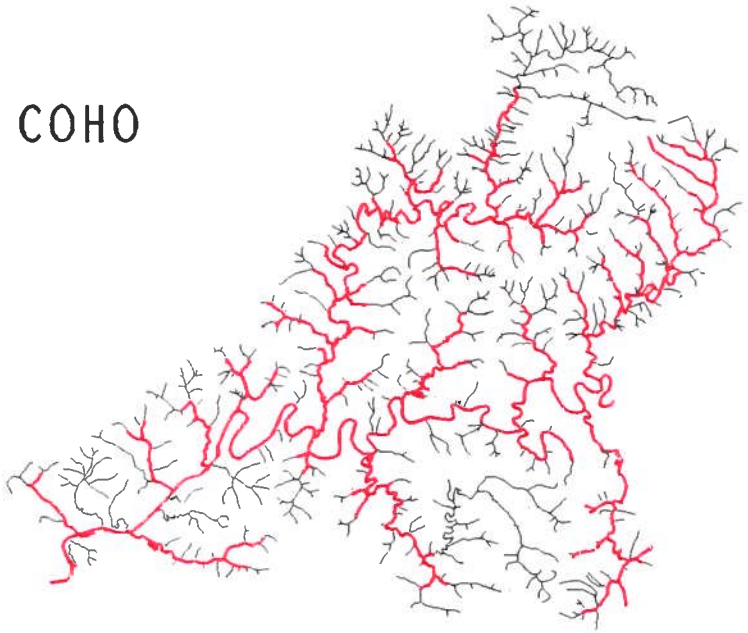
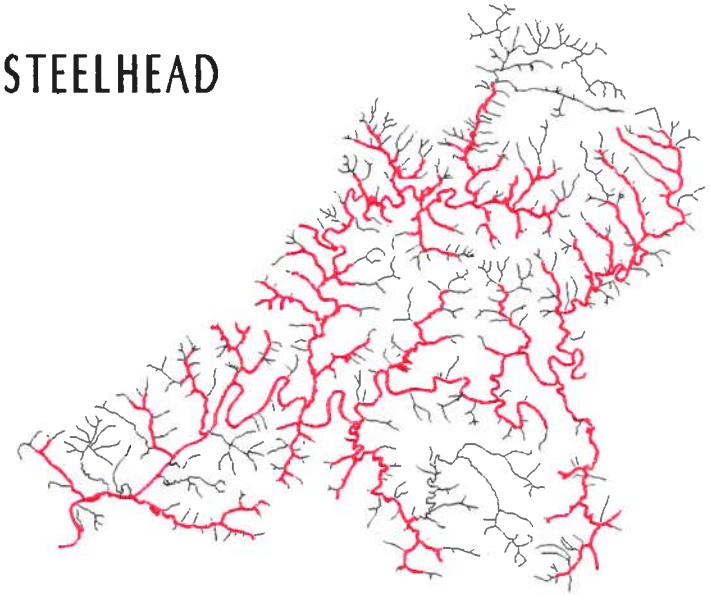


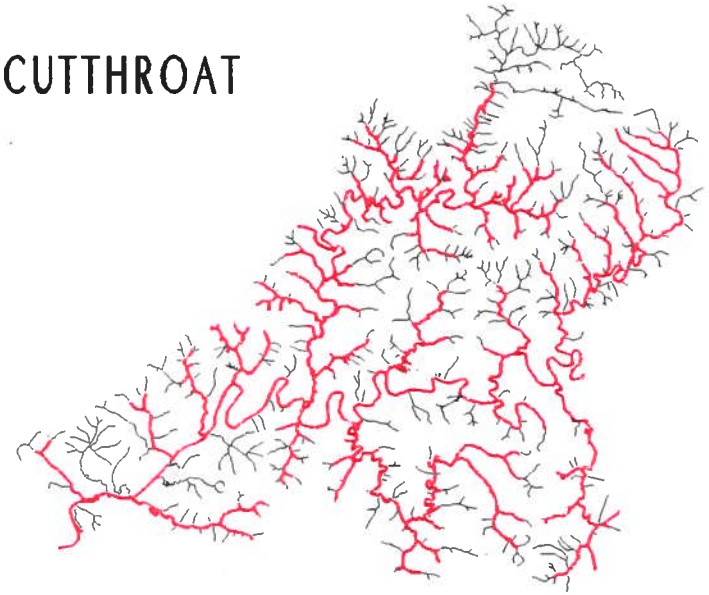
SMITH

Historic Fish Distribution

STEELHEAD



CUTTHROAT



Map #12

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Umpqua squawfish; large scale sucker; three-spined stickleback; green sturgeon and white sturgeon.

Aquatic species were well distributed. Low gradient streams extend far into the valley headwaters. Igneous rock intrusives resulted in three significant fish passage barriers within the watershed. The waterfall in the North Fork of Smith River is impassable for all fish species. However, there are resident cutthroat trout above this barrier. The stair step (Devil's Staircase) in Wassen Creek restricts movement of anadromous fish upstream, but allows genetic transfer from the resident trout populations above the area which sometimes move downstream. The falls in the mainstem of the Smith River was historically at least a partial barrier to chinook.

Chinook salmon generally occurred in the lower to middle mainstem reaches of Smith River, as well as some of the larger tributaries such as the North and West Forks of the Smith River (Map 12). Coho salmon and winter steelhead distribution patterns are nearly identical to each other, and both show extensive use of the watershed for spawning and rearing. These species are capable of utilizing smaller tributaries as well as mainstem areas and large tributaries. Steelhead can use slightly more area by utilizing the steeper gradient tributary streams. All moderately confined and unconfined depositional areas, and most transport reaches were utilized (Map 8). Cutthroat trout distribution overlaps those of chinook, coho, and steelhead and extends beyond them into the Wassen Creek sub-watershed above the falls at devils staircase. Cutthroat populations below barriers are most likely sea-run and resident, while those above barriers are resident.

The National Marine Fishery Service (NMFS) conducted a status review of the Umpqua River cutthroat trout (the trout that utilize this watershed) which was completed in June 1994. On August 9, 1996, the Umpqua River cutthroat trout was listed as "endangered" under the Endangered Species Act. This evolutionary significant unit includes anadromous, potentially anadromous, and resident cutthroat trout populations occurring below natural, impassable barriers in the Umpqua Basin. Critical habitat has not been proposed or designated.

Anadromous salmon and trout distribution would be temporarily blocked in some streams from log jams, landslides, and beaver dams. Likewise, aquatic species richness and diversity fluctuated in the watershed responding to changes in habitat capability and disturbance, especially floods. Water temperature was not likely a significant limiting factor to full occupation of salmonid habitat. In a reference condition only a small portion of the watershed restricted distribution or capability at any time. If some habitat was restricted, there was sufficient refuge habitat in undisturbed areas adjacent to the larger scale disturbances. Natural disturbance events were episodic and infrequent with larger scale events occurring more infreqently. Habitat recovery was relatively swift. Native aquatic species have evolved to accomodate these natual disturbance events through migration or rapid colonization.

CHAPTER IV: HUMAN INFLUENCES ON THE LANDSCAPE

Settlement

Settlement developed in the early 1850's along the Umpqua estuary and on lower Smith River, tidal reaches of Smith River were attractive to a number of Donation Land claimants. They could use this sluggish stream for water transportation to their farms in the forests of the Coast Range. The lumber community of Gardiner, Oregon, became the site of commerce and industry in the early 1860's and for the next fifty years was the principal community on the lower Umpqua. (Beckman, Toepel & Minor, 1982). By 1875, most of the bottomland adjacent to tidal sections of the Smith River had been claimed.

Families of the original homesteaders have remained in this watershed. The strong attachment and commitment to this area is readily apparent by multiple generations of families remaining in the area. Existing homesteads still maintain the original homestead character.

Transportation advanced as technology advanced. The first and natural transportation methods were by sea and by the rivers, including lumber schooners, steamers and tugs. By the 1880's T. Egerton Hogg's Oregon-Pacific Railroad connected Yaquina Bay to the Willamette Valley. In 1912, a spur line of the Southern Pacific reached west into the Siuslaw watershed to Cushman then turned south along the eastern degree of a series of lakes to cross the Umpqua into the new town of Reedsport and, by 1916, to Coos Bay. This line opened western Lane, Douglas, and Coos counties to the Willamette Valley and increased commerce.

Agriculture

The mainstem of Smith River and some of the major tributary streams were the first areas to be cleared for homesteads . Trees were harvested by early settlers to open up fields and to construct buildings on their homesteads. The fertile bottomlands were cleared and turned into vegetable gardens, hay fields, or pastures.

Much of the bottom land was wetland and had to be drained prior to farming operations. Dikes were constructed along the mainstem of the Smith River to control access of the river to these floodplain areas. The land level was raised behind the dikes by either dredging sediments from the Smith River channel or by bringing soil down from the hillsides in flumes (pers. communication public meeting 1/97).

The dairy industry was a major industry in the Smith River watershed in the early 1900s. Milk was shipped by boat to the cheese factory in Reedsport. As milk prices declined, the dairy declined while the beef industry rose.

Logging and Road Building

Of all economic ventures in western Oregon since the 1870's, logging has dominated as the major business enterprise. Commercial logging operations began around the 1860's. At first, axes and crosscut saws were used to fell trees. After felling was completed along the Smith River, the logs were propelled into the river with jackscrews. They were rafted to lumber mills at Gardiner City. On sites away from the river, logs were moved by oxen or bull teams either directly to the river or to railway lines that served as an intermediate transportation system to the rivers. Steam donkeys also came into use. The logs were towed down river to the mills by tugboat. Some use of logs dumps and log rafts on the Smith River continued until the late 1970's.

Railroad logging was an important method of transporting logs out of the coast hills to the river through the 1930's. The Jewett Milling Company of Gardiner constructed four miles of track which it used from 1917 to 1927 (Beckman, Toepel & Minor, 1982). "Camp 7" was a well known railroad logging camp located at the mouth of the Hudson Slough. Logs were transported on the Camp Seven rail and dumped into the Smith River at the mouth of Hudson Slough. Railroad logging also occurred in Noel Creek, Joyce Creek, Hudson Slough, Franz Creek and maybe Eslick Creek and continued to 1937 (Smith Watershed Analysis Public Meeting Notes, 1997) and (Map 13). Evidence of trussles and log dump pilings still remain in places.

As the logging effort went deeper into the forest, in addition to railroad tracks, splash dams were built on a few tributary streams as a relatively inexpensive means to transport logs down these small waterways (probably early 1900's). In this method, logs were gathered until the water rose behind the dam. When sufficient water was captured, the splash dam was released and the head of water propelled the logs downstream. Logs drives were essentially the same process except that no structural dam was constructed. These methods were detrimental in that they flooded the upstream terraces, then after being released downstream left a large amount of debris in side streams and scoured the stream channels down to bare bedrock. Dynamite was used to remove obstructions like boulders and to break up frequent log jams. In this manner, the channel was smoothed out to facilitate the movement of logs. There is documentation of one splash dam operating on Johnson Creek until 1916-1917 (Public Mtg. notes, 1997) and one just below Gold Creek on the West Fork of the Smith River (USDI 1996b) and two on Vincent Creek (USDI 1996a). It is suspected that the North Fork of the Smith River and other large tributary streams had log drives due to the absence of boulders in these systems and the extent of bedrock exposed. In the 1950's to 1960's, three locations along the mainstem of the Smith River were reviewed as potential dam sites.

A consequence of this practice was the destruction of evidence about Native American cultural activity along streams (USDI 1996a).

Many small to medium intermittent mill operations were scattered along sloughs and tributaries from the turn of the century through about the 1950's. Many of these were family based. Tributary streams or sloughs were dammed to provide a floating pond for

logs destined for the mill. The earthen dams were 50 to 80 feet in height. Evidence of some of these storage ponds can still be seen today. Eight of these mill sites are located on the Historic Map (Map 13).

One of the two most important mill sites in central Oregon coast prior to 1900 was on the lower Umpqua River. The other mill site was on the Siuslaw River. In 1864, the Gardiner Mill Company constructed a sawmill at Gardiner near the confluence of the Smith and Umpqua rivers. In September the firm sold its first lumber, a cargo of 53,907 feet, for the San Francisco market. The Gardiner plant was purchased by Charles Hanson in 1868 and then in 1871 by entrepreneur, Asa M. Simpson. Under the latter businessman's control, logs flowed through the saws at Gardiner and the lumber of the south-central coast began moving out to markets around the world. The mill prospered under Simpson. Simpson also had retail yards at Stockton and Sacramento and other sawmills at Astoria, Knappton, South Bend, Grays Harbor, and Renton. Eventually, he had more than fifty schooners, barkentines, tugs, and one clipper ship in his fleet. He dominated the coastal lumber trade until his death in 1914. From 1902 to 1919 the Gardiner Mill produced a range of 8,226,000 to 20,000,000 board feet of lumber per year. Wilson Jewett bought out Simpson and continued the improvement of this plant. (Beckham, Toepel & Minor, 1982)

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. In 1916, lands on the eastern portion of the watershed came under federal management through the Chamberlain-Ferris Act. Those lands came under jurisdiction of the Bureau of Land Management in 1946 (USDA, 1996b).

Some logging of National Forest lands may have begun in the early 1900's. Small sales were often negotiated with land and mill owners and all harvests were concentrated near the valley bottoms and lower slopes. One of the larger, older plantations was a 459 acre unit in the Murphy Creek area. It was logged in about the 1920's by private owners, probably logging up the slopes as far as they could reach, pulling logs downhill with their tractors and cable. It was turned over to U.S. Forest Service ownership, possibly as a result of homestead requirements not being met.

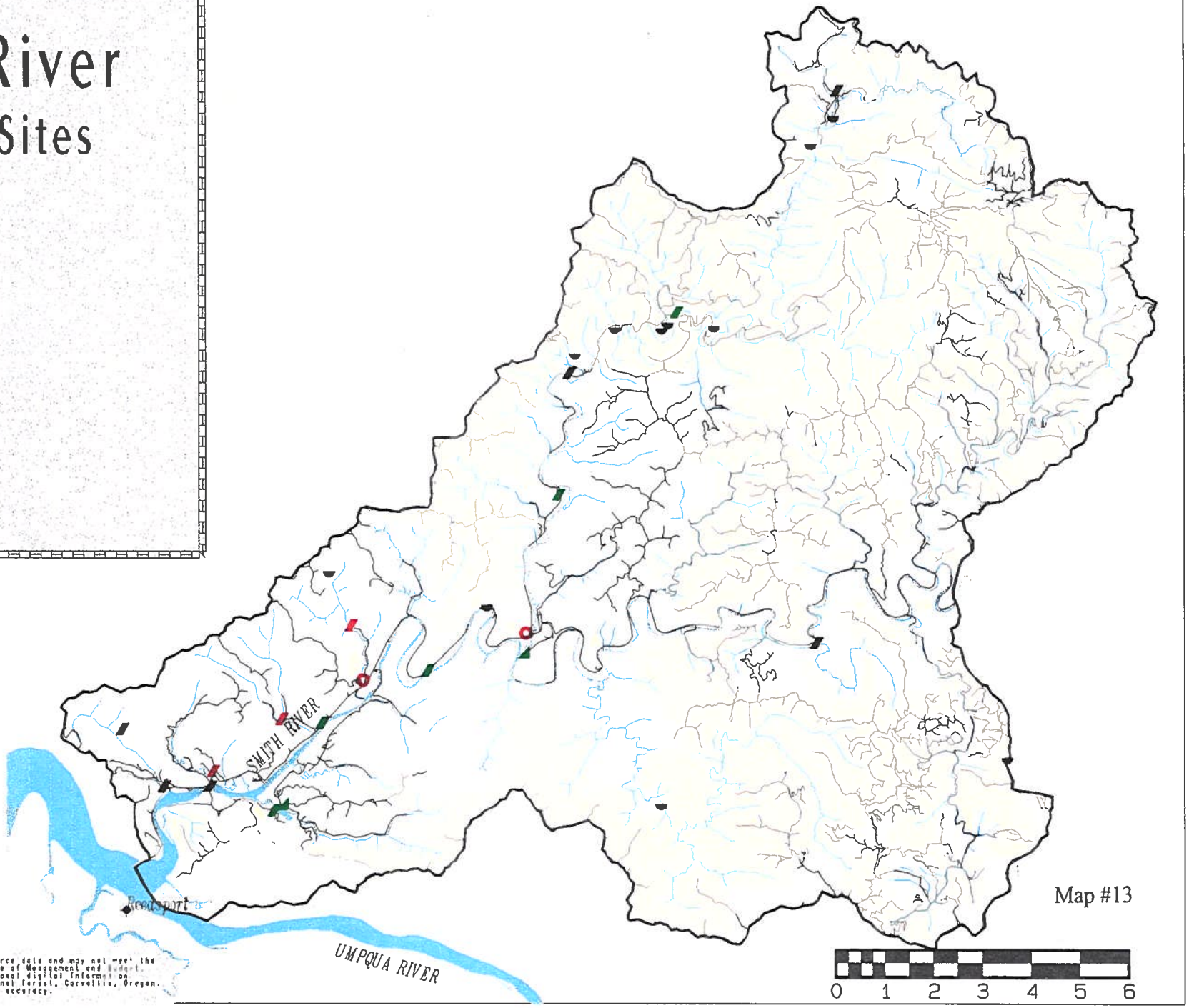
In response to the larger demand for lumber , political pressure was exerted on national forests in the 1950's to provide wood to offset some of the growing demands. The harvest of national forest acres increased rapidly (Table 7) (Map 14).

Extensive road building and logging operations occurred on federal lands in the North Fork of the Smith watershed particularly between 1960 and 1972 (Appendix A). The vast majority of the harvest activity after 1960 was clearcutting, as this optimized regeneration of Douglas-fir, the fastest growing timber producing tree in this area. Following the 1962 hurricane force "Columbus Day Storm" (also known as the "Frieda" windstorm), a large surge of salvage activity occurred. There was other salvage as the result of windthrow on the leeward side of some clearcuts and "slopovers" from

Smith River
Historic Sites

- Federal Lands
- Mills
- Railroads
- Schools
- Homesteads
- Indian
- Cemetary

July 17, 1997



Map #13

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MILES

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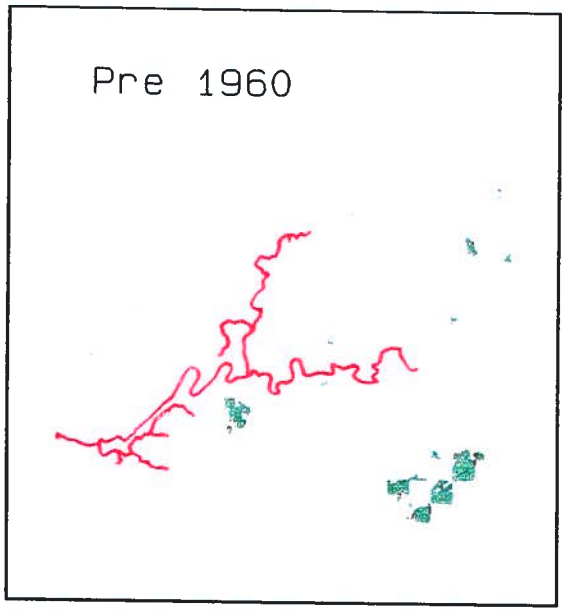
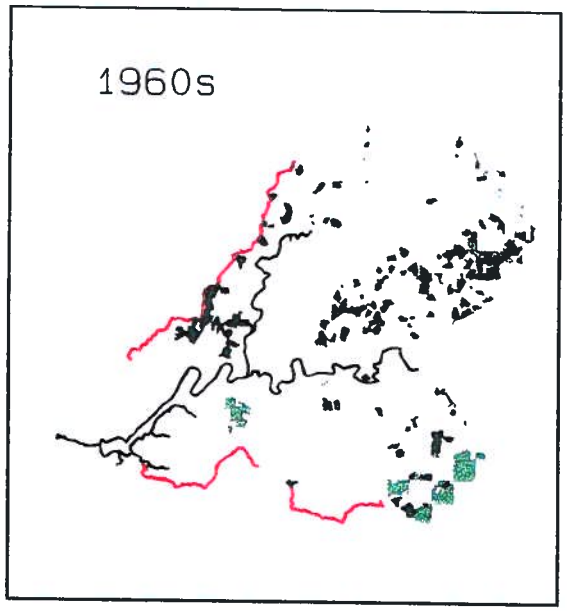
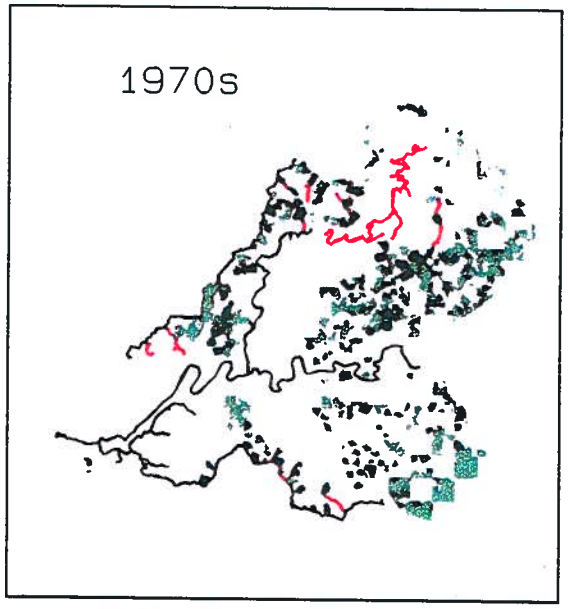
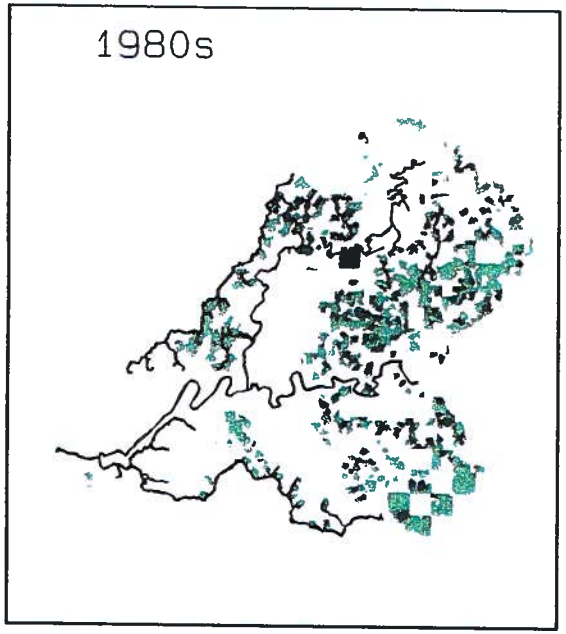
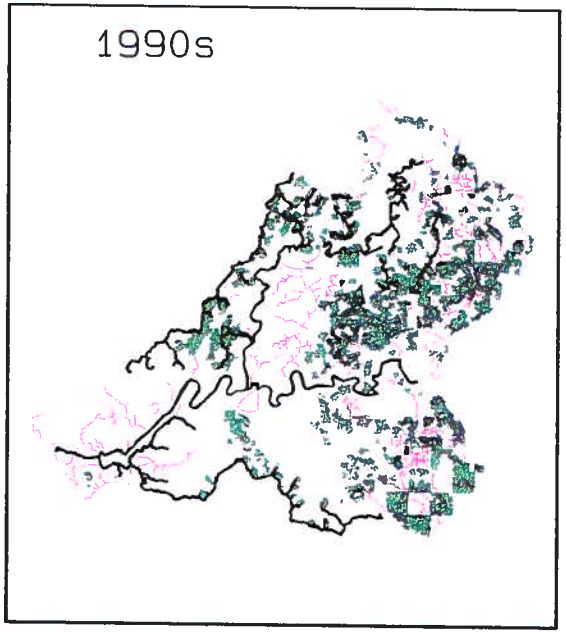










SMITH

Timber Harvest and SNF and County Road Construction by Decade

- Existing Roads
- New Roads
- Unknown Date of Construction
- Recent Clearcuts
- Older Clearcuts

Map #14

broadcast burning. In the 1970's the USFS required more suspension on some sites and the use of skyline cable yarding allowed harvest of trees from very steep slopes.

Table 7: Acres of Timber Harvest Over Time

Time Period	USFS	BLM*	Private & Other	BLM & USFS
1916 - 1955	458	1,533		1,991
1956 - 1975	6,254	7,740		15,021
1976 - 1995	3,112	9,807		10,498
TOTAL	9,824	19,080	unknown	29,472

*Acres for BLM were taken from the West Fork & Middle Fork Watershed analysis, acres from BLM land in other areas are not accounted for.

About 588 acres of natural stands were partially cut in the late 1960's through the 1970's to salvage trees nearing mortality and to fulfill a "thinning" target. Operations would include up to about 200 feet along road ways where timber could simply be cabled to the road. Areas along the 4811 and Franklin Ridge road were treated in this manner (Map 23).

Trucking became the main transportation method for logs. Several quarries were developed in the area to facilitate construction of roads. Hard rock quarries are found on Roman Nose, Baldy and Goodwin Peaks. During the '60-'70's about 176 miles of road were built to allow access to the upper slopes of the watershed and logging of these sites (Map 13). In 1967, a P-line was installed for Forest Service Road. It was built from 1969 to 1973 with Congressionally appropriated funds. Currently, there are about 668 total miles of road in the watershed, including those maintained by county, federal and private ownerships. Roads built after 1975 began using end-haul construction rather than the standard sidecast method.

By 1995, about 9,824 acres of National Forest land in the North Fork of the Smith River watershed area had been logged. The extensive road network through the watershed was built to accommodate a dispersed setting harvest pattern, thought to be most beneficial for watershed protection. Limits had been placed on the percent of a subwatershed that could be harvested at any one time. A portion of the Wassen Creek drainage was the only unroaded portion left in the Smith River area.

Concern that this area of the Forest had a high rate of soil instability has been raised periodically, and resulted in changes in timber harvest methods. The North Fork of the Smith, Smith River and Umpqua watersheds contain some very steep, heavily dissected terrain, which combined with sidecast road building and timber harvest resulted in slope failures. After a rain-on-snow event in 1968 or 1969 many headwalls failed. The Gilmore Report of 1970 reported that road building was the main contributor to the problems and planned a study to compare different types of logging systems and road building. The Johnson '72 sale had the first headwall leave area on the Forest. In 1971, there was a moratorium placed on logging and road building in the "Smith/Umpqua

Block." Sales that were already sold were logged, but no new sales were to be sold until after the study was complete. Graduate students from Oregon State University did work on the study, but no plan of action resulted. It was decided to go ahead with logging utilizing helicopters to reduce resource impacts. The Perkins '75 Timber Sale was one result. Traditional cable type harvest then resumed with additional restrictions including full suspension of headwalls and implementation of "headwall leave areas." (Tom Taylor, 1997).

Riparian buffers were implemented in 1970's as well and reduced the direct impacts of harvest activity to the perennial streams in harvest units, but did little or nothing to protect the intermittent tributaries. Steep, intermittent streams are the sources of large woody material which is critical for in-stream fish habitat in the perennial stream channels. Additionally, wood debris and large wood was cleared from many of the creeks that were believed to impede fish passage. This practice continued until the early 1980's. Areas that had stream cleanout (at least partial removal of log jams) are shown on Map 15. Cedar salvage from stream channels and riparian areas also occurred during this period (Map 15).

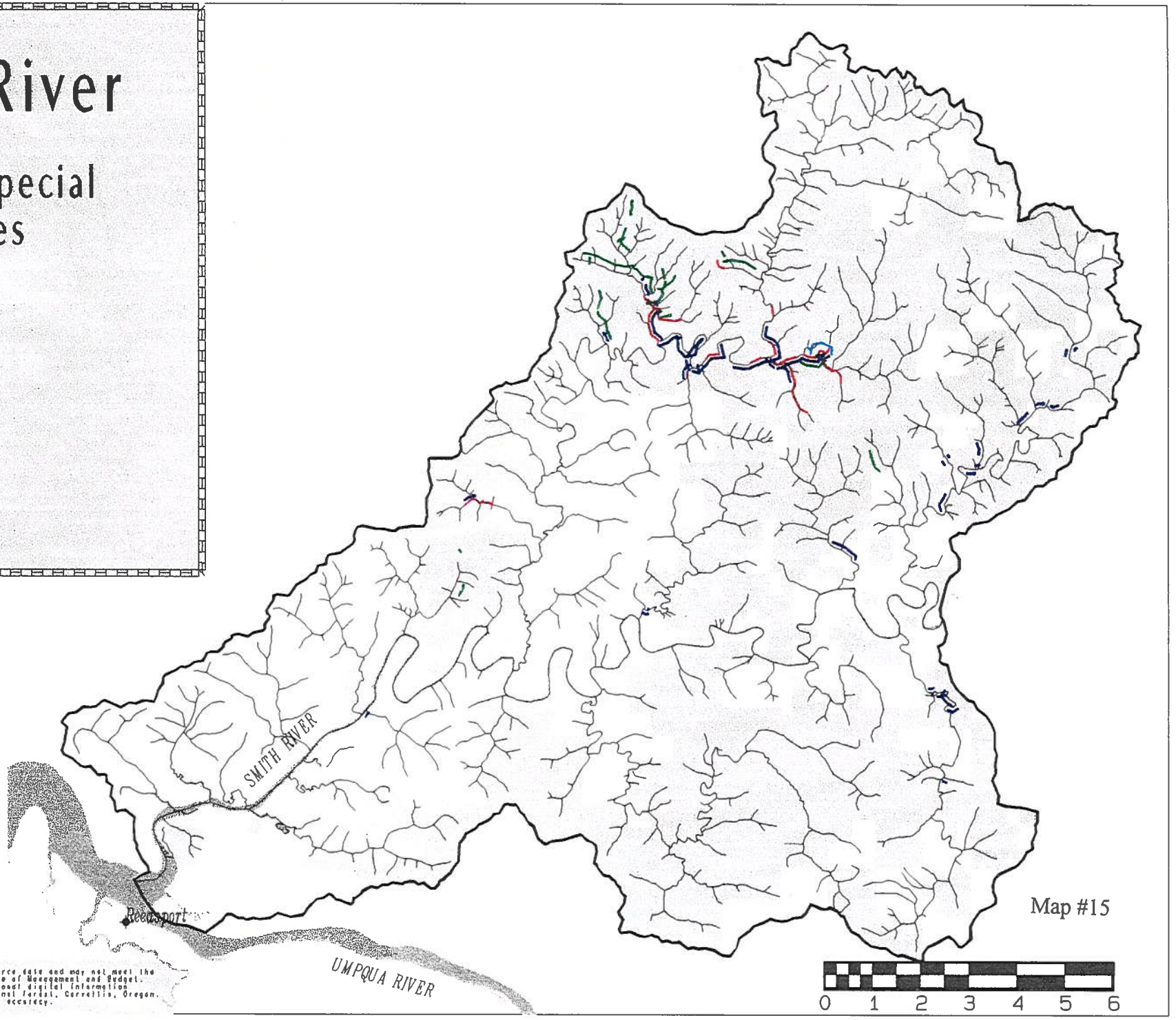
Concern over landslide activity and the resultant degradation of fish habitat continued. In 1983 several groups appealed plans for further timber harvest activities in this area. In 1984 an injunction was placed against the Forest Service against further harvest activities (Appendix B2). That injunction was lifted in 1996.

Smith River

Aquatic Special Features

- Cedar Sales
- Stream Cleanout
- Salvage Sales
- Structures
- Federal Lands

July 17, 1997



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CHAPTER V: EXISTING RESOURCE CONDITIONS

This chapter brings into the analysis an assessment of the current condition of resources in the watershed. The discussion highlights the major effects of various landuse practices since euro-american settlement. The combination of human influenced disturbances and natural disturbances has resulted in the current conditions of the resources. The changes in resource condition and ecological processes, as a result of human influences on the landscape are summarized in Table 15.

EROSION PROCESSES

Table 8 gives a summary of landslide survey results for the Mapleton District from 1972-1984, listing numbers and volumes for undisturbed areas, in-unit and road related slides, and extrapolated transfer rates for three of the nine surveys. Similar to other landslide surveys taken in the Pacific Northwest, in-unit slides were most frequent, but road related slides had the largest volume of material being input into the aquatic system. The most intense storms during the period preceded the 1972 and 1975 surveys, and this was reflected in the number and volume of slides for these two years. These years were also during the period in which sidecast road building was still being utilized. Many of these slide areas had been overloaded with sidecast material 10 years earlier. The delay in sliding was assumed to be related to decaying organic debris incorporated in the sidecast and storm magnitude not seen before these years (USDA 1980).

Landslide Surveys also revealed the following information:

- Most in-unit slides occurred in plantations less than 5 years old
- Aspect was an indicator of landslide susceptibility with north-facing slopes having the highest probability of failure.
- Slope steepness was an important factor. Anywhere from 85-100% of slides recorded over the period of record occurred on slopes greater than 70%.
- A small percentage of slides were caused by windthrow in undisturbed areas, and these slides tended to be larger than average.
- Percent of all slides which resulted in jams in either intermittent or perennial streams were 46, 40, 65, 42, 20, 25 and 19 for surveys in 1975, 1978-1981, 1983 and 1984, respectively.

Locations of slides showed good agreement with SRI mapping of high-risk areas. Failures were on steep, highly dissected landforms and occurred in headwall areas and on stream-adjacent slopes subject to saturation (NACSI 1985).

Table 8. Landslide Frequency And Soil Transfer Rates For Undisturbed, In-Unit And Road Related Landslides

	Undisturbed								
	2/1972	1975	3/1978a	1978b	1979	1980	1981	1983	1984
Number of Landslides Detected	42	22	65	8	0	0	3	1	2
Slides/mi^2	.20	.02	.39	-	-	-	-	-	-
Avg Volume/Slide (yd^3)	81	126	26	97	ND	ND	149	14	848
Soil Transfer Rate (yd^3/mi^2 . yr)	108	13	71	_	_	_	_	_	_

	In-unit (clearcut)								
	2/1972	1975	3/1978a	1978b	1979	1980	1981	1983	1984
Number of Landslides Detected	317	189	39	74	12	11	129	9	53
Slides/mi^2	.21	.37	.85	_	_	_	_	_	_
Avg Volume/Slide (yd^3)	144	289	41	65	107	88	80	124	123
Soil Transfer Rate (yd^3/mi^2 . yr)	62	210	72	_	_	_	_	_	_
Relative Soil Transfer Rate Compared to Undisturbed	2X	55X	3.4X	_	_	_	_	_	_

	Road Related								
	2/1972	1975	3/1978a	1978b	1979	1980	1981	1983	1984
Number of Landslides Detected	89	34	NA	17	5	1	44	14	18
Slides/mi^2	1.43	1.12	NA	-	-	-	-	-	-
Avg Volume/Slide (yd^3)	505	861	NA	334	173	222	267	365	187
Soil Transfer Rate (yd^3/mi^2 . yr)	4841	6483	NA	_	_	_	_	_	_
Relative Soil Transfer Rate Compared to Undisturbed	45X	500 X	NA	_	_	_	_	_	_

1/ - Data was taken from NCASI Technical Bulletin No. 456, Catalog of Landslide Inventories for the Northwest, April 1985.
2/ - After Swanson, Swanson and Wood (PNW), (September 1977)
3/ - After Ketcheson and Froehlich, (January, 1978)

Although landslides are a natural occurrence in the Smith River WA area, road building and harvest have affected the size, character and timing of slides entering the aquatic system. Road-related slides surveyed on the Mapleton District range from 200-900 cubic yards per slide (Table 8), and it has been estimated that when these slides result in a debris torrent, the volume of materials may increase from 5 to 10 times (USDA 1980). The content of these larger torrents usually include higher proportions of fine sediments and smaller pieces of large wood than naturally occurring torrents, lending to longer travel distances in first and second order channels. There is also a higher occurrence of dam break floods which damage stream channels throughout the watershed .

In addition, road and harvest unit debris slides and torrents tend to occur with higher frequency than slides in natural areas which tend to accelerate sediment loading. This higher influx of sediment may influence fisheries both when it is transported and when it is deposited. During transport (especially during high stream flow), spawning gravels may be removed entirely, leaving a bedrock channel in some areas that is more susceptible to higher summer temperatures and more efficient for winter transport. Deposition of fine sediments in lower gradient mainstems clog gravels that would ordinarily allow oxygenated water to flow through fish reds.

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 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 (Map 14) which made them more prone to failure than roads constructed by full bench, 100% end-haul techniques. A large proportion of the existing roads in the WA area were sidecast constructed. In general, the road network has increased the efficiency of water and sediment delivery and routing through the watershed.

In the process of building roads, impacts to the aquatic resources were not always recognized or accounted for in the design. Many roads and associated culvert installation 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 not believed to contain or be important for aquatic resources at that time. Much has been done to alleviate this problem although there are still roads and culverts that preclude passage to available habitat. This may be especially important along the lower portion of the mainstems where summer temperatures exceed the lethal limit for salmonids in many areas. These areas that were historically used for a substantial amount of rearing are now unsuitable for rearing due to the high temperatures. Therefore, access to the tributaries which should have cooler water is vital for salmonids.

Landslide Survey Results from the Forest Flood Assessment

Following the February flood of 1996, the Siuslaw National Forest undertook a flood assessment aimed at learning from such a large event and testing whether recent restoration efforts had paid dividends on lands managed by the Forest Service (Appendix C1). As part of this assessment, high elevation aerial photography (1:24,000) was flown for the entire Forest in March, 1996, before leaf out. This flight included adjacent federal, private and state lands and covered approximately 90% of the Smith River WA area. Using this photography, a landslide assessment was contracted for the Forest to analyze the effects of the February storm. In general for this watershed, the February storm was most intense in the northern half, although some damage did occur in the southern half as well. Table 9 shows results for the Smith River WA area.

It must be noted that although some field verification was accomplished, it is difficult to pick up slide occurrence in forested canopy, especially with high elevation photography. It was estimated that slides smaller than 40' x 40' could not be accurately distinguished from other features under a forested canopy. Also, the November flood that occurred later in 1996 was more severe in this area, and may have increased sediment delivery significantly, above and beyond results seen in Table 9.

Table 9. Number Of Slides Recorded By Ownership After The February, 1996 Flood. (Forest Flood Assessment, 1997)

Ownership	% of WA area	Road Related	In-unit	Forested	Totals	slides per sq. mile
National Forest	33	12	7	11	30	.40
Other	67	125	68	34	227	1.51

CURRENT CONDITION OF VEGETATION

Seral Stage Distribution

The watershed contains a wide distribution of seral stage vegetation types (Map 16) . This current condition is a result of the cumulative influence of natural disturbance processes and human influences on the landscape. Mature conifer seral classes have decreased, and early seral, young conifer, conifer-mix, and deciduous stands have increased.

Large conifer (>21") currently occupies 33% of the total watershed vegetation (Map 16). About 35% of BLM and 19% of private and other lands are typed as large conifer. On National Forest system lands large conifer is 52 % of the landbase in this watershed (CLAMS data-Table 10) (Appendix H1, H2). Large conifer (from CLAMS) is considered similar to mature conifer (Siuslaw Data, Table 11) (Appendix H3). 52% (or 59% from the Siuslaw NF vegetation inventory - Map 18) is significantly less than the 73.9 % that existed on Forest Service lands in the 1940's (Map 17). (Note: No historical vegetation mapping was readily available for other ownerships). Two significantly large stands of remaining mature habitat should be noted, one in the Wassen Creek area and one in the Baldy Mountain area. This watershed has a higher percentage of mature conifer on federal lands than most other watersheds on the Forest.

In addition to the types of seral mixes seen on the landscape, mature conifer distribution and patch sizes have decreased. Plantations, which constitute most of the young seral stages, appear as about 20 to 60 acre patches of young aged, mostly conifer, patches scattered throughout the watershed. The historical vegetation mapping from the 1940's is not as refined as today's standards (one example is that generally riparian vegetation was not broken out as a distinct mapping unit). The average patch size of mature conifer on the historic vegetation map is 245 acres. The patches on the current vegetation map show an average patch sizes of 43 acres. The trend has been for fragmentation of mature blocks of forest into smaller blocks. The comparison of forest patches composed of conifer and deciduous mixed species is similar. Historic mapping shows an average patch size of mixed species of 302 acres and the current vegetation typing shows an average patch size of 47 acres. These trends in differences between the seral stage distribution and species distribution of the 1940's and 1990's are similar to those described in the Federal Lands Assessment (USDA 1995) and other watershed analyses on the Forest.

The CLAM database displays more deciduous species cover than the aerial photo interpreted data from BLM and USFS vegetation mapping. The reason is because the size of the mapping unit is much smaller. The CLAM database shows as much as three times more deciduous than the USFS vegetation map. The mapping is based on canopy cover without consideration for tree stem distribution.

The advantage of using the CLAM database in this analysis is that it is the only vegetation database available to us that covers the entire landbase, regardless of ownership boundaries. It also distinguishes riparian vegetation boundaries.

Table 10: Vegetation Seral Stage Distribution by Ownership (CLAMS remotely sensed data)

SERAL TYPE	USFS	BLM	PRIVATE INDUS-TRIAL	OTHER PRIVATE, COUNTY, STATE	TOTAL ACRES	% OF WATER-SHED
Non forest (shadow, water, cloud)					1,134	1%
Open	307	1,618	2,930	526	5,381	4%
Semi-closed	3,165	5,348	14,220	4,979	27,712	20%
Broadleaf (all sizes)	6,288	6,873	8,348	5,022	26,531	19%
Conifer-deciduous mix sm.<10" dbh	802	1,014	1,455	479	3,750	3%
Conifer-deciduous mix med. 11-20"	3,656	4,263	5,222	2,060	15,201	11%
Conifer-deciduous mix large 21-30"	5,556	4006	3,431	1,986	14,979	11%
Conifer-deciduous mix very large>30"	7,091	4,248	2,485	1,789	15,613	11%
Conifer small<10"	638	808	1,257	210	2,913	2%
Conifer medium 11-20"	5,417	4,404	2,569	1,013	13,403	9%
Conifer large 21-30"	6,529	3,347	945	788	11,609	8%
Conifer>30"	2,678	1,359	362	264	4,663	3%
Total by Owner	42,127	37,288	43,224	19,116	141,755	

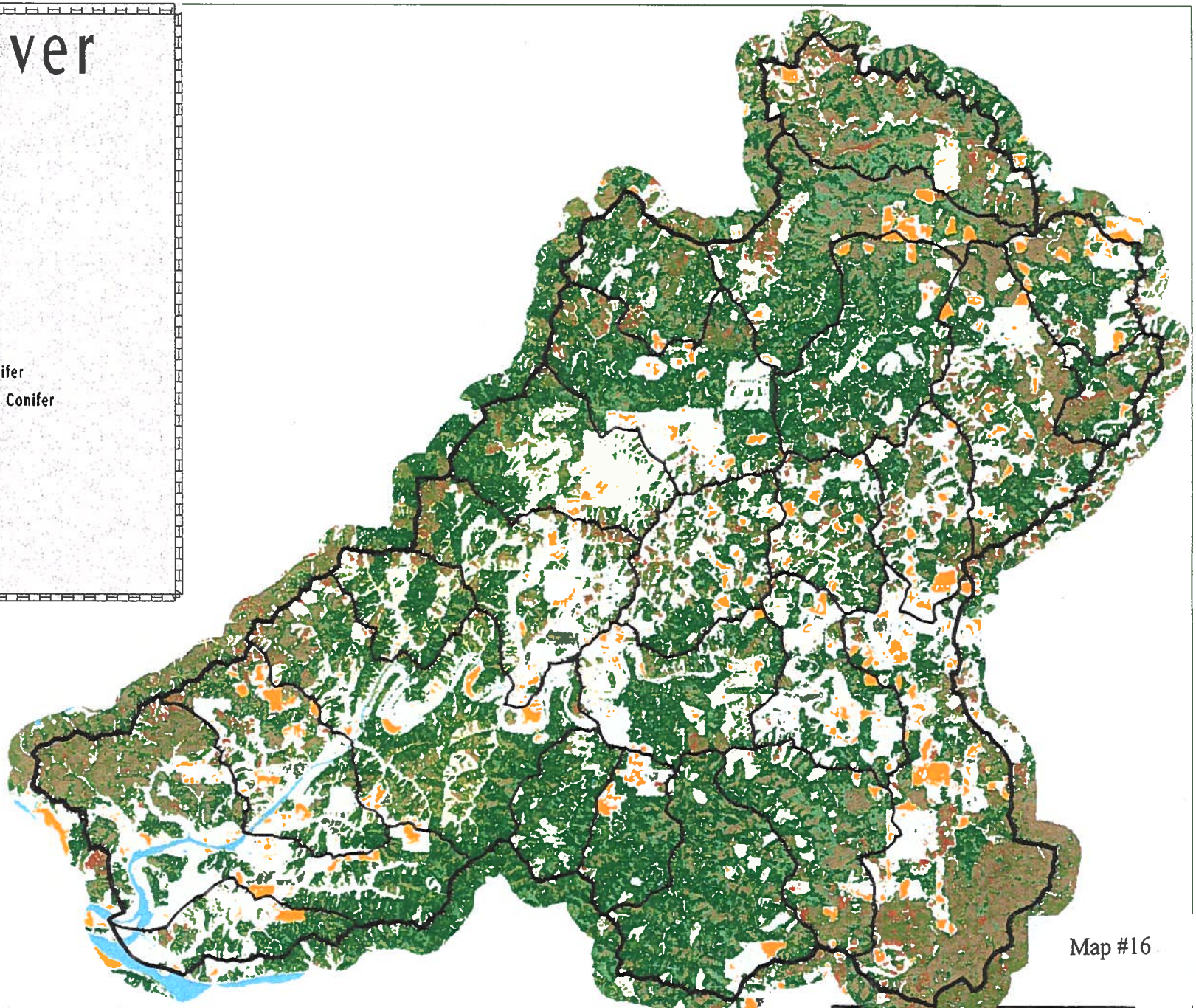
Table 11: Changes in Seral Stage Distribution from the 1940's to Current by Ownership (for comparison) - Siuslaw National Forest Vegetation Inventory Data.

SERAL TYPE	USFS- 1940		USFS - CURRENT		BLM - CURRENT		TOTAL FEDERAL CURRENT	
	Acres	%	Acres	%	Acres	%	Acres	%
Grass / Forb	56	<1	48	<1	3	0	51	-
Very Early Seral	626	2	698	2	4819	13	5,517	7
Early Pole	2814	7	479	11	7126	19	7,605	10
Conifer Mix Pole	2209	6	1156	3	105	<1	1,261	2
Young Conifer	3048	8	2130	5	7713	21	9,843	13
Young Conifer Mix	1454	4	861	2	393	1	1,254	2
Mid-aged Conifer	?	?	2440	6	123	<1	2,563	3
Deciduous Age Mix	0	0	2669	6	22	<1	2,691	4
Mature Conifer	23274	59	20858	49	16103	43	36,961	49
Mature Conifer Mix	5761	15	5523	13	557	2	6,080	8
Pure Hardwood	59	0	585	1	119	<1	704	1
Untyped	2	0	522	1	299	1	821	1

Smith River
CLAMS

- shadow,water,cloud
- Open
- Semi-Closed
- Broadleaf, Broadleaf Medium
- Conifer Small, Mixed Small Conifer
- Conifer Medium, Mixed Medium Conifer
- Mixed Large Conifer
- Conifer Large
- Conifer Very Large
- Mixed Very Large Conifer

July 17, 1997



Map #16

0 1 2 3 4 5 6
MILES

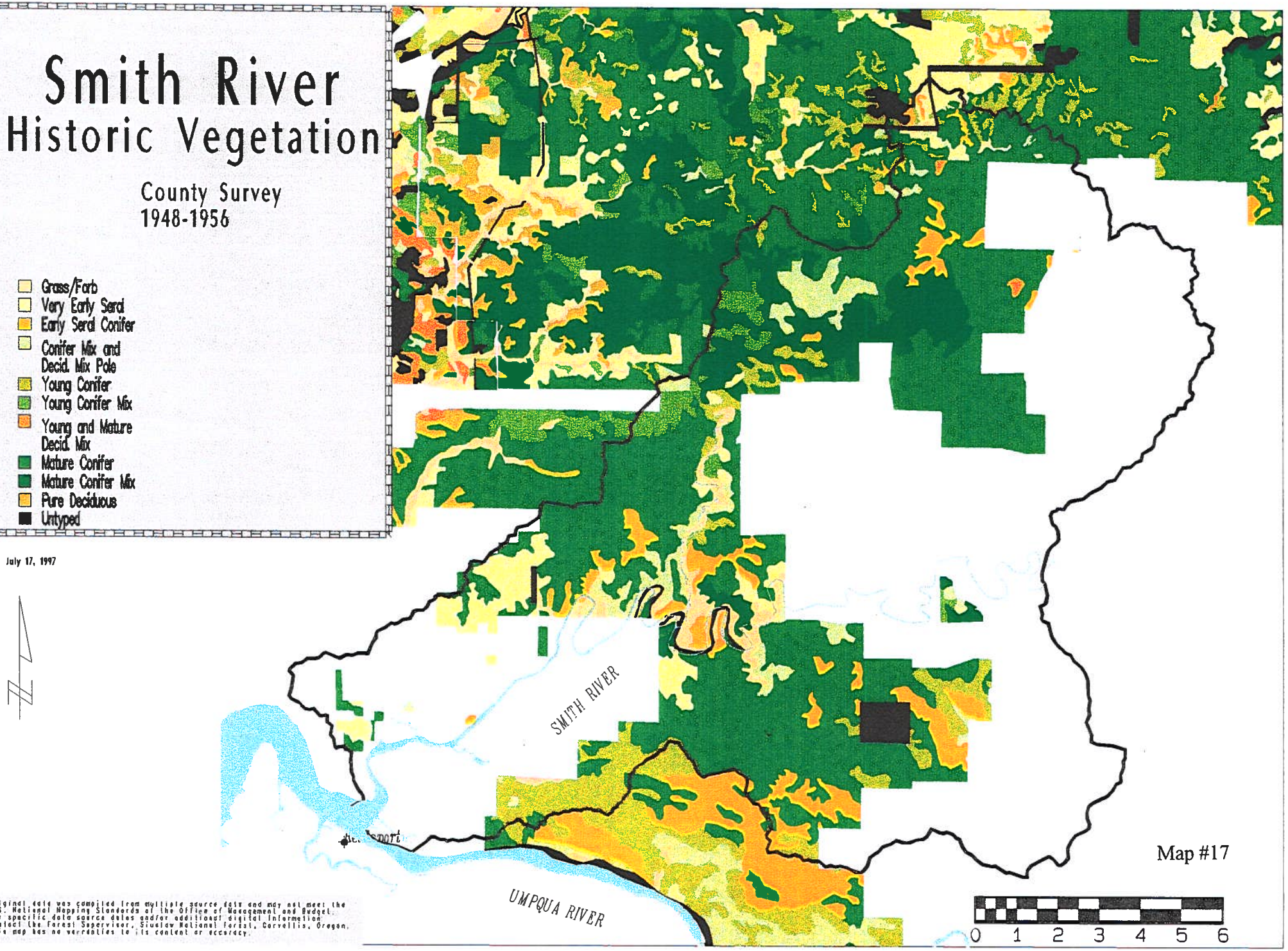
Original [illegible] compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source dates and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map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

Smith River
Historic Vegetation

County Survey
1948-1956

- 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

July 17, 1997



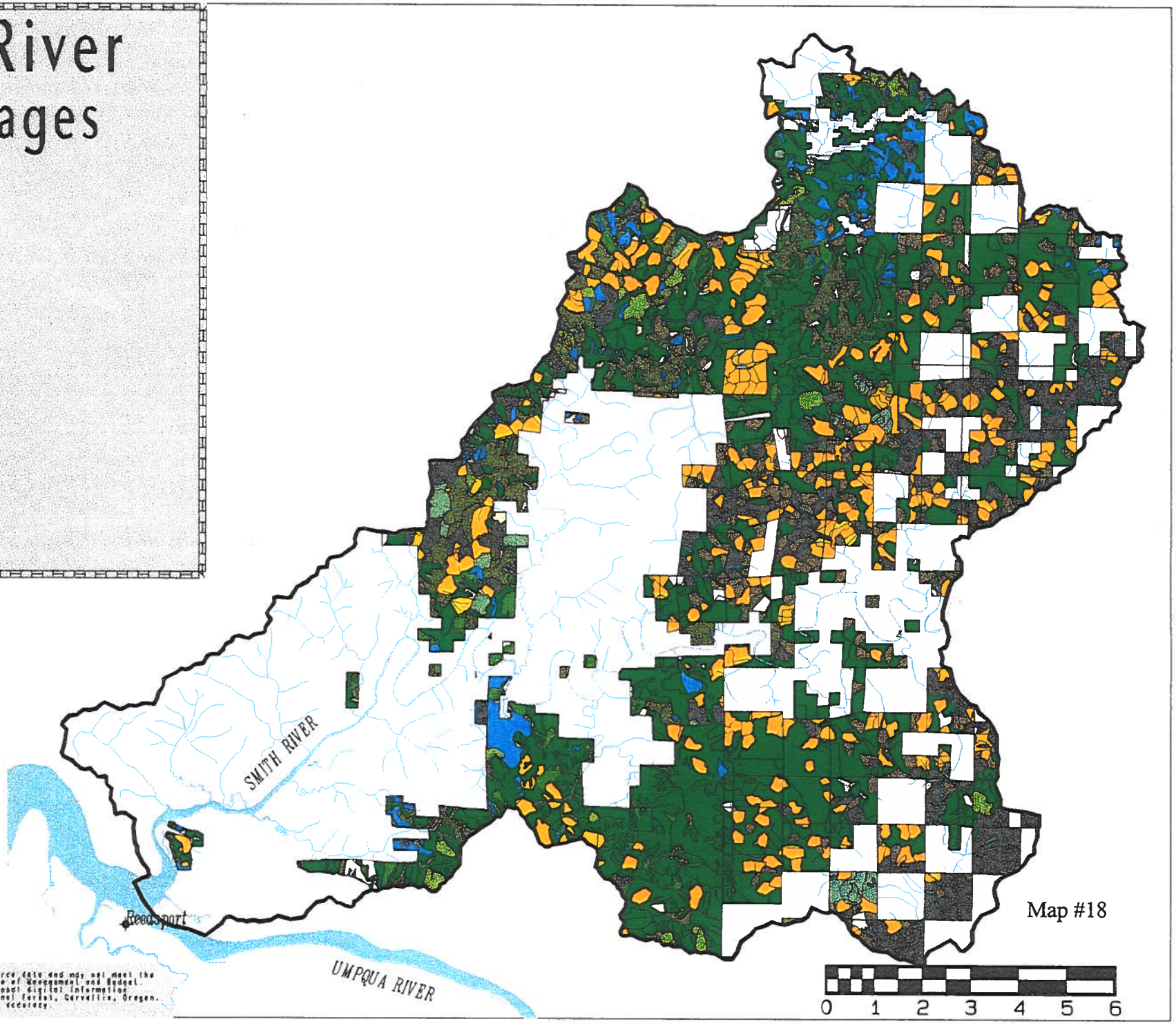
Map #17

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.

Smith River
Seral Stages

- class 1,2,3 streams
- System Roads
- Grass/Forb
- Very Early
- Early Pole
- Conifer Mix Pole
- Young Conifer
- Young Conifer Mix
- Mid Aged Conifer
- Deciduous Mix
- Mature Conifer
- Mature Conifer Mix
- Pure Hardwood
- Untyped

July 18, 1997



Map #18

Species Composition, Age and Structure

Intensive timber management has changed the natural range of species composition, ages and structure that used to dominate the watershed. After a natural stand of mature conifer 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 dominant alder overstory component that would persist for 30 -50 years, before the understory of Douglas-fir would become the dominant species. Typically reforestation techniques shorten this time so that brush and pure alder stands persist mainly in riparian areas or disturbed sites. However, the NF Smith watershed shows more evidence of pure red alder, likely related to the higher frequency of soil disturbance debris torrents and higher difficulty of brush control, when compared to the rest of the district.

The purpose of plantation management regimes was mainly to produce timber. Clearcutting was the predominant regeneration system and the shade intolerant Douglas-fir was selected for reforestation. A few shade tolerant species (western hemlock, western red cedar and grand fir) were planted to take advantage of micro-site conditions. Also shade-tolerant species were expected to seed in naturally. Pre-commercial thinning of very young stands in the 1960's and 1970's favored the faster growing Douglas-fir as crop trees over the slower growing shade-tolerant trees. Plantations contain denser and more evenly placed 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 to support later intermediate thinning entries, for the purpose of increasing the diameters and value of the timber.

Today, about 35% of the federal lands (about 27,480 acres) 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 7). Plantations are generally concentrated along the main road systems. Many plantations about 30 years old are concentrated along the 4811 road as a result of extensive salvaging in the aftermath of the Frieda windstorm of 1962.

Structural composition of some mature stands was changed as a result of thinning operations in mature stands during the 1970's, the resulting structural composition in those areas are less diverse than natural forests would be. Some of these partial cut sites were later part of clear-cut units.

WILDLIFE HABITAT

The Smith River watershed contains portions of LSR R0267 in the northern half of the watershed and a large portion of LSR R0265 in the south half. The Northwest Forest Plan has identified the area directly east of this watershed analysis area as a critical connecting corridor by allocating sections of federal land as Connectivity /Diversity Blocks. These blocks are designed to be managed on a 150 year rotation with a minimum of 25-30% of the designated block in a late-successional condition. These blocks are designed to provide connectivity for animal and plant species associated with older forest habitat between LSRs in the Coast Range and those in the Cascades. Portions of federal lands allocated as Late-Successional Reserve adjacent to these blocks, have been identified as a critical wildlife corridor for linking the gene pools of these two areas (Siuslaw 1997). This is the first forested corridor over which large home range species can travel to mix with Cascade species south of the Columbia River.

The July 1995 Assessment Report of Federal Lands in and Adjacent to Oregon Coast Province identified the Key Watershed portions of the Smith and North Fork Smith as one of the 5 areas of the Siuslaw National Forest with relatively high proportions of mature conifer forest and relatively low road density with the best potential for recovery of unbroken late-seral forest communities.

Interior Conifer Habitat

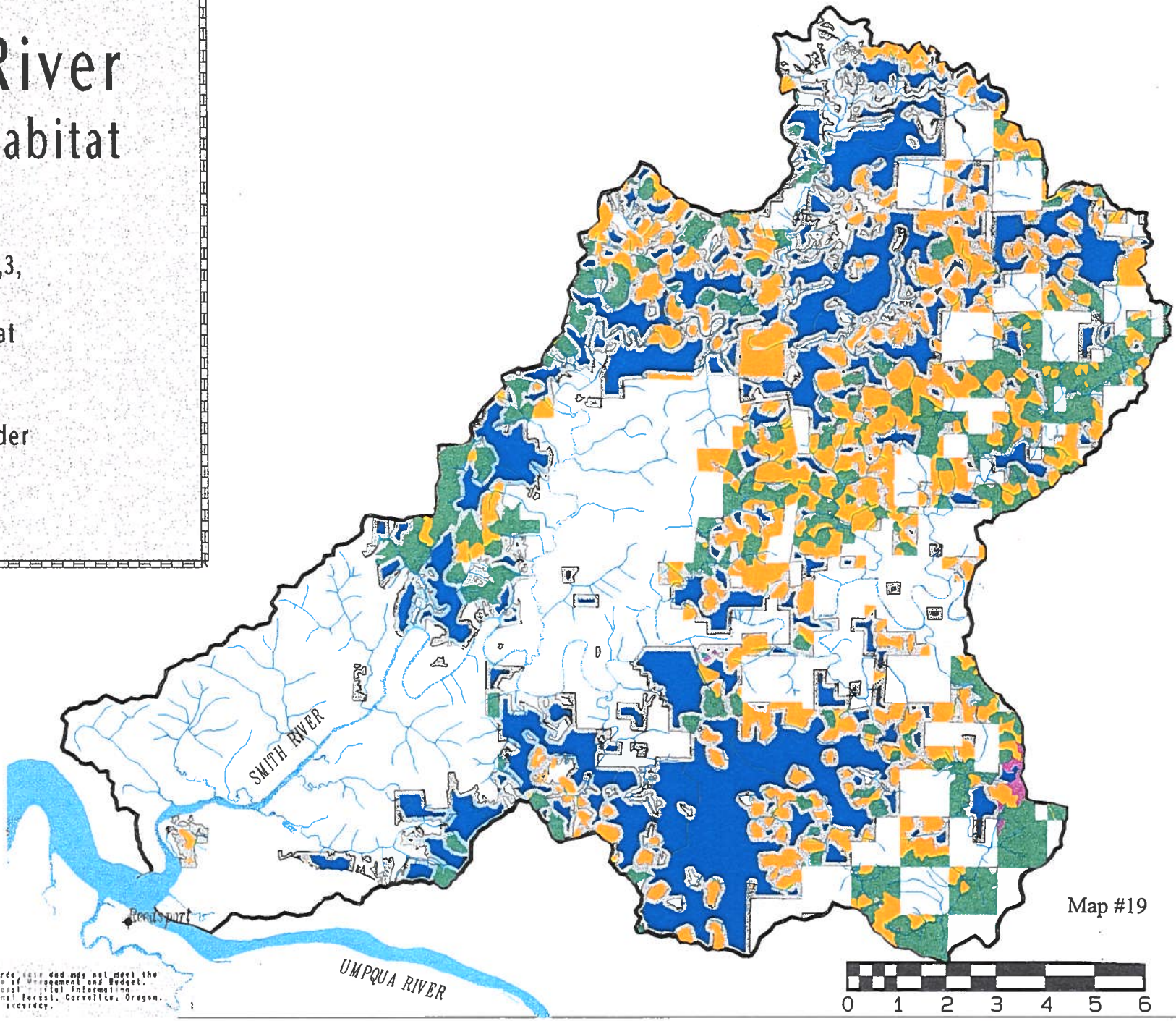
18,479 (13%) of the mature conifer is in interior conifer forest habitat. The interior forest habitat analysis represents the worst case scenario (> 500' from the edge of mature stands). This level of impact assumes an abrupt edge i.e. clearcut adjacent to a forest boundary. In reality, different species and different ages classes occur adjacent to forest boundaries and ameliorate microclimate and to some extent predator impact on to adjacent forested areas. Given the worst case scenario, Table 12 displays the percent of mature conifer interior habitat on Federal land for each subwatershed.

Several large patches of contiguous interior conifer forest exist within the analysis area. The largest block (6,142 acres) is located within the Wassen, Upper Wassen, and Wassen Lake subwatersheds in the southern portion of the watershed (Map 19). This block is part of LSR R0265 and is part of a much larger block of mature conifer habitat that extends to the south of the Watershed boundary. Other large blocks exist in the northern part of the watershed in the Peach, Kentucky, Steelie and Sheep subwatersheds. For the most part, however, patch size of interior conifer forest habitat has been reduced from reference conditions.

Smith River
Interior Habitat

- strm-class 1,2,3,
- Mature Stands
- Interior Habitat
- YO 1-25yrs
- YO 25-45yrs
- YO 45 and older

July 21, 1997



Map #19

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

Table 12. Interior Mature Conifer Forest (>500' From Edge) By Subwatershed In Smith River Watershed

Subwatershed	Interior mature conifer (acres)	% of sub-watershed mature = interior	Subwatershed	Interior mature conifer (acres)	% of sub-watershed mature = interior
Coon	94	15	Smith falls	254	19
Eslick	514	34	Spencer	216	18
Johnson	47	6	Steelie	1,679	38
Joyce	30	39	Sulphur	620	40
Kentucky	1,514	37	Upper Wassen	3,416	65
Lower North Fork Smith	252	26	Vincent	245	16
Lower Wassen	538	35	Wassen	1,117	56
Murphy	656	30	Wassen Lake	1,610	52
Okie S	758	41	West Branch	383	21
Otter	615	40	Weiss	1,064	47
Peach	1,261	34	West Fork Smith	511	25
Sheep	785	29	West Smith	39	12

Connectivity between the northern and southern blocks of mature conifer habitat, is somewhat limited due to the fragmented nature of the remaining mature conifer blocks and the large block of matrix land use allocation in the middle of the eastern portion of the watershed. Species with limited dispersal mechanisms (i.e. salamanders, ground beetles, fungus) may find it difficult, if not impossible, to disperse to other older forest habitats. The areas are partially connected by a small north/south band of mature forest located on the far west side of the watershed. On the eastern half of the watershed connectivity is somewhat restricted by land that contains only small, severely fragmented patches of mature forest.

Mature conifer stands that have an average tree diameter greater than 32" are scattered from north to south throughout the western half of the watershed. The largest block of this type of habitat exists in the Wassen Creek area in the southern half. This area contains the oldest trees within the watershed and represents the best habitat for plant and animal species that are closely associated with late seral forest conditions. This watershed provides some of the best, most intact, large blocks of mature conifer habitat in the Northern Oregon Coast Range. Due to the limitation of existing data, it was not determined if the forests in this area contain multiple canopy layers.

Special Habitats

Special, or unique, habitats include cliffs, talus slopes, rock faces, lakes, ponds, marshes and sloughs. Smith River Watershed contains many unique habitats (Map 11). Roman

Nose Mountain on the eastern edge of the watershed contains many unique features, perhaps the most unique being the grass bald at the top. This grass bald area is unique to scattered peaks within the coast range that are most often composed of intrusive igneous bedrock. This area supports a unique community of vascular plants and lichens. Rock features such as outcrops or rock faces, cliffs and talus slopes can also be found on Roman Nose. Rock faces are relatively common throughout the watershed and may provide unique habitats for plants.

The only lake known to exist in the watershed is Wassen Lake located in the south eastern portion of the watershed. Some small perched ponds also exist throughout the analysis area and are often associated with old debris slide and slump deposits.

Marsh and slough areas can be found within the watershed primarily downriver from Noel Creek. Hudson and Otter slough and Stowe Marsh, contain the majority of this type of habitat, much of which has been lost due to diking and draining of the wetlands. These habitats, along with the mouth of the Smith River, may provide coastal bird species some refuge during high wind/storm events. Huge flocks of Scaup ducks have been documented using the lower 3 miles of the Smith River during the winter months. This flocking behavior seems to be unique to the Smith River area and it is unknown why they do this (personal. communication, Roy Lowe, USFWS).

Heron rookeries that once existed on the lower Smith River have been abandoned or logged out (personal communication, Dan VanDyke, ODFW).

WILDLIFE SPECIES AND POPULATIONS

Late-Successional Forest Species

Survey information is available on several species that use primarily mature conifer forest including spotted owl, marbled murrelet, bald eagle and botanical species. This data was collected in association with past timber sales and/or past management direction. The following habitat condition analyses addresses 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 34 spotted owl home ranges (30 pairs and 4 territorial singles) on federal lands within the watershed. Appendix E1 displays the amount of suitable conifer habitat within the median home range (1.5 mile radius) for each owl pair or territorial single. The average amount of habitat within the owl pair home ranges is 2,217 acres with a range from 781 to 3,994. Owl activity centers that are below 40% mature conifer habitat (1,906 acres) within the median home range radius are below the threshold used by the U.S. Fish and Wildlife Service (FWS) for establishing "take". Of the 34 spotted owl home ranges in the watershed, 22 (65%) currently have sufficient suitable habitat. The Smith River watershed provides some of the highest quality habitat

for owls and other late-successional forest dependent species in the Oregon Coast Range north of the Umpqua River. On the average, throughout Federal lands between the Umpqua and Yaquina Rivers, only 28% of known owl activity centers have sufficient suitable habitat to be considered viable (Siuslaw 1997). Because of the relatively large amounts of mature interior conifer forest within the watershed, it is an important area reproductive center for owls. → NSRT Habitat Development?

Marbled Murrelets - The watershed lies within Conservation Zone 3 as outlined in the Federal Register, May 24, 1996, Final Designation of Critical Habitat for the Marbled Murrelet. There are all or portions of 50 marbled murrelet reserves (area of contiguous suitable habitat within 0.5 mile of an occupied site and containing the occupied site) on federal lands within the watershed. Appendix E2 displays the amount of contiguous suitable habitat (conifer > 18 inches diameter) within each site. The average amount of habitat within each 0.5 mile circle is 237 acres, and ranges from 43 to 462. Only a small portion of the watershed has been surveyed for marbled murrelets, mostly in association with past timber sales. Although murrelet activity has been documented throughout the watershed, the larger blocks of interior habitat in the Northern portion of the watershed and the Wassen Creek area, in the south, probably provide the best habitat for long-term productivity for this species.

Bald Eagles - Four known bald eagle nest sites are located within the watershed. Three of these are active and have consistently produced young within the last several years. The three active sites are located along the mainstem of the Smith River. The Doe Creek site is located furthest to the east along the Smith River and has 3 associated nest trees on BLM lands and one on private land. The second nest site is located along the Lower Smith River and has two associated nest trees one on Forest Service land and one on private. The third nest site is located across from the town of East Gardiner at the mouth of the Smith River. Both associated nest trees are located on Forest Service lands. The fourth site is located on private land along the western boundary of the watershed on Joyce Creek. This site has been unoccupied since 1989.

The East Gardiner nest site is located in a relatively small, isolated block of mature conifer habitat on the west edge of the watershed near the confluence of the Smith River and the Umpqua. The Doe Creek nest is located on Matrix land and the Lower Smith River nest site on Forest Service land is located within an LSR. There are administrative withdrawals of 1/4 mile around nest sites which ensure that appropriate management activities will occur to enhance the condition of the habitat.

There are 23 Bald Eagle Management Areas on the Forest (11 occupied sites and 12 potential). The Lower Smith River and East Gardiner nest sites are two of the occupied Bald Eagle Management Areas. One unoccupied Bald Eagle Management Area is located within the Forest Service parcel T21S, R11W, Sec. 3. The Doe Creek nest site, located on BLM, as well as Forest Service nest sites are managed in accordance with the Pacific Bald Eagle Recovery and Implementation plan.

There have been historical sitings of bald eagles in the upper portions of the North Fork of the Smith River. Scattered eagle sightings recorded (14) from 1977 to 1983 indicate some level of presence during the year. Of the 14 recorded sightings, only six of the recordings identified the month: 2/77, 2/78, 7/78, 12/82, 1/83, 6/83. Only one of the 14 sightings (no date) indicate 2 eagles were seen. The ability of this section of river to produce enough forage for eagles during the latter parts of the summer is not known. Generally, during the end of May and throughout the summer months the water levels decrease rapidly leaving only a few pockets of deep pool habitat for resident cutthroat, suckers, steelhead and lamprey. Most recently a mature bald eagle was sighted at the mouth of Cedar Creek on 3/25/97. No nest site has ever been located. Aerial surveys of this area are recommended to attempt to better determine eagle nesting status in this area.

Given the amount of suitable habitat within close proximity to fish-bearing streams in this watershed it appears that nesting habitat is likely not a limiting factor for this species except for in areas of cutover land adjacent to the Smith River. Suitable eagle habitat does exist on federal lands between the three existing pairs on the mainstem of the Smith, therefore, it is more likely that the available food supply is the limiting factor for supporting nesting bald eagles in this watershed.

Other Wildlife Species Of Concern

Amphibians and Reptiles - Powell and Wright (1994) observed the following amphibian and reptile species during September field surveys in the Wassen Lake area; roughskin newt, Western redbacked salamander, Northern alligator lizard, Dunn's salamander, Western terrestrial garter snake, Northwestern salamander, red-legged from (R-6 Sensitive Species, BLM special status species), and Southern torrent salamander (BLM special status species). As the survey was conducted during a non-optimal season for surveying certain species, it is recommended that the area be re-surveyed during the months of April to June. These species should also be present in other areas of the Watershed that have similar habitat types.

Big Game Habitat - Elk and deer thrive in areas that provide a diverse range of habitats. Naturally occurring or man-made openings and cover areas serve to meet the yearlong nutritional and security needs of deer 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. Within the Siuslaw hunting unit, of which the Smith River Watershed is a part, the population management objective for elk is 4,000 animals with a Bull:Cow Ratio of 10:100. ODFW officials believe approximately 1,200 animals currently inhabit the area and that the Bull:Cow Ratio is at approximately 5-7:100. ODFW officials also report that Roosevelt Bull elk may be overexploited. This assumption is based on the low number of branched antlered bulls observed during yearly surveys. Generally, elk are increasing within the analysis area although this area seems to support an overall lower density of elk than other areas on the coast. The current condition of the watershed is good for elk and deer due to a

diverse mix of successional stages and cover conditions. Areas of Matrix lands in the center of the watershed offer some of the best habitat within the watershed.

Red tree vole - This species is listed as a Survey and manage component 2 species in the Northwest Forest Plan. The red tree vole is closely associated with old-growth Douglas-fir forests however it has been found in all seral stages of Douglas-fir forests. Red tree voles tend to select large, live trees with large branches for nest sites and shelter and feed almost exclusively on Douglas-fir needles. Interim guidelines for management of this species are discussed in the November 4, 1996 Memorandum File code 1950. Basically surveys for this species are only required when within a fifth field watershed there is less than 40% of land in federal ownership and has an average stand diameter of 10" or less and below 60% canopy closure. Approximately 68% (43,536 acres) of the land in Federal ownership within the watershed meets these minimum levels. This is approximately 30% of the acreage in all ownerships within the Watershed boundary.

Northwestern Pond Turtle - This species is a listed sensitive species which inhabits marshes, sloughs, ponds and slow-moving sections of rivers and streams. One adult pond turtle has been documented in Stowe Marsh along the lower mainstem of the Smith River. One successful nesting attempt has also been documented on private land to the east of Stowe Marsh. The pond turtle probably also exists in other areas within the watershed.

Haddock's micro caddisfly (Rhyacophila haddocki) The Haddock's caddisfly, a Forest Service sensitive species, inhabits high elevation (generally over 3,000 feet elevation) small permanent headwater creeks, seeps and springs. The Mary's Peak area on the Alsea Ranger District is the only known occurrence of this species on the Forest however habitat exists in the headwater areas of Kentucky and Gold Creeks just west of Roman nose mountain on BLM (Paul Hammond personal comm.).

Bats - Ten bat species are known to inhabit the Oregon Coast Range. Smith River Watershed probably contains habitat suitable for all of these species. In 1996 a study by Oregon State University of use of bridges (Map 10) by night roosting bats was initiated on Siuslaw National Forest Lands as well as adjacent BLM lands. Eight of the ten species of bats were found to be using bridges regularly as night roosts. Myotis yumanensis (Yuma myotis), M. lucifugus (Little Brown myotis), M. volans (Long-legged myotis), and E. fuscus (Big brown bat) were the most commonly caught species. Three bridges on the North Fork of the Smith (Bridges #2, #5 & #7) as well as the bridge on the West branch of the North Fork Smith were surveyed for numbers of bats observed and number of guano pellets collected. All four of these bridges were used by bats the #2 bridge having the most use. Three other bridges on the North Fork Smith (bridges 8, 9 &10) were surveyed during the general survey where bats were either observed or captured. Four species were captured at bridges 8 & 10 including the Long-eared, Little Brown, Fringed and Long-legged Myotis. No bats were detected at bridge 9, probably due to its flat bottom structure which seems to preclude bat usage. Another bridge at the mouth of Spencer Creek consistently has one to four Corynorhinus townsendii

(Townsend's Big-eared bat) a Forest Service Sensitive species, day roosting under it throughout the study. This bridge was also used by seven other species of bat during the study including a colony of 45 Big brown bats. Additional surveys of bridges are scheduled for 1997.
Abandoned buildings and barns, snags, loose tree bark and canopies of mature forest also provide habitat necessary for roosting, hibernation and raising of young. Mature conifer forest may provide the best habitat for bats within the watershed.

In general little information is available on the populations of any wildlife species. Surveys are needed to determine existing population levels.

BOTANICAL RESOURCES

The known botanical resources in the watershed include vascular plants that are on the Regional Forester's Sensitive Species list 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 habitats in the watershed but species specific surveys or inventories have not been performed.

Vascular Plants - Surveys for all Regional Forester's sensitive plant species were performed prior to past ground disturbing activities (primarily timber harvest). Smith River Watershed contains two documented locations of loose-flowered bluegrass, Poa laxiflora. One population is located on the North Fork of the Smith River and another population is located at the base of the lower Kentucky Falls. These populations also represent the two southern most known populations of this species. A conservation and monitoring strategy for Poa laxiflora was developed by the forest botanist in April, 1993. As a result of this strategy all populations south of the Siuslaw River are protected as No-Impact Populations. No-impact populations, as the name implies, are completely protected from project activities. Poa laxiflora typically grows in riparian zones, that are dominated by alder or alder/conifer mixed stands that receive a high amount of rainfall. It prefers partial shade with canopy cover averaging 50 - 60 % and is associated with areas of small-scale disturbance.
No other sensitive plant species have been located during botanical survey efforts in the watershed. Of the 17 vascular plant species mentioned on the ROD, only two species (Allotropa virgata, Arceuthobium tsugense) have ranges which overlap this watershed. Habitat availability for these species within this watershed is unknown at this time.

Noxious Weeds and Undesirable Non-Native Plant Species - Noxious weeds pose an ever increasing threat to native ecosystems, crop lands and other plant communities. A list of weed species known or suspected to occur within the watershed can be found in Appendix F. The Forest Service currently coordinates the management of noxious weeds through a Memorandum of Understanding with the Oregon Department of Agriculture.

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 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. Of the 8 survey points within the watershed only two have been surveyed to date. The remaining 6 plots are scheduled to be surveyed in FY 97. Current surveys detected 17 different species of lichens (Appendix G). Survey of these plots focused only on large lichen species growing 1/2 meter above the base of trees, therefore only a small portion of the total number of lichen species present at the site may have been detected.

On a three hour search by a group of OSU students, staff and Forest Service ecologists of the peak of Roman Nose and adjacent forest and rocky cliff areas, 99 lichen species were found (Appendix G). This level of lichen diversity is exceptionally high for a Coast Range site. To preserve both the unique physiographic features and lichenological diversity, it is important that the rock pit not be further expanded.

Bryophytes

Bryophytes reach their greatest diversity and abundance in late-successional forests. These forests provide many habitats, such as an abundance of coarse woody debris at various stages of decay and more shaded, cool and humid conditions than are typically found in younger, managed stands. Current conditions within the watershed for bryophyte diversity, distribution and abundance are relatively unknown at this time. Mature conifer and remnant old growth stands would be expected to have a higher diversity and abundance of bryophytes. Larger blocks of this type of habitat are present in the Wassen Creek area in the southern portion of the watershed as well as in the North Fork Smith River area in the northern portion. BLM plans to conduct surveys for bryophytes in the Wassen Creek area in 1997. No surveys are scheduled on National Forest Lands.

AQUATIC HABITAT

Riparian Vegetation

The species composition and seral condition of riparian areas has been changed since Euro-american 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 recruitment of individual conifer trees into deciduous stands. The current seral stage of riparian areas (Maps 16,18) is described as being dominated by early seral conditions with smaller diameter trees, whereas historically, a greater component of older seral conditions and larger trees were expected (Appendix D2).

The current seral condition of the vegetation directly influences the stream environment and over time influences large wood supply and routing, water temperature and nutrient cycling. To evaluate the effect of current seral condition of riparian vegetation on stream system dynamics, two ecological components important to the function of riparian vegetation were analyzed: 1) the ability of riparian areas to supply large woody debris to the stream system and 2) the ability of riparian areas to provide shade to the stream channels.

Large Woody Debris

With the emphasis on commercial timber production, clear-cut boundaries, went down to the streams in many areas and caused impacts to the tributaries that contain the habitat for cutthroat, coho, and steelhead. The vegetation loss at the stream edge and the hot slash burns that prepared the site for reforestation, resulted in sediments being introduced into the streams that clogged gravels and filled pools. Riparian buffers were implemented in 1970's and reduced the direct impacts to the perennial streams in a harvest unit but did little or nothing to protect the intermittent tributaries which are the sources for the material used for habitat in the perennial channels.

Additionally, wood debris and large wood, that was believed to impede fish passage, was cleared from many stream channels. This caused winter and summer rearing habitat for juvenile fish to be degraded. This practice continued until the early 1980's. Areas that had stream cleanout (at least partial removal of log jams) is shown on Map 15. Salvage of cedar for shake material from stream channels and adjacent riparian areas degraded habitat even more.

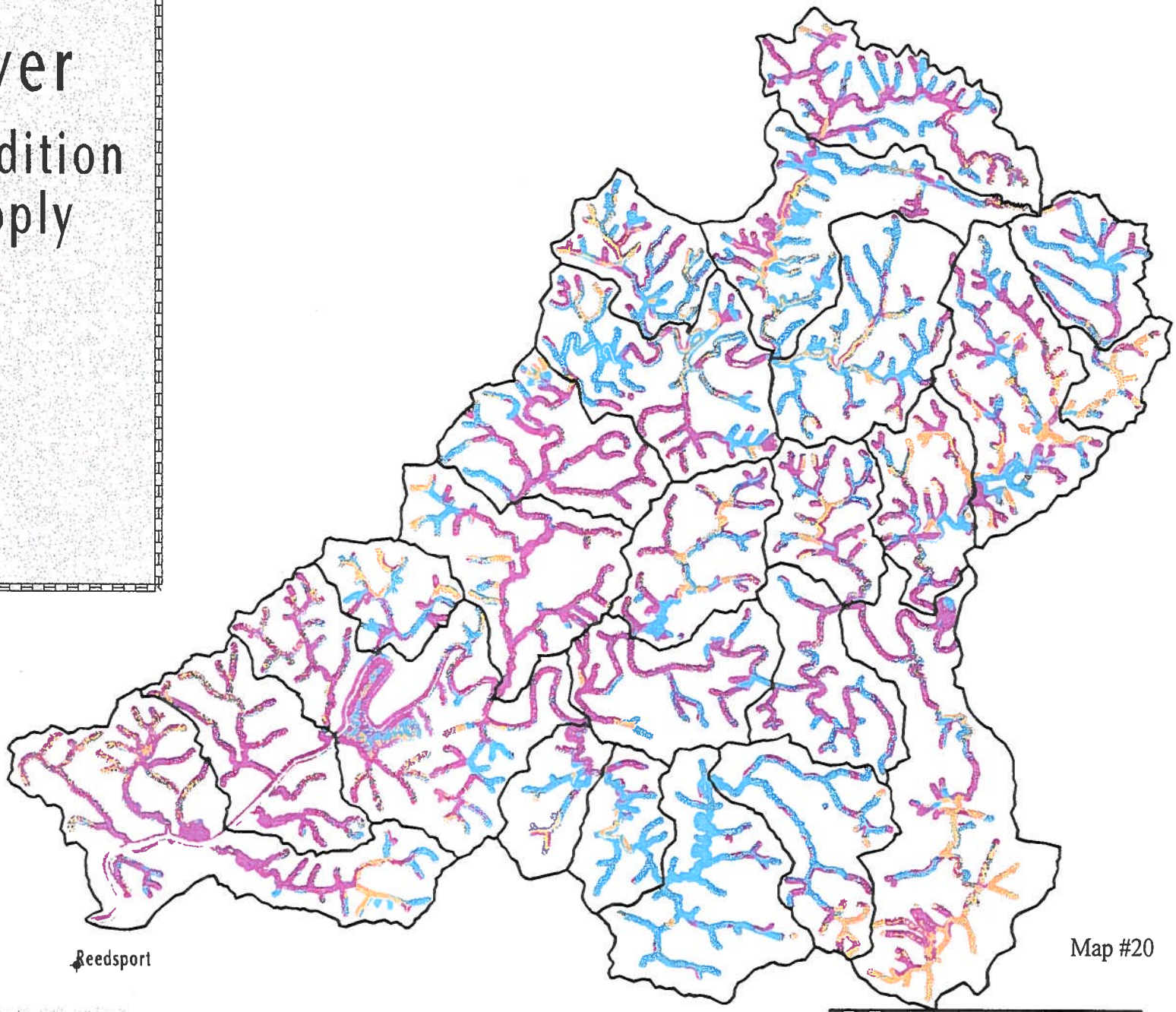
Existing in-stream LWD is slowly decomposing. Potential LWD sources from upslope in some areas are quite drastically reduced (Table 13). As a result, the trend for LWD in this watershed, and the associated fish habitat, is to continue to decline in quantity, particularly in those areas with reduced LWD source areas (Map 20).

Smith River

Current Condition of LWD Supply

- Adequate
- Near Term Adequate
- Not Adequate

July 23, 1997

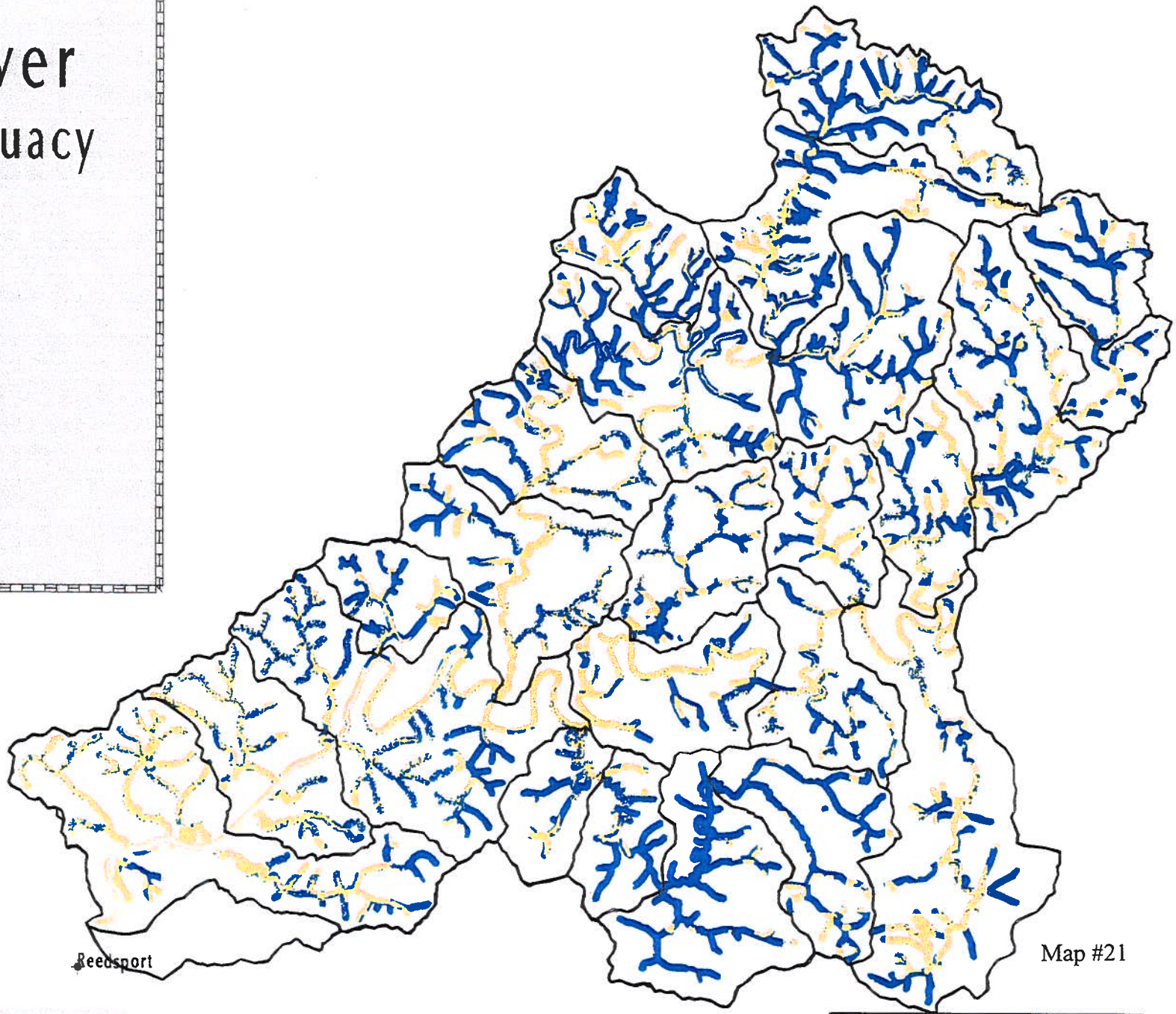


Map #20

Smith River
Shade Adequacy

Adequate
Not Adequate

July 17, 1997



Map #21

0 1 2 3 4 5 6
MILES

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Table13. Summary Of Landuse And Riparian Condition By Subwatershed

6th Field Watershed Name	Subwatershed Name	Rd Density mi/sq mi	Past Stream Cleanout (Y/N)*	Past Cedar Sales (Y/N)*	% Riparian with Adequate or Near Term Potential LWD	% Riparian with Adequate Shade
North Fork Smith	Sheepherder	2.85	N	N	46.2	70.6
	Kentucky	2.35	Y	Y	75.7	60.3
	Steelie	2.30	Y	N	82.0	71.3
	West Branch	2.80	Y	Y	76.9	59.4
	Peach	2.28	Y	Y	66.2	63.7
	Sulphur	2.09	N	N	39.5	49.8
	L. North Fk. Smith	2.31	Y	N	36.1	62.3
West Fork Smith	Okie	2.80	-	-	66.7	70.6
	West Smith	3.66	-	-	82.6	62.7
	West Fork Smith	4.29	-	-	62.1	54.4
	Coon	3.99	N	Y	49.4	45.1
Lower Smith	Johnson	3.13	-	-	47.4	45.7
	Smith Falls	1.83	-	-	37.4	49.8
	Spencer	2.97	-	-	58.4	57.4
	Weiss	2.43	-	-	37.7	37.5
	Eslick	2.01	N	Y	70.5	62.5
	Murphy	1.27	-	-	49.5	49.8
	Joyce	2.28	-	-	30.4	34.9
	Otter	2.37	-	-	41.9	30.3
Wassen Creek	Wassen Lake	2.94	N	N	76.7	76.4
	Upper Wassen	1.13	-	-	92.9	92.1
	Wassen	0.39	N	N	87.7	77.3
	Lower Wassen	0.36	N	N	69.1	64.6
Vincent Creek	Vincent	4.48	-	-	57.0	40.6

* Only applies to USDA Forest Service lands

Shifts in riparian vegetation affect both stream function and aquatic habitat condition, primarily by affecting the amount of large wood entering a stream. The majority of the wood in a stream comes from debris torrent deposits. Timber harvest has had the largest impact on the amount of large woody debris available for routing through various stream segments from the source areas. In less steep areas, midslope and lower valley bottom roads have the potential to stop large wood from moving down source or transport sections of a stream during a debris torrent. When this happens large wood stacks up behind the culvert and ends up being removed or dumped elsewhere to facilitate water

movement under the road. In this watershed this process occurs primarily on the large valley bottom roads after large storm events.

A second method of recruitment of individual large wood pieces is from riparian areas adjacent to streams. These large pieces, usually with roots intact, 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 and associated fish habitat.

The potential for riparian areas to provide LWD directly to the stream channel was assessed (Appendix D3). The current LWD supply condition on Class I, II, and III streams throughout the watershed is adequate on 41% of the streams, near-term adequate on 17% of the streams, and not adequate on 42% of the streams (Map 20). A comparison between Federal lands and non-Federal lands shows that 75% of the riparian areas along these streams are inadequate or near-term adequate conditions for supplying LWD on Federal lands. Historically the greatest potential for anadromous fish rearing existed primarily on non-Federal lands. Table 13 displays LWD source conditions for the subwatersheds within the analysis area. The following subwatersheds show the lowest potential for natural recruitment of LWD into the streams: Sulphur; Lower North Fork Smith; Smith Falls; Weiss; Joyce; and Otter.

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 (Appendix D4). Floods and human activities (harvest and roads) have the potential to influence stream temperature by altering channel shape and the amount of shade-producing vegetation.

Table 13 and Map 21 display the existing shade adequacy of the riparian vegetation. For comparison, Federal and non-Federal conditions were separated by the size of the stream. The "mainstems" include: North Fork of the Smith River; West Fork of the Smith River; and the Main Smith River. "Main Tributaries" are Class I streams that empty into the mainstems. "Class II and III" streams are other, smaller tributary streams. There are large differences in shade adequacy between Federal and Non-Federal lands. Overall, 68% of the Federal land riparian areas provide adequate shade to the stream channel. Whereas, on Non-Federal lands only 33% of riparian areas provide adequate shade.

The mainstem category is misleading since this area contains the tidal influence of the mainstem Smith River which contains large expanses of inter-tidal marshes where shade is not as an important feature. In other portions of the mainstem, i.e. Upper North Fork and West Fork of the Smith River, the potential to provide shade exists but the current condition is lacking in riparian vegetation of a certain size or species composition.

The other two categories provide a good basis for comparison since stream size and function should be similar across land ownership boundaries. On the "Mainstem Tributaries", 63% are adequately shaded on Federal lands and only 34% on Non-Federal lands. On the smaller, "Class II and III Streams", 73% are adequately shaded on Federal lands and only 44% on Non-Federal lands.

Water Temperature

Water temperature is a determining factor in the species 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 out compete cold water species (salmonids) when temperatures rise. Then tributaries that are able to maintain cooler temperatures are critical to maintain as refugia. State water temperature standards for the Umpqua cold water aquatic species basin stipulate that a "7 day moving average of the daily maximum shall not exceed 64°F" (DEQ, 7/1/96).

Increases in water temperature directly affect 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. 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. Optimum temperatures for the survival and growth combined are at or below 58°F. Above 64°F the fish begin to become stressed, and survivability and growth decrease as the temperature continues to rise. Sustained temperatures above 70°F will result in mortality for anadromous salmonids. Availability of cold water refuges, such as cooler stratified layers in deep pools, or under-gravel seeps can partially compensate for such effects.

Water temperatures have been monitored in the North and West Forks of Smith River and a small amount in Perkins Creek (Map 22) Summary data from 1975-1979 is compiled in Appendix C2a. This early data does not include 7-day average maximum temperatures now used by the State to judge water quality limited streams but does give similar information. Appendix C2b contains temperature data from 1981-1996 with 7-day average maximum temperatures. Timing of the highest water temperatures in the watershed relates to ambient air temperature and stream aspect. The warmest water temperatures generally occur between mid-July and mid-August in this watershed. Some of the monitoring periods occur outside this critical time period, and these are marked in Appendix C2b.

Water temperature was measured on six different locations on the mainstem of the North Fork Smith River to just above the mouth of the Middle Fork (Map 22). Results reveal average maximum temperatures exceeding 64°F (State standard) at every location, and when monitoring included the warmest time period mentioned above, temperatures were

above 64°F from 49-71% of the sampling period for these sites (Appendix C2a,b). In addition, seasonal maximum temperatures for this portion of the North Fork equal or exceed the lethal limit for salmonids (72°F) and include one measurement of 80 F at Bridge #8 in 1977, the highest water temperature ever recorded for the Mapleton District. Seven stream temperature monitoring sites for the West Fork Smith done by the Bureau of Land Management in 1996 showed slightly lower 7-day average maximums, but all seven exceeded 64°F. Number of days that the daily maximum exceeded 64°F ranges from 18% of the sampling period in the upper West Fork to 57% of the sampling period in the lower West Fork (Appendix C2b).

Reasons for high temperatures in the North Fork Smith include the fact that in late summer, low water flows move over a wide, predominantly bedrock channel. This exposed bedrock acts as a solar panel to heat the shallow water. In addition, the east-west orientation of the North Fork Smith in this area exposes the stream channel to solar heating for a large part of the day. Due to the width of the stream, riparian vegetation, even at its maximum potential, does not provide shade for the entire channel.

Despite fairly high shade adequacy, high water temperatures occur well up into the Middle Fork of the North Fork Smith. Summary data for two monitoring sites sampled in 1975 show average daily maximums for the period to be 62.4°F and 62.9° F. Subsequent years of monitoring at these same two sites show slight increases in recorded temperatures with the 7-day average maximum for 1981 at the upper site reaching 64.6°F. Monitoring at the mouth of the Middle Fork for 1978 and 1981 show temperatures approaching the lethal limit for salmonids (70.0°F and 71.9°F, respectively). What may be partially responsible for the increase in temperature in the Middle Fork was a significant amount of stream cleanout in the area in 1977 (Map 15). This loss of large wood probably increased the streams ability to move gravels out of the area and scour portions of the Middle Fork to bedrock. As in the mainstem of North Fork Smith, this would increase the amount of solar heating and decrease the amount of gravels present that create cooler subsurface flows. Also similar to North Fork is the east-west orientation of the Middle Fork, keeping sun on the stream for a large part of the day.

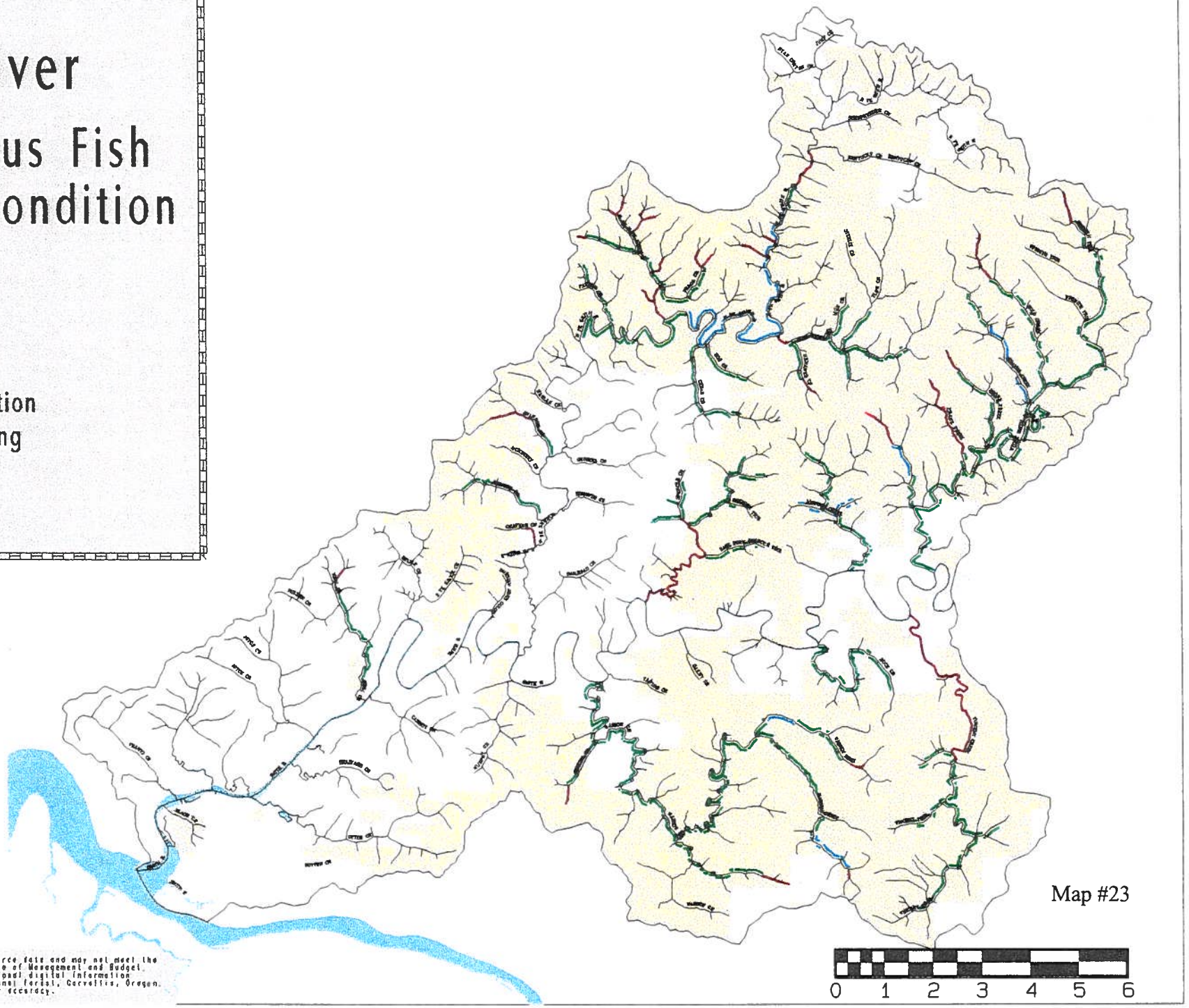
Given the extremely warm temperatures found in the mainstems of this watershed, the importance of cool water refuges in tributaries to the mainstems are critical to cool water fish survival in this watershed. From monitoring done over the last two decades, certain tributaries stand out as cold water refuges. Bob Creek and North Branch to the Middle Fork had cooler water temperatures for measured years off the North Fork Smith with very few days exceeding 64°F. Cedar Creek and The West Branch of North Fork Smith both had 7-day average maximums right at the threshold for the years surveyed (63.8°F and 63.7°F, respectively), although data from Cedar Creek is suspect as the contractor stated he had buried this gauge in the sand for a portion of the sampling period during subsurface flow. Both Cedar and West Branch have long stretches of bedrock channel that may affect their temperatures. Tributaries to the West Fork monitored in 1996, including Coon, Crane, Moore, Beaver and Gold, all fall just below the threshold 7-day average maximum and these sites only exceeded 64°F from 2-12% of the sampling

Smith River

Anadromous Fish Rearing Condition

- Functioning
- Partially Function
- Not Functioning
- Federal Lands

July 29, 1997



Map #23

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MILES

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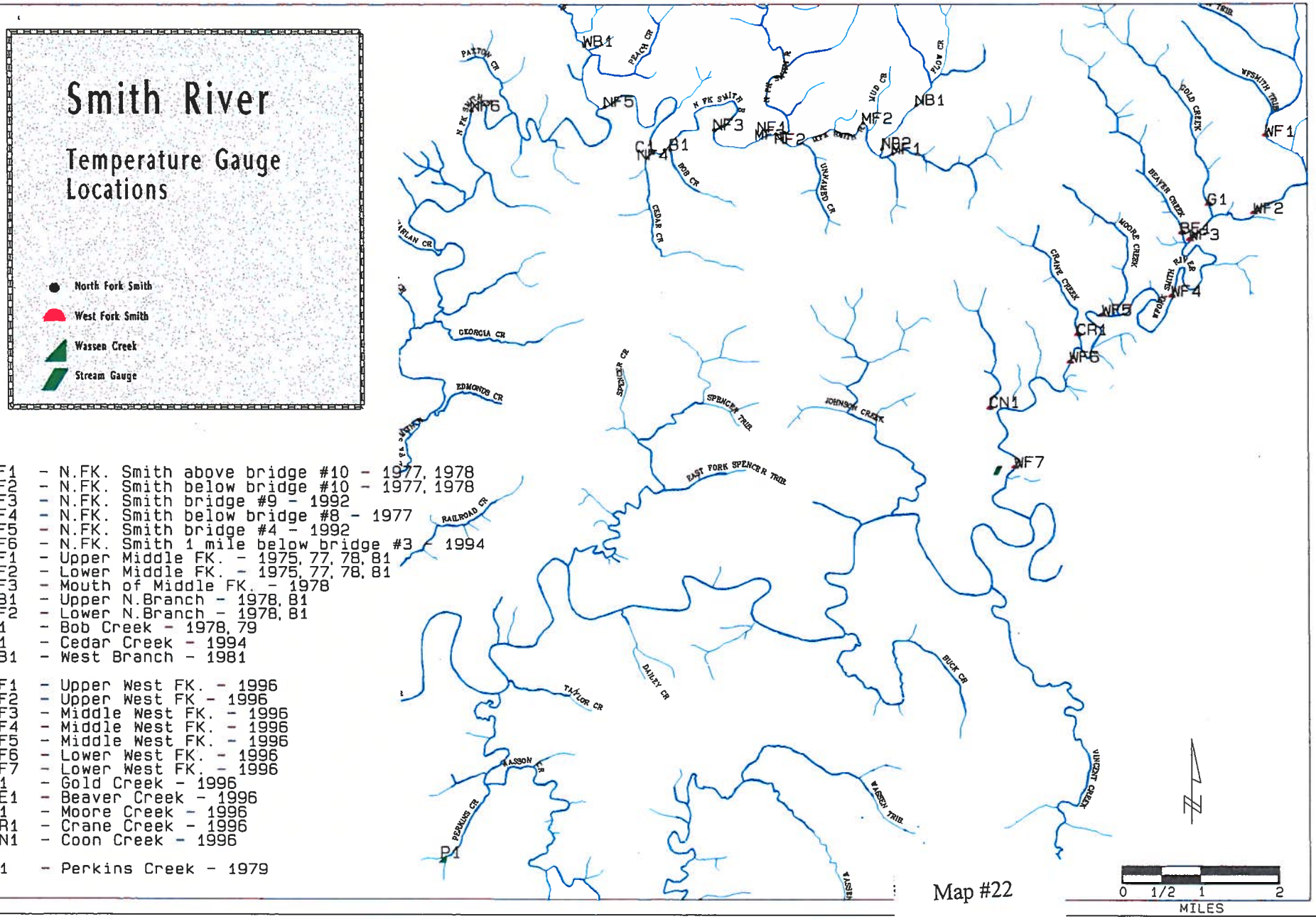
Smith River

Temperature Gauge Locations



NF1 - N.FK. Smith above bridge #10 - 1977, 1978
NF2 - N.FK. Smith below bridge #10 - 1977, 1978
NF3 - N.FK. Smith bridge #9 - 1992
NF4 - N.FK. Smith below bridge #8 - 1977
NF5 - N.FK. Smith bridge #4 - 1992
NF6 - N.FK. Smith 1 mile below bridge #3 - 1994
MF1 - Upper Middle FK. - 1975, 77, 78, 81
MF2 - Lower Middle FK. - 1975, 77, 78, 81
MF3 - Mouth of Middle FK. - 1978
NB1 - Upper N.Branch - 1978, 81
NF2 - Lower N.Branch - 1978, 81
B1 - Bob Creek - 1978, 79
C1 - Cedar Creek - 1994
WB1 - West Branch - 1981

WF1 - Upper West FK. - 1996
WF2 - Upper West FK - 1996
WF3 - Middle West FK. - 1996
WF4 - Middle West FK. - 1996
WF5 - Middle West FK. - 1996
WF6 - Lower West FK. - 1996
WF7 - Lower West FK. - 1996
G1 - Gold Creek - 1996
BE1 - Beaver Creek - 1996
M1 - Moore Creek - 1996
CR1 - Crane Creek - 1996
CN1 - Coon Creek - 1996

P1 - Perkins Creek - 1979

Map #22

period. The upper Perkins Creek gauge had only 2 days in the summer of 1979 greater than 65°F.

In-Stream Aquatic Habitat Condition

The dynamic nature of stream systems and the movement of sediment and wood through the system with high flow events results in a cumulative effect on aquatic resources and that effect is usually most prominent in the mainstem stream reaches. Activities involved with settlement of the area have resulted in 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 (coho and steelhead rearing). Lower portions of the larger streams are very heavily diked which has reduced winter rearing habitat and encouraged the stream to downcut further. The effect of diking and entrenchment is that stream reaches formerly acting as deposition areas conducive to quality habitat have now become transport reaches, moving valuable wood and substrate out of the system.

Splash damming and log drives have further reduced the capacity of certain stream channels to function. By removing the roughness elements of logs and boulders from the channel the velocity of the water increases and causes the creek to scour additionally. These events have primarily impacted the spawning and winter rearing for chinook and summer and winter rearing for coho, steelhead, and cutthroat trout. Additional impacts include: increased water temperatures with reduced subsurface flow and wider streams due to lateral scour of streambanks once the creeks reach bedrock.

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 impact 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 LWD, 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 the streams may be more sediment rich. Changes in the 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 resistant to changes in flow, sediment and wood inputs with increased rates of landslides and several years of below average precipitation may have overwhelmed these segments with sediment at times.

Good examples of a transport reaches can be found in Perkins, Cedar, Coon and Crane Creeks. Although a series of debris jams was mapped in Perkins Creek in the late 1970s, recent stream surveys show no jams existing in the mainstem, but a large accumulation was found near the mouth. Cedar Creek is almost entirely transport and similarly lost a large debris jam in a recent high flow. Coon and Crane Creeks, tributaries to West Fork Smith River, show transport throughout very similar to Cedar Creek. All these streams

show significant amounts of exposed bedrock channel and evidence of significant scour. These transport streams are major contributors of gravel to the higher order streams below them but have transitory fish habitat that may undergo major changes every 5-10 years, depending on occurrence of intense storms in the area..

The cumulative effects of valley settlement, log drives, logging, stream cleanout, valley bottom roads as well as effects from upstream and upslope landuse are significant in the depositional segments of the stream network. The unconfined, lowest gradient depositional segments are the most sensitive to change and the most highly altered since non-native American settlement. These areas are also the prime agricultural and home 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 the following chart. (Table 14).

The majority of Source and Transport sections of the stream network are under Federal management. In these areas it is important to maintain upslope vegetation which maintains stable slopes yet if landslides do occur, allows the mixture of substrates; wood, rocks and soil that will slowly move through the stream system creating fish habitat. The majority of Depositional channels, are on private land. These stream sections provide the highest potential for fish habitat.

Table 14: Percent of Various Geomorphic Segments in Different Ownerships

GEOMORPHIC SEGMENT	FEDERAL*	OTHER GOVERNMENT*	PRIVATE INDUSTRIAL*	OTHER PRIVATE*
Source	69%	1%	26%	4%
Transport	71%	2%	22%	5%
Slow Transport	77%	0%	17%	6%
Depositional	63%	0%	27%	10%
Depositional Flat	20%	3%	37%	40%

* Data available for North Fork Smith River, Wassen Creek, West Fork Smith River and Mainstem Smith River

Current conditions of fish habitat within the Smith River watershed were determined through the use of existing Level II stream habitat surveys conducted by the Forest Service and from Aquatic Habitat Surveys conducted by the Oregon Department of Fish and Wildlife. Habitat that was rated was the potential for rearing anadromous salmonids (for the most part 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 the 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 than if there was little or no beaver activity. This is because beaver

dams have been shown to be very productive for coho rearing. Refer to Appendix D5 for the desired conditions for various components of fish habitat.

Map 23 shows the stream reaches that had completed surveys and the ratings that were given to those stream reaches. Appendix D6 shows how each stream reach rated for each habitat component. Stream habitat information on Vincent, Spencer, Buck, and Johnson Creeks was not readily available to be analyzed, so habitat ratings were based upon information made available by Karen Smith (Fisheries Biologist BLM - Coos Bay).

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. The West Fork of Smith River, portions of the North Fork of Smith River, and Beaver Creek have reaches that are functioning as good rearing habitat and have great potential for fairly quick gains in aquatic habitat conditions with restoration.

Stream reaches that received the functioning designation totaled 18.2 miles. Portions of the North Fork Smith River fall into this category, only because stream habitat improvement projects have been completed there and have increased the amount of large wood and deep pools available for the fish in the short-term. None of the surveyed stream reaches that were determined to be functioning met the LWD criteria for a functioning system but they did meet the other 3 requirements.

Stream reaches that received the non-functioning status are the worst areas for salmonid rearing. Many of these areas were in the higher gradient, more confined streams where rearing habitat would not be expected. Non-functioning stream segments were located in places that would have had high historic potential for salmonid rearing. The total miles for non-functioning stream reaches in those streams surveyed were 26.1 miles. Portions of the Middle Fork of the North Fork Smith, Vincent Creek, West Branch of the North Fork Smith, and Crane Creek have reaches that fall into this category.

The remaining 79.1 miles of surveyed stream reaches were designated as partially functioning. This designation had, by far, the widest variation of condition ratings. Most of the stream reaches received the partially functioning designation because of lack of large woody debris in the stream channel and the associated deep complex pools. Many of the reaches met the criteria for percentage of pools per mile but unless they were deep pools they have little value for rearing salmonids and providing cover. Bob Creek, Cedar Creek, West Fork Smith River, and Wassen Creek are examples of streams that are primarily in this rating group.

FISH POPULATIONS AND DISTRIBUTION

Factors affecting the populations of the fish species that are being monitored include those described above as well as commercial and recreational fishing, ocean conditions, and naturally occurring events (floods, fire, landslides). Commercial and recreational fishing can remove a significant portion of a fish run, especially when the populations are in decline. Historically, coho salmon were the main targets of the 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. Chinook use of the West Fork of the Smith River, has been enhanced by the fish ladder which has been installed at the falls on the Mainstem of the Smith River.

Assuming that the Smith River is similar to other coastal tributaries of Oregon, the populations of chinook and coho both declined throughout the first half of the century. Then in the 1970's the coho populations plummeted, declines of steelhead and cutthroat trout were also noted. Although the major impacts to coho habitat happened throughout the 50's, 60's and 70's drastic population declines of coho were not noted until the 70's. Recent theories (Estuary and Marine conditions March 1996 symposium) have demonstrated that ocean conditions may have been responsible for the delayed response of the coho. The ocean conditions were favorable for the coho during these periods until there was a regime shift in 1976, when ocean conditions changed for the worse for coho. Then the combination of poor ocean conditions and poor in-stream habitat conditions may have caused dramatic declines in the coho populations. The estuaries have also changed dramatically since settlement. Dredging of the channel, removal of large wood, and filling of the floodplains have all affected the inter-tidal environment that the smolts must pass through on the way to the ocean. Introduction of exotics may also have affected the anadromous fish populations (shad, striped bass, smallmouth bass, and non-native populations of salmonids).

SOCIAL COMPONENTS

A portion of the coast range, much of the North Fork Smith watershed land, has a feeling of isolation from the surrounding roads and towns. The area is bounded by hills and one sees out only from peaks, primarily to the east. This isolation is part of the attraction of the area, but also makes roads and trails which link with the surrounding land, cities, and towns important. Partly the result of isolation created by topography, a large portion of the watershed is high quality primitive forest land, unusual in the state, with value for recreation, scenery, and open space, as relief from cities and towns.

The coastal influence is felt in the southwest quarter of the assessment area, a source of change and resources for residents. Most settlement and resource use has been in the southwest portion of the area, particularly historically.

A river divides the watershed, rivers and creeks run into it from the north and south and the close connection to major river, river mouth, and the ocean immediately to the southwest, mean that water features dominate the area. The watershed is a complex of river valleys with their value as attractions: for beauty, recreation, and resources. Rivers and streams create corridors through the watershed followed by roads and trails. The area also has numbers of waterfalls, varying in height from 10 to 100 feet, in the eastern half which are spot scenic and recreation attractions. Rivers and waterfalls are the primary recreation value and a primary value overall to people living in and visiting the North Fork Smith Watershed.

The biophysical units identified in this assessment (Map 4) are meaningful in the way that people use the watershed. The north (BUs #1 & #3) and south (BUs #5, & #6) portions of the watershed are distinct in characer and have unique value as forest settings. In these areas, scenic quality is predominantely semi-primitive or primitive in character. The central portion (BU #4), and on a smaller scale, BU #2, is used as a rural river valley as farmland, with foothills used for timber and river associated recreation use. As it does for wildlife, BU #7, the coastal influence area, also has had and continues to have distinctive value for people.

SUMMARY OF CHANGES IN RESOURCE CONDITIONS

It is difficult to create an understanding of how ecosystems have worked in the past. In addition, no natural system is static, natural forces are constantly applying pressures on different components of the ecosystem. During this analysis, interpretations were made about expected natural conditions of various resources based on what is known about natural disturbance regimes. Both historic and existing conditions of resources have been described in Chapters III and V. Table 15 summarizes the expected natural and existing condition of resources for a quick reference to what resource conditions have changed on the landscape.

Establishing "Ecological Units" helps explain some of the types of changes in the watershed. However, a few resource components are not affected by the "Ecological Unit" designation. For instance, water temperature is expected to be low throughout the area under historic conditions. Documented changes to that expected condition are summarized in this chapter. Wildlife is expected to be able to find suitable habitat throughout the watershed under natural condition, being displaced from certain areas by disturbance events for a temporary period. The quality of existing wildlife habitat is documented in this chapter. Fish distribution potential has not changed, however, habitat quality has been reduced and many areas are not being utilized to potential capacity at this time.

Table 15: Summary of Changes in Resource Condition by Ecological Unit

AREA #1 GENTLE INTRUSIVE INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Includes large basalt sill which defines the topography and creek location	
• Soils are a patchy intermix of thin and thick soils (could be mapping artifact - most of this is in Lane CO) • Slopes include a high percentage of 0-35% and the top of Baldy Mtn is the largest contiguous flat block in the watershed. Fewest unstable areas of watershed - limited to inner gorge areas.	• High amount of riparian roads on private in unconfined valley areas. Small areas of concentrated road building but mostly on flatter slope, one midslope private road in headwaters of N. Fk. Smith that crosses several headwalls - high potential for mass wasting. • Slight increase in debris torrents over what's expected due to road construction • Area hit hard by February 1996 storm. Road related failures into 1st order streams in Jump Creek had long travel distances into 2nd order streams.
• Very low stream gradient with unconfined depositional sections high in this North Fork Smith system and Sheepherder Creek - • Short transport reaches are all on the North side of the unit (South-facing slope draining into N. Fk Smith)	
• Not accessible to anadromous fish due to falls created by basalt intrusion and does not provide for gene transfer downstream from resident cutthroat trout.	• Fairly good populations of resident cutthroat trout • Resident cutthroat habitat in fair condition
• Drier Plant Association Groups (PAGs) • Western hemlock is prominent in the understory • Mixed fire severity regimes expected to result in smaller patches within larger patches	• Mainstems of creeks are all predominantly private ownership - assume grazing, lack of riparian vegetation • Seems single storied stands from photos, but in the field dense hemlock understory. Also has small patches of dense conifer. Lots of older age cohorts from before the last fire(s). Oldest trees identified in ecology plots and CVS plots were 300 to 350 years old. Old-growth trees seem to be concentrated along ridge tops and in creek bottoms, with fewer in midslope positions, but they are scattered throughout the Basalt Intrusion and Steep Intrusion landscape blocks. • The mature (not oldest age cohorts) Douglas-fir are commonly 130 years old (with fire scars) and 90 years old. Hemlock are somewhat younger (60 to 75 years old) with cedar rarely found (Ecoplot, CVS and field trips). Frank Price did all his fire sampling in this area near Roman Nose and found same ages. The area was reburned when stand was 40 years old.
	• Short trees, slow growing on major ridge systems • Many stands developing old-growth characteristics • Large block of interior forest habitat. Important area for providing secluded wildlife habitat
	• View opportunities from Baldy Mtn. • Kentucky Falls Special Interest Area provides quality recreation experience • In short-term, this area offers best opportunity to consolidate and enlarge the remaining interior habitat

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #2 - STEEP INTRUSIVE INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Rock outcrops line the basalt intrusion along the crescent on top at the slope break	• Limited amount of private ownership - mostly USFS land
• Toe slopes into drainages (bottoms of hill slopes) are steep in many areas. This unit is second only to Perkins Creek in amount of steep, high landslide susceptible ground.	• Fairly high road density and highest percentage of USFS midslope roads in the watershed. • Some road stabilization completed • High incidence of slides in the past 30 years • The largest known debris jam in the entire watershed exists in the West Branch of the N. Fk. and there are hundreds of yards of scoured channel above it • Results of the February 1996 Flood Assessment suggest that most of the slides identified in this unit were natural, possibly suggesting a higher natural rate here than in other units.
• All tributaries draining into the north-south portion of the N. Fk Smith just south of the basalt intrusion are source reaches. Moderate length transport reaches are all on the north side of West Branch, N. Fk and Middle Fk. Smith.	• Remnant debris accumulations in the stream. Area of high incidence of debris cleanout, salvage, and cedar sales in stream zones • Scour of stream channels apparent
• North Fork falls blocks fish passage	
• Mixed fire severity regime expected to result in smaller patches within larger patches.	• Many clearcut harvest units • *Peach Creek* - The severity of the last fire was mixed resulting in many two-storied stands and small patches. There is considerable alder in most of the stands, and gentle, broad peaks are blanketed with pure or mostly pure conifer. • Highly fragmented on west portion, large block of interior mature forest habitat on east portion
•	• North Fork Smith hiking trail provides quality recreation experience • Wild and Scenic area quality reduced to west

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #3 UPPER WEST FORK INTRUSIVE INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Main geologic influence is the basalt intrusion - largest change in elevation in the watershed	• inconsistent ownership - mixture of private and BLM lands; private ownership is all one private industrial owner (partnership potential).
• slope extremes (landslide susceptible areas) are limited to inner gorges • Top of West Fk Smith has less dissected, longer slopes stretching down from the highest peak in the area.	• moderate to high amounts of midslope and riparian roads
• The tribs to upper W. Fk. all flow in a NW to SE direction and are all confined in the headwaters and down through the top of the mainstems. Lower mainstems include flatter topography and moderately confined valley form. • Stream substrates are dominated by basalt (75%) but move through channels with a sandstone bedrock base • Good potential for fish due to long drainages	• High amount of source area • Intermittent scour in channels • Streams stabilizing, large wood beginning to accumulate in channels • Current fish habitat conditions fair to good (relatively intact) - potential for quality habitat for spawning with restoration. • Lower section of this area includes some of the best fish habitat in the West Fork Smith. • Good potential **for recruitment of large wood**
• **Moist and Wet PAGs** • **Mixed Fire Severity creating variable patch sizes**	• Riparian reserves are a mix of natural mature conifer stands and harvested units - reduced quality. • Many stands have been harvested, so the natural vegetation pattern is difficult to discern. • Fairly large interior block of mature forest habitat in headwaters • The last fire was primarily stand replacement. The stands are mostly even-aged Douglas-fir, with a few remnants from before the last fire.
	• Roman Nose provides quality view opportunities.

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #4 - HIGHLY DISSECTED TYEE INFLUENCED ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Highly dissected terrain with knife ridges and short, steep slopes • Debris torrents are frequent in this landscape. The landslide susceptibility model pinpoints headwalls and some inner gorges as areas highest in landslide susceptibility	• High amount of private industrial ownership interspersed with BLM lands • Lower mainstems entrenched so not interacting properly with floodplains • Roads are almost all ridgetop with some valley bottom. Midslope roads are absent in most of this unit because they are virtually impossible to build here. • Instability scattered throughout, no longer locally concentrated
• Mainstems of Smith and N Fk Smith have entrenched meanders with steep slopes (sandstone cliffs) on outsides of meanders. This lends to a high percentage of confined, very low gradient segments that can be thought of as "slow transport" areas where material accumulates temporarily and moves out during times of higher flows • Substantial amounts of transport geomorphic segments that reach to the mainstems.	• Flow regime in the lower mainstem valleys has changed due to diking, downcut channels • Riparian habitat quality greatly reduced • Riparian function reduced due to compaction and change in vegetation characteristics
• Stream substrates and geology are all sandstone • Expect large boulders and abundant gravels in tribs to mainstems due to the abundance of source areas from hillslopes and soils that are particularly thin and gravel rich (over 75% Damewood-Bohannon-Umpcoos and Umpcoos-Rock Outcrop-Damewood series). Soil series are more consistent here than anywhere else in the watershed	• Reduced fish habitat quality and quantity - lack of LWD in channels • Water temperature increases due to exposed bedrock and loss of riparian vegetation • Reduced ability to produce salmonid species • Contains majority of functioning streams for rearing of anadromous fish • Good potential for restoration on upper mainstems • Lack of valuable substrate accumulation in main tributaries - bedrock exposed - high amount of channel scour. 1982 photos of Railroad Creek show one in-unit slide that started in the headwaters and traveled over 1.3 miles, scouring half the length of Railroad Creek.
• **Moist and Wet PAGs** • **Mixed Fire Severity creating variable patch sizes**	• *Murphy Creek* - This place was intensively managed. Downhill logging and roads along every creek. The vegetation in this watershed is primarily brush and deciduous trees. The 1989 photos indicate large patches of brush (shrubs) with alder in the creeks. There are a few scattered conifer. The more northern part of the • subwatershed (toward the Smith River), contains small stands of alder and fewer large patches of shrubs. • *Lower North Fork Smith and Sulfur* - The severity of the last fire appears moderate to high, although much of the watershed has been logged and natural vegetation patterns have been obscured. The alder component in the watershed is high. Most of the remaining conifer are even-aged, with faster growing trees on some slopes and smaller, denser conifer on other slopes. • Many clearcut harvest units • Highly fragmented vegetation on landscape • Greatest change in patch sizes in the analysis area - more variable, smaller now. • Mostly Douglas fir with some western red cedar understory, less western hemlock • Many plantations on the west side of this block are about 30 years old (salvaged from Columbus Day storm)
	• Lots of dispersed camp sites

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #5 - WASSEN/VINCENT ELKTON INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• The southeast portion of this unit has a higher amount of siltstone incorporated in the geology. • The S-shaped form of Wassen Creek's length is most likely affected by the anticline (sandstone upper bedrock fold) that comes to the surface and then plunges in the western portion of the unit	• Same
• There is evidence of deep-seated mass movement in this area - slump earthflow terrain (Wassen Lake most likely formed by a debris avalanche). • Although steep slopes exist in this unit, there is a higher proportion of lower gradient terrain. Subsequently, the combination of slope and landform here showed much lower numbers of landslide susceptible areas from the stability model. • Soil mapping here shows a higher variability of soil type	• Accelerated production of fines. Recent salvage of wildfire area has increased fines. - Vincent Creek • This unit has an inordinate amount of midslope roads built by the BLM and private - Vincent Creek • landowners. Some of these BLM roads are scheduled for decommissioning. Highest road density in analysis area. - Vincent Creek • Riparian road throughout its entire length. - Vincent Creek • Much of the Wassen Cr. drainage is unroaded. - Wassen
• Low gradient, deposition reaches of Wassen Cr extend all the way up into the headwaters area (up to Wassen Lake) • Most of Wassen is unavailable to anadromous fish - the genetic contribution from resident cutthroat trout above the barrier is likely important to the survival of that species	• Good potential for long term restoration of aquatic condition due to large size of drainage and low gradients, but is generally in poor condition - Vincent Creek • Private lands in lower Wassen Creek are some of the most productive anadromous fish areas - Wassen •
• Drier PAGs • The last fire in this unit was one of mixed severity. • The vegetation pattern is one of many small patches of conifer interspersed with deciduous trees. Alder is a component of stand structure, but does not occur in large patches. •	• Loss of riparian vegetation. due tofire salvage harvest - Vincent Creek • Large patch of contiguous mature conifer. - Wassen • Some western hemlock in overstory and understory - Wassen • In most cases, the topography is highly dissected with no major ridges or valleys and no cardinal orientation. In a few areas where east to west ridges are prominent), the post fire vegetation pattern follows topographic features: the fire was partially stand replacement on north aspects and stand replacement on south slopes. North slopes have two-storied stands with fire remnants in the upper canopy, and south aspects have an even cover of smaller Douglas-fir.

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #6 - PERKINS - STEEP HIGHLY DISSECTED TYEE INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Geology is sandstone. Local faults have been mapped in this area	• Same
• Perkins Cr. is the steepest most highly dissected area in the watershed • Source areas include several locations greater than 90%. The landslide susceptibility model showed that the east side of Perkins Cr. (west, northwest facing slope) is almost all high susceptibility for landslides. Soils on the west side of Perkins Cr. are mapped as predominately less than 17" deep.	• Experimental logging occurred here to test the ability of helicopter logging success in extremely steep terrain • The only roads present in this unit are at the top of the ridge above the headwaters of Perkins Creek (4100 Road) and on some spur ridges extending north from the 4100 Rd.
• The mainstem of Perkins Cr and even up into the headwaters is almost entirely transport (of the other streams where geomorphic segments were done, only Cedar had as much transport).	• Debris jams mapped in the late 1970s have all since washed down to the mouth. Jams setting up in lower drainage (depositional segments) - beginning to accumulate materials behind them.
• Transports materials often downstream (gravels and wood). Important source of substrates for Lower Wassen.	• Low percent gravel in stream channels • Bedrock in upper reaches of Perkins
• Intermittent habitat - some years may produce substantial numbers of anadromous fish, other years may produce substantially less due to transport nature of stream	• Fair to good habitat for resident cutthroat
• The last fire was mixed severity. These watersheds are dominated by two-storied stands. The patches are small. There is considerable alder on the lower third of the slopes.	• Alder component increased in this area. • Small patch sizes of vegetation seral class represent expected fire regime.

Table 15 cont.: Summary of Changes in Resource Condition by Ecological Unit

AREA #7 - COASTAL INFLUENCE ZONE	
EXPECTED NATURAL CONDITION	**CURRENT CONDITION**
• Geology is Tyee sandstone with wide bands of quaternary alluvium deposits in the mainstems and slough areas • Gentle topography predominates. Adjacent hillslopes are rarely greater than 55% and show little occurrence of high susceptibility for landslides from the stability model. Above the confluence with the N Fk, slopes greater than 90% (sandstone cliffs) occur on the insides of the entrenched meanders on the Smith River. • High variability in soil series due to all the influences affecting development includes organic rich deposits in the slough areas, fine sediments on flood plains and coarse, gravelly loamy soils on uplands.	• Ownership is almost totally private with some small blocks of USFS • Large amount of valley bottom (riparian) roads due to the amount of private ownership. Lots of ridgetop roads, not many midslope roads
• Includes inter-tidal influence with marsh and slough areas off the main fork Smith River. Effects of rain on snow in the Cascades that cause flooding of the Umpqua R. will directly affect this unit as well due to its proximity to the Umpqua. • Mainstem Smith and Lower N. Fk. Smith are almost exclusively moderate and unconfined deposition areas • Expect high degree of stream channel sinuosity and interaction with the floodplain • Wetland systems were extensive	• Increased sediment deposition in estuary and sloughs. • Loss of wetland habitat • Loss of floodplain function • Diking of the mainstem has increased the transport capacity of this unit resulting in higher stream energy, loss of floodplain function, loss of off-channel winter rearing habitat, downcutting of channel. Sediment and debris is carried out of system more rapidly.
• Historically this area was very important for summer and winter rearing of anadromous salmonids due to the extent of the floodplain and off-channel habitat.	• Loss of rearing habitat in mainstem and loss of access to lower tributaries may be critical to anadromous fish for summer rearing in this areas due to high summer temperatures in the mainstem
• Expect large patch sizes of forested vegetation of a single seral class • Sitka Spruce PAG • Long fire return intervals due to climatic influence. Fires are infrequent stand replacing events • Chronic small-scale wind disturbance	• Grazing in the valley bottom on private behind diked areas. Forested valleys converted to grass. • Vegetation plot data indicates 2-storied stands. • Loss of spruce in bottomlands • Patch sizes in this area reduced beyond historic range.

CHAPTER VI: RESTORATION OPPORTUNITIES

Restoration of this analysis area to obtain late-successional wildlife habitat conditions, provide for aquatic resources and allow recreational opportunities will be addressed by issue. Based on the changes in resource condition that have occurred in the watershed, (Table 15) certain types of opportunities are more appropriate in specific areas of the watershed. The ecological processes and/or conditions, that the analysis has predicted to be operating in specific areas, help to determine the types of projects that are appropriate to meet the objectives.

Restoration opportunities are general for the most part. Arrows on the Opportunity Maps (Maps 24 - 28) identify examples of the types of areas recommended and the activity should not necessarily be limited only to those areas. When specific project locations were known, however, they were included.

ISSUE I: PROTECTION OR ENHANCEMENT OF LATE-SUCCESSIONAL WILDLIFE HABITAT (Map 24)

Based on the principles of conservation biology, restoration of species habitats should focus first on the existing quality habitat areas, then, once those areas are secured, restoration efforts should move out into more degraded habitat areas. With this concept in mind, restoration of late-successional habitat should be prioritized as follows:

1. Improve habitat adjacent to existing large blocks of suitable habitat
2. Link large blocks existing habitat through riparian corridors
3. Link larger landscape flows (connectivity areas)

Managed stands 35 years and older may provide habitat for Northern flying squirrels and bushy-tailed woodrats which are forage species for the Northern Spotted Owl. For this reason, some evaluation of the prey potential of these aged stands should be made prior to thinning or harvest activities especially when they are within 1/4 mile of a pair center or territorial single and when the amount of suitable owl habitat is at or below 1,906 acres. Managed stands within the watershed that meet this criteria are: Stand Numbers 2286-017, 2286-001, 2272-007, ; and BLM 1960 stands in T20S, R9W, Sec11.

Few habitat improvement projects have been completed for big game species. These species have benefited from the cutting of forest and creation of early seral conditions in the central portion of the watershed. This area will likely continue to provide some of this early seral habitat. One meadow has been seeded for elk forage in the North Fork of the Smith River near Bob Creek.

Silvicultural techniques are tools to achieve resource objectives. The main techniques being currently applied under the NW Forest Plan are commercial thinning and precommercial thinning. Thinning helps to maintain stand vigor and puts acres on a faster developmental track toward late-successional habitat. The effects of leaving overstocked stands untreated are not yet fully understood, but it is known that widespread, extreme inter-stand competition could lead to a decline in overall stand health, including increased spread rates of disease such as root rot or Swiss needle cast, limited growth capacity on remaining dominant and codominant trees due to crown degeneration, and increased windthrow susceptibility due to increased height to diameter ratio. Also understory vegetation is completely eliminated due to the lack of available sunlight. Benefits from thinning also include opportunities to underplant shade tolerant species where the residual overstory is widely spaced. There are also opportunities to culture for structural elements that will increase stand level diversity.

The LSRA (Siuslaw 1997) determined that given the high density and predominant monoculture of trees in the managed plantations on federal land, that several management options are appropriate and desirable to accelerate the attainment of late-successional characteristics. REO guidelines for silvicultural treatments in both precommercial and commercial age classes emphasize the need to maintain diversity in meeting LSR objectives, including leaving some areas untreated. An objective to keep in mind when treatments are applied is to mimic natural disturbance pattern, including such characteristics such as patch size, seral types, density and variability.

For silvicultural prescriptions of CWD in managing plantations, a recommended "number" or volume is less important than an understanding of the dynamics of CWD and, particularly, a determination of whether the managed area is currently on the upward or downward trend for coarse woody debris. The importance of managing for CWD in plantations is to provide continuity and critical habitat for the succession of fungus, lichens, small mammals, insects, amphibians, mycorrhizae and host of other species.

The final objectives of stand characteristics should dictate the application of various silvicultural prescriptions. Care must be taken in applying silvicultural treatments to ensure that key structural, functional or diversity components in the stand are not eliminated. Looking at the Issue 1 Map (Map 24) gives an idea where potential plantation units are located. Restrictions on where thinning won't be applied include: areas without sufficient density to warrant a thinning, stands where access is limited, ex. can't get road access and helicopter isn't viable, and within 1/4 mile of a spotted owl nest during nesting season (3/1-6/30).

The quality of the vegetation data that was available for use in this watershed analysis was inadequate to adequately assess multiple canopy layers. This information would be useful to identify and characterize late-successional areas. Riparian vegetation analysis too was limited by the quality of the vegetation information

ISSUE #1: POTENTIAL OPPORTUNITIES:

- Reduce Fragmentation
  - Accelerate late-successional structural development
  - Enlarge interior habitat areas
  - Maintain dispersal habitat (i.e. 40% canopy cover)
- Provide for connectivity of species
  - Connect smaller blocks of mature habitat
- Provide wildlife security areas for reclusive species
- Protect Existing Mature Conifer Habitat
  - Secure existing quality habitat in critical areas
  - Protect Large blocks of Interior
  - Maintain existing refugia
- Restore provincial home range habitat (deficient areas first)

ISSUE II: PROTECTION OR ENHANCEMENT OF SALMONID FISHERIES AND AQUATIC SPECIES HABITAT (Map 25)

Wassen Creek has been designated by the NFP as a Key Watershed. The area supports an important population of resident Umpqua cutthroat trout above the falls at Devils Staircase. This falls blocks migration of anadromous fish upstream from this area, blocking off miles of habitat. However, occasionally resident trout from above swim down through the falls and contribute to the gene pool of the anadromous trout below. Therefore, this area is important for the viability of the Umpqua cutthroat trout species.

For other anadromous species such as coho, the West Fork of the Smith River provides a much more productive and potentially high quality habitat area. Management activities in the West Fork of the Smith River should focus on restoration of aquatic species habitat.

ISSUE II: POTENTIAL OPPORTUNITIES:

- Restore deep complex pools
  - Place LWD in stream channels
  - Accumulate substrates on bedrock areas
  - Restore the interaction with the floodplain
  - Encourage future recruitment of LWD
  - Decrease the width/depth ratio of streams
- Restore stream interaction with the floodplain
- Provide shade by promoting forested riparian habitat
- Provide for fish passage

ISSUE III: MAINTENANCE OF SLOPE STABILITY IS CRITICAL TO DISTURBANCE PROCESSES (Map 26)

The ability of either the Forest Service or the BLM to maintain roads has been reduced as a result of reduced timber harvest levels. By the early 1990's, the Siuslaw National Forest was no longer able to maintain all of the roads to standards that would insure stability during major storms. Consequently, the Forest has adopted a base level of roads that will be maintained for access and travel management (ATM roads). All non-ATM roads will be stabilized to protect aquatic resources (Appendix I1) and in some cases, roads will be blocked or decommissioned after stabilization if they pose an immanent threat to aquatic or terrestrial resources. The BLM Transportation Management Objectives (TMO) is a similar program where an interdisciplinary team evaluates the current and future need for each BLM controlled road, assigns maintenance levels, and recommends road closures. Established reciprocal right-of-way agreements between the BLM and companies owning land intermixed with BLM sections will limit BLM's ability to close many roads that cross BLM administered lands.

Waterbarring is one temporary measure to reduce excessive surface runoff that could degrade the roads and nearby streams. Pull back of cracking and unstable sidecast road fill is another proven technique to prevent large amounts of fine sediment from moving down hill to the stream channel. Other techniques include replacement or removal of culverts that are undersized or are failing due to lack of structural integrity or placement of rolling dips behind culverts that could catch overflow should the culvert fail during the next decade .

In 1994, a portion of the Mapleton District's watershed restoration money received as part of the Northwest Forest Plan was spent in the North Fork of the Smith River area to treat roads and improve fish habitat (Appendix I1). These projects included:

- 13.9 miles of waterbarring;
- 20 locations of sidecast pullback totaling 3200 cubic yards of material;
- 2 miles of road decommissioning using subsoiling techniques;
- placement of 13 fish habitat structures in the North Fork of the Smith River
- 30 structures in the Middle Fork of the North Fork of the Smith River;
- erosion control for dispersed recreation sites along the North Fork.

In addition, the 1996 Forest-wide waterbar contract included 9.8 miles of waterbarring off the 4811 road (west boundary of the watershed) and on the north side of Wassen Creek roads treated prior to the February flood of 1996 appear to have "survived" the storm far better than the untreated road system. A more specific and comprehensive road assessment for the entire watershed will be carried out in the summer of 1997.

ISSUE III: POTENTIAL OPPORTUNITIES:

- Minimize accelerated landslide rates, maintain slope stability
- Reduce accelerated input of sediment, concentrating on road stabilization and proper waste area designation
- Allow natural inputs of sediment and debris
- Stabilize and decommission non-ATM roads that are chronic producers of sediment

ISSUE IV: PROVIDE QUALITY RECREATION WHILE MAINTAINING THE AQUATIC CONSERVATION STRATEGY (Maps 27,28)

Aquatic Conservation Strategy Objectives are itemized in the Record of Decision for the NFP (B-11). These objectives need to be pursued with the implementation of any project activity in the stream influence zone

North Fork Smith Recreation Emphasis Area - Current Condition

There are approximately nine and a quarter miles of River from bridge 10 to the Siuslaw National Forest boundary in T20S, R10W, Section 32. This is one of the sections of the North Fork Smith considered to have "outstanding scenery and fisheries value." National Forest land in this area is in need of restoration to retain and enhance those values.

Dispersed camps and boat access cover approximately 31% of this stretch of the North Fork of the Smith River. This figure was determined by calculating the acreage of all area between camps and the river and between camps and adjacent boating access. All acreage included in the calculation has the potential to be impacted. In addition, twenty-six percent of the North Fork is private land or recently acquired formerly private land where forest vegetation is in the process of re-establishing. The total area with some level of impact to the stream system, from non-recreational as well as recreational impacts, is 57%. In addition, Forest Road 23, with nine bridges, follows this section of N. Fork Smith and the Road is often within one tree length of the River.

During this analysis, it was determined that many of the existing dispersed recreation sites are in areas which maintain Aquatic Conservation Strategy (ACS) objectives. These sites have been highlighted on Map 26. These appropriately located sites occupy approximately 24% of the length of this corridor using the same set of parameters for potentially impacted area as described above. This percentage will change with time and condition and should be evaluated in an environmental assessment. Two dispersed boat ramp sites and several dispersed campsites are included in this determination (Map 28).

Implementation of restoration activities would result in some social impacts such as: limiting people's access to and along the river; and changing the scenery of the river due to in-stream fish habitat enhancement structures. Guidelines have been developed for

construction of fish enhancement structures which maintain Wild and Scenic River eligibility (Appendix D5).

ISSUE IV: POTENTIAL OPPORTUNITIES:

- Reduce compaction of floodplain and erosion of streambanks
  - Reduce road density in riparian areas
  - Improve existing sites to reduce resource impacts
  - Provide "controlled" dispersed camping
  - Locate new facilities out of riparian areas, limit sites to areas of low potential impact
- Maintain function of floodplain
  - Maintain riparian vegetation (spp, composition, structural character, diversity, CWD)
  - Allow channel complexity
  - Allow channel migration
  - Maintain habitat for wildlife/amphibian/botanical species
- Maintain/improve water quality (temp, bacteria)
- Evaluate and make recommendations concerning fishing access and season
- Maintain and restore wild and scenic qualities of area
- Provide recreation opportunities
  - Allow drift boat access
  - Provide dispersed camping in specific areas along the river

Table 16: Restoration Opportunities By Issue

ISSUE I: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA #1

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA # 1	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
Reduce Fragmentation: Accelerate development of late-successional habitat	Imitate historic disturbance regimes and variability (such as severity & frequency of fire) through management Ridgetop areas more prone to lightning, have more frequent, small patch fires, and shorter rotations (i.e. Roman Nose to Baldy along ridge system). Portions of this area have more remnant old trees, more WH & WRC than other parts of the district	Use commercial thinning as a tool to accelerate late-succesional habitat. Using techniques described in the LSRA (Siuslaw 1996) i.e. thinning to control density, create snags and coarse woody debris. Select for species and structural diversity In general thin to achieve variable density and variable conditions over the landscape i.e. canopy gaps and no thin areas. Underplant with shade-tolerant species Establish learning objectives for landscape areas thinned and not thinned. *Landscape level: in this area, thin adjacent to large mature blocks* Monitor to insure establishment of hemlock in plantations, underplant where appropriate
	Dense stands (mixture of western hemlock and Douglas- fir) are common and relate to the dry PAGS, hemlock understory common. Particularly in the Baldy Mt. area.	In the Baldy Ridge Area: Thin a small percentage of the areas that would benefit from thinning. If treated ,plantations should be thinned lightly. It is appropriate to have dense plantations in this area. (Limited opportunities, mostly pre-commercial aged plantations). .

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA #1

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA # 1	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
-enlarge interior habitat blocks	Reduce the width of microclimate edge effect inside mature stands where those stands are next to recently cut units and plantations. Do this by applying treatments that reduce penetration of light, and wind into the mature stand. Take advantage of micro-climate edge effect to establish multi-canopy patches inside mature single canopy stands	Where possible focus treatments on managed stands closest to interior blocks first. Aggregate patches of mature into larger blocks. Manage those portions of young stands along edges against mature stands to maintain or accelerate height growth. Treatments may include timing PCT to delay the onset of within species competition, vegetation competition management, and fertilization. Do not locate projects that involve large gap creation or very wide spacing in those parts of older plantations which are immediately next to mature stands Site prep, where necessary, and plant shade tolerant trees under single canopy mature stands along edges with sufficient side light to support understory tree survival and growth. Cultivate the understory to rapidly fill the gap between the ground and the bottom of the overstory live crown.
-maintain dispersal habitat		Maintain dispersal habitat - 40% canopy closure Same management treatments as above only emphasize areas which would restore connectivity to the northeast and northwest of the watershed, ex.-the Jump Road Units.

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA # 2

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA #1	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
Provide for Connectivity: -connect blocks of mature conifer habitat.	This area is key to restoring connectivity to the Cascades	-Maintain variable thinning to imitate fire regimes at a moderate thinning level (~80tpa) on west side -Monitor hemlock establishment, underplant if necessary -Link to mature forest to the northeast and northwest -Link blocks of mature through riparian corridors -PCT in section 36
Provide seclusion for late-successional wildlife species	Limit number of entries for vegetation manipulation	This area is part of a large secure block identified in the Fed. Lands Assessment. For vegetation management limit multiple entries. Establish wildlife security blocks by restricting road access into this area. Close roads not needed for vegetation management - partnership opportunities with private to reduce road densities
Protect existing mature habitat		BLM Matrix block located in T.19S.,R9W, Sec.24 -recommend changing designation to LSR because of its importance to the existing owl pair and to maintain connectivity to Cascade habitat as described in the LSR Assessment.

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA # 2

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA #2	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
Reduce Fragmentation -accelerate development of late-succesional stand characteristics -enlarge interior habitat blocks -maintain dispersal habitat	Imitate historic disturbance regimes and variability (such as severity & frequency of fire) through management This area currently has a fair amount of WH as an overstory and understory component - maintain it. Variability already built into plantations due to amount of rock outcrop (Perkins)	same as area 1 -Continue using thinning as a tool to achieve variable habitat characteristics mostly in Vincent Creek area, leave denser stocking on drier PAG's, and S. facing aspects. Establish learning objectives for landscape areas thinned and not thinned - ***Landscape level: In this area, don't thin adjacent to large mature blocks*** Enhance connectivity to the south
Provide seclusion for late-successional wildlife species	WL area 2 is a unique, high quality late successional habitat because of its relative lack of fragmentation. Minimize number of entries for vegetation manipulation	This area is part of a large secure block identified in the Fed. Lands Assessment. For vegetation management limit multiple entries. Establish wildlife security blocks by restricting road access into this area Close roads not needed for vegetation management - partnership opportunities with private to reduce road densities

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA # 3

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA # 3	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
Reduce Fragmentation -accelerate development of late-succesional stand characteristics -enlarge interior habitat blocks -maintain dispersal habitat	more moist and wet PAGS in this area Fire regimes variable in size and intensity, predominately non-stand replacing fires	Thin plantations in large blocks - group. Consider combining this area with density management activities in the Siltcoos watershed to create logical sales Rd. 4811. Maintain 40% canopy closure Restore species diversity (underplant WH & WRC)
Provide for connectivity of species	Emphasize thinning here because of available units and to provide connectivity from north to south.	Connect blocks of mature conifer through riparian corridors
Provide seclusion for late-successional wildlife species	Minimize number of entries for vegetation manipulation	Reduce road densities

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA # 4,5

MANAGEMENT OPPORTUNITY	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
WILDLIFE PRIORITY AREA # 4		
-accelerate development of some late-successional habitat, because there is little here.	Variety of seral classes expected Moist and wet PAGs	Use thinning as a tool to accelerate LS conditions as described above Thin in patches Maintain dispersal habitat @ 40% canopy closure
Provide for connectivity of species		
WILDLIFE PRIORITY AREA # 5 Maintain Dispersal Habitat	Non late-successional species best supported in this area. Short distance for migration has limited effect on large home range late-successional species. Small home range species are more affected.	Provide elk forage opportunities, road closure - conversion to stringer meadows, maintain natural openings, control noxious weeds Maintain dispersal habitat - 40% canopy closure Establish corridors for small home range species
Protect existing mature habitat		Adjust provincial home range boundaries into manageable landscape units, which maximize interior old-growth habitat

Table 16 cont.: Restoration Opportunities By Issue

ISSUE I cont.: PROTECT OR ENHANCE LATE-SUCCESSIONAL WILDLIFE HABITAT - PRIORITY AREA # 6

MANAGEMENT OPPORTUNITY WILDLIFE PRIORITY AREA # 6	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
On Federal land accelerate LS habitat for Eagles Maintain Mature habitat because there is little.	Scattered mature conifer remains in this area Private ownership limits opportunities Dispersal of some species will be threatened by existing habitat conditions	The 1/4 mile circle designated in MA #4 of SNF Plan should be expanded to include this entire block. Use thinning as a tool to create late-successional structural characteristics Acquire mature forest land in Eslick Creek area. Restore wetland vegetation communities, especially lowland spruce Acquire land to restore lowland spruce ecosystem

Smith River
Wildlife Priorities

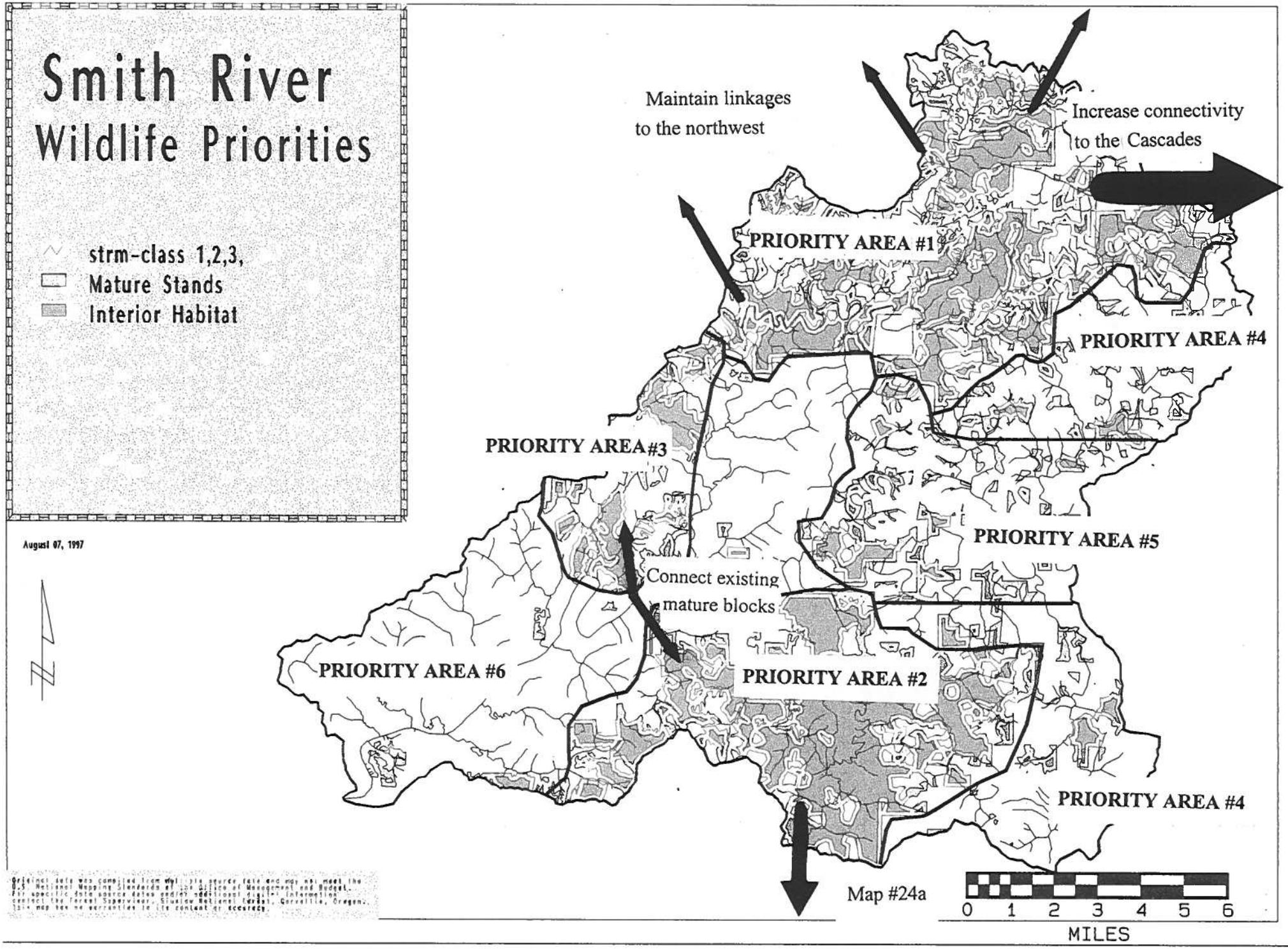


Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #1: Provide shade by promoting forested riparian habitat LOW PRIORITY	Mixed conifer occupation of riparian areas occurred historically. Area will supply little LWD or sediment to productive anadroumous stream reaches below. Stream temperatures a limiting feature of this watershed	Encourage partnerships to plant conifers, fence area off from cattle to allow re-establishment of natural plant communities
BU #2: Encourage future recruitment of LWD	Area is susceptible to debris torrents. Alder in the riparian areas is a result of disturbance, therefore, conifer may be limited in source and transport reaches.	In riparian areas of all streams, where stability is not a concern, thin plantations to grow large conifer for the future Riparian planting in portions of transport and depositional segments
Place LWD in stream channels	Stream cleanout records document existence of large cedar and old log jams in channels (West Branch and Middle Fork, North Fork) N/S portion of North Fork is a key refuge for Coho rearing,	Place LWD at the base of transport and in depositional segments - maintain area as a refugia
Provide for passage of aquatic organisms	Allow access to historic distribution	Culvert passage problems on Peach Creek and 4800922

Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #3: Improve riparian shading	Dry plant association Stream adjacent slopes lacking sufficient conifer to provide shade	Plant conifers in riparian on Upper West Fork Smith where conifers are lacking. Establish partnership in Gold Creek to re-vegetate riparian zones and close stream bottom road Close Roads in Beaver Creek - reduce riparian roads
Increase available large woody debris	.Accelerate growth of conifers along riparian areas to provide for future source of LWD	Thin plantations within 1 site tree potential of streams Release riparian conifers
Improve current fish habitat	Focus on lower portions of transport reaches into depositional reaches for large wood additions to resemble natural wood accumulations Wood should be placed as complexes for multiple benefits to multiple species.	Mainstem West Fork Smith upstream from Beaver Creek confluence through depositional reaches - especially towards the top of the moderate depositional reach (Map 8) Key restoration area. Activities need to maintain ACS objectives. Add large wood in lower Gold creek to complex habitat Promote beaver activity in Beaver Creek
Provide for passage of aquatic organisms	Make culverts passable to fish and amphibians	Replace Beaver Creek culvert (scheduled for FY 97 - Jobs in the Woods)

Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #4 Improve fish habitat	Lower occurrence of depositional reaches in tributaries than other areas Concentrate large wood complexes below areas of transport to resemble natural large wood accumulations Wood structures need to be large enough to withstand flows Abundance of source and transport areas results in gravels throughout the stream system	Concentrate structural work in mainstem North Fork Smith and West Fork Smith below tributaries that are likely to transport wood and substrate material (West Branch North Fork, Middle Fork North Fork, Cedar, from Moore Creek down to Coon Creek) Close roads in Crane Creek - reduce riparian roads Suggested Tributary Structural Improvement Work: **1st Priority:** Lower West Branch North Fork; Middle Fork North Fork; Lower Moore Creek; Buck Creek **2nd Priority:** Spencer; Johnson (Main Smith); Johnson (North Fork); Bob; Cedar; Vincent Reduce Riparian roads in Spencer, Johnson (Main Smith), and North Fork Smith (Recreation Roads)
Provide for passage of aquatic organisms	Allow fish and amphibians to use historic areas	Bob Creek culvert; Moore Creek culvert (scheduled for FY 97 - Jobs in the Woods) Johnson Creek (North Fork) develop partnership to improve summer flows in lower reach of creek that dry up during low flows

Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #4 cont. Improve Riparian shade	Re-establish conifer in areas that historically contained conifer but presently do not or are lacking Cooperation with private landowners is imperative for shade development on mainstems	Concentrate plantings in moderately confined and unconfined stream reaches where disturbance has recently removed vegetation - little preparation needed (Middle fork North Fork, Spencer, Johnson) Plant on toe slopes and terraces Mainstems of North Fork and West Fork : North Fork - plant in less utilized/closed recreation sites. Plant riparian conifers in acquired lands. Develop partnership with current landowner on homestead. West Fork - release of existing conifers. Cooperate with private landowners..
Encourage future recruitment of LWD	Accelerate conifer growth and recruitment in riparian zones	Plant conifer in key riparian areas (Map 21) Thin plantations within 1 site tree of stream channel Release existing conifers

Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #5: Improve fish habitat	-Key watershed - Wassen -Devils staircase in Wassen Creek limits anadromous fish access. -Upper Wassen - manage for resident cutthroat trout as a potential gene flow source for Sea-run cutthroat -Currently Wassen in partially functioning condition -Allow natural channel migration - Vincent	-Partnerships or acquisition in Lower Wassen are best opportunities for fish habitat improvement -Potential for capturing materials out of Perkins Creek due to high transport potential out of this area -Low priority for treatment -Vincent -reduce riparian roads -Concentrate improvements in Upper Vincent where habitat is at least partially functioning -Limited opportunity here due to access in Wassen Creek and the Main Vincent Creek riparian road.
Improve riparian shade	Private cooperation necessary	Plant riparian conifers on private near mouths of Wassen and Vincent Encourage rapid growth of conifer in Vincent Creek, retain sufficient shade in thinning operations.
Increase available large woody debris	Commercial thin plantations to accelerate conifer growth in riparian Allow wood in channel to store and transport fines	Some opportunities in Upper Vincent for thinning plantations (25-45 years old)

Table 16 cont.: Restoration Opportunities By Issue

ISSUE II: PROTECT OR ENHANCE AQUATIC SPECIES HABITAT

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU # 6 Improve fish habitat	Predominantly transport reaches Habitat is transitory there for a number of years and then pulses through	Little opportunity besides allowing for large wood to naturally enter stream and pulse through down into Wassen Creek
BU #7 Improve fish habitat	River access to floodplains is important during flood events in the mainstems of the North Fork and the main Smith River. Dikes limit fish access in these areas. Fish structure work should concentrate on summer rearing habitat, restoring access, and reducing stream temperatures	Work with private landowners to identify potential areas that are currently diked where breaches could be done to increase access for fish during flood events May be good opportunity in future to work with the local landowners as part of the salmon festival (Tsalila) in Reedsport which is geared to habitat restoration of anadromous salmonids and natural resource education. Maintenance of dikes, roads, and bridges should incorporate fish access and floodplain function issues into the design (i.e. Otter Slough Bridge)
Enhance fish access	Tributaries to the mainstems may be critical for thermal refuge during the summer.	Identify tide gates or culverts that block fish access to tributaries off the mainstems and make them fish passable for juvenile as well as adult fish

Table 16 cont.: Restoration Opportunities By Issue

ISSUE III: MAINTAIN RESOURCE VALUES BY RECOGNIZING INHERENT INSTABILITY IN THE LANDSCAPE

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #1: LOW PRIORITY Reduce accelerated input of sediment	landslide susceptible areas restricted to stream adjacent slopes Allow natural inputs of sediment and debris	Stabilize mid-slope roads, especially at stream crossings - partnership opportunities with private land owners -Roads in Jump Creek area - critical stability concerns -Insure proper drainage of road system -Let non-*ATM* roads grow closed naturally -Employ sidecast pullback where needed
BU #2: HIGH PRIORITY Minimize accelerated landslide rates, maintain slope stability	Steep, high landslide susceptible landforms Limit management to less extreme areas. Utilize helicopter to treat vegetation where appropriate Limit new road construction to ridgetops, limit lengths Appropriate storage of excavated road material is essential - site specific evaluations requires	-Stabilize mid-slope roads with waterbars and sidecast pullback. -Evaluate the impacts associated with opening old spur roads -Monitor stabilization (waterbarring) of non-ATM roads -Monitor road use permit (Davidson) on 4800-910 make sure road maintenance is adequate -Develop quarry management plans for Baldy Mt. quarry -Locate waste disposal sites outside this area if possible -Evaluate existing waste disposal areas for pullback potential -Provide vegetative buffers for stream adjacent and other unstable areas -Grow large trees in riparian areas to limit scour from debris torrents -Employ sidecast pullback where necessary -Forest Road 4820 should be taken off ATM system - alternate routes available

Table 16 cont.: Restoration Opportunities By Issue

ISSUE III cont.: MAINTAIN RESOURCE VALUES BY RECOGNIZING INHERENT INSTABILITY IN LANDSCAPE

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #3: Maintain slope stability	-Those shorter northeast facing slopes have concentrated areas of instability so use caution with management. -The basaltic influence may make this area more stable than areas to the southwest (see landslide susceptibility map)	Maintain slope stability on northeast facing slopes Decommission BLM road 1.4 off of Gold Creek Partnership with private to decommission roads - especially mid-slope roads Develop quarry restoration plan for Roman Nose quarry
BU #4: Maintain road stability	Highly dissected area warrants special road consideration Roads are limited to tops of knife ridges predominantly	Close problem roads: **BLM** Spencer : 20-10-25.0, 25.2, 25.3; 24.4, 24.5; 13.3 plus spurs, 11.0, spur off 11.2 Johnson: 20.1,20-9-29.0,18.1, spur off 19.1, 19.2, 7.1, spur off 7.0, 17.1, spur off 8.0, spur off 8.1 Coon Creek ridge Road 16.0, 15.3-15.9, 15.4, 15.6 Lower Moore Creek Ridge Road; 21-10-2.0; 20-10-36.0 **USFS** 4811 948 monitor sediment production on 4811 958 - Old Wagon Road 4811-955 **23-942 (high priority) Lower 4820

Table 16 cont.: Restoration Opportunities By Issue

ISSUE III cont.: MAINTAIN RESOURCE VALUES BY RECOGNIZING INHERENT INSTABILITY IN LANDSCAPE

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #4 cont. Waste Area Stability	Locate and map waste areas and stabilize current ones Geologic contact zones are inherently unstable	Stabilize 5 acre Spencer Creek waste area Develop a plan for future waste area disposal sites
BU #5: Maintain road stability	Not as unstable as most of watershed, especially Upper Wassen and Vincent Slopes less steep - lower debris torrent occurrence Includes slump terrain - Deep seated instability Upper Wassen/Vincent highly Managed/Roaded	Lower priority of mid-slope road stabilization Problem roads requiring attention : 32.1; 21-9-20.1 and 21.0 (BLM portion); 9.1; 21-9-8.0 and 8.1; 21-9-3.3, 3.4 and 3.5; 21-9-30.1; 21-9-18.0

Table 16 cont.: Restoration Opportunities By Issue

ISSUE III cont.: MAINTAIN RESOURCE VALUES BY RECOGNIZING INHERENT INSTABILITY IN LANDSCAPE

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #6 Monitor road stability	Perkins contains the highest percentage of steep unstable ground in this watershed (see landslide susceptibility map) Previously used as a test ground to assess the effects of management on extremely unstable ground Team recommends staying out of area in terms of timber management.	Monitor spurs off of FS 41 road which were stabilized in 1990 Monitor effects of helicopter logging on steep ground
BU #7: Maintain stability	Predominantly private Low to moderate landslide susceptibility overall, the only steep portions are inside river meander bends along Smith River and North Fork Smith River	Maintain lower 41 road Maintain proper drainage on private roads

Table 16 cont.: Restoration Opportunities By Issue

ISSUE IV: PROVIDE RECREATION WHILE MAINTAINING THE ACS

MANAGEMENT OPPORTUNITY BY AREA	ECOLOGICAL OR SOCIAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #1: Maintain wild and scenic qualities of area - scenic emphasis	Fairly stable/resilient landforms outside of stream adjacent slopes Viewsheds should be primary emphasis from roads, trails, and viewpoints Connecting routes to population areas are important	-Limit expansion of existing recreation areas . -Maintain linkage to Whitaker - Mapleton Tour Route Rd. 4800 and 2300 and BLM 28.1 and 4390 - Discovery Route. -Maintain recreation access roads free of erosion -Add entrance signage to Kentucky Falls SIA -Leave alder patches undisturbed, adds scenic quality to landscape -Review roaded natural and rural recreation setting areas for areas to designate as semi-primitive -Adjust Special Interest Area boundaries to span from ridge to ridge, not a limited distance from the stream channels -ATV trail establishment is an inappropriate use of this area
Allow recreation opportunities	Provide for recreation opportunities across management boundaries	Coordinate construction and location of BLM proposed linking trail from the base of Roman Nose to Kentucky Falls.
BU #2: Maintain wild and scenic qualities of area	-This is a beautiful area, allow recreation use while maintaining the scenic qualities people enjoy. -Encourage natural processes to dominate, view fish habitat structures as a temporary opportunity, contract to appear natural -Appendix D2 describes desired resource condition of this area from an aquatic and scenery perspective	-Thinnings need to enhance scenery values, restrict activity to non-holiday periods -Reduce contrast in vegetation pattern, caused by angular effects of edges in plantations to restore scenery viewed in the area -Retain and enhance native rhododendron, bigleaf maple, and old-growth conifer patches along the North Fork mainstem -Designate and establish view points -Designate prime dispersed use sites which minimize roads and monitor angling to protect fisheries

Table 16 cont.: Restoration Opportunities By Issue
ISSUE IV cont.: PROVIDE RECREATION WHILE MAINTAINING THE ACS

MANAGEMENT OPPORTUNITY BY ISSUE	ECOLOGICAL OR SOCIAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #2: Continued Maintain function of floodplain	-Vehicles in floodplains decrease infiltration and percolation of water and reduce the ability of the floodplain to function -Establish access points in low impact areas	Limit dispersed sites in North Fork trail area to designted areas to protect recreation, scenic quality and other resources Provide interpretation at bridges of reiver and recreation opportunities
Allow channel complexity		-Employ fish habitat structures which encourage natural condition of stream channel - appearance matters. Maintain natural appearance. -Employ restoration techniques which do not disturb character of surrounding area -Employ fish habitat enhancement structures in the lower section (from section 33 launch sites) of the river which allow drift boat passage
BU #4: Provide "controled" dispersed camping		-Identify and encourage appropriate use of established dispersed sites in sections 33,35,36 (Map 28) -Reduce existing impacts protect against additional -Complete an environmental assessment for recreation in this area. Link it with a wild and scenic suitability study. Complete river designation process
Maintain riparian vegetation (spp, composition, structural character, diversity (CWD)		-Establish environmental education opportunities and campground interpretation to discourage harm of riparian vegetation and loss of CWD/LWM from floodplain and stream channel. -Determine percentage of riparian vegetation in this E-W section of the N.Fork that has been altered. Establish tolerance thresholds. -Plant conifer and deciduous native shrubs and trees for restoration in dispersed recreation areas
Control fishing impacts		Evaluate and make recommendations concerning fishing access points and seasons

Table 16 cont.: Restoration Opportunities By Issue

ISSUE IV: PROVIDE RECREATION WHILE MAINTAINING THE ACS

MANAGEMENT OPPORTUNITY BY ISSUE	ECOLOGICAL OR SOCIAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #4: Continued Maintain function of floodplain		-Minimize the amount of area that is compacted, -Reduce the amount of roading -Restrict and control vehicle access
Maintain wild and scenic values		Remove rebar and gabion cages from old stream restoration structures, camoflage obvious restoration structures i.e. V shaped structures - LOWER PRIORITY
Allow drift boat access		sec 22,23,29 fish habitat restoration structures need to allow boat passage
Allow recreation opportunities	Provide consistency along recreation corridor	-Identify character of river corridor and emphasize and retain the character in management -Possible cooperative management of recreation sites between agencies -Possible cooperative river suitability study. Complete Wild and Scenic River designation process -Restore some native vegetation to rivers edge at Noel Ranch Boat Ramp site to improve aesthetic quality and enjoyment of the site and to reduce impact of the parking lon on the river.

Table 16 cont.: Restoration Opportunities By Issue

ISSUE IV: PROVIDE RECREATION WHILE MAINTAINING THE ACS

MANAGEMENT OPPORTUNITY BY ISSUE	ECOLOGICAL OR SOCIAL GUIDANCE	SPECIFIC RESTORATION PROJECT(S)
BU #4,5 Allow recreation opportunities	Roadless area boundary should follow topography. Current NW Forest Plan desired condition (LSR) is consistent with current recreation opportunity spectrum setting	Redefine semi-primitive unroaded area - adjust southern boundary along ridgeline to follow watershed boundary Review roaded natural areas to add areas of semi-primitive in and adjacent to Wassen Creek Area
BU #5 Allow recreation opportunities	Provide for recreation opportunities across management boundaries	Coordinate construction of Wassen Creek Trail
All BUs	Consider "Back Country Byways" program as part of selecting principal and alternative route designation through the watershed on National Forest land	
All BUs	Consider landslides, road failures, and stream channel function in locating and maintaining recreation facilities	

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APPENDIX A

GEOLOGY

Appendix A - Geologic Unit Descriptions
(Open File Report 0-89-3, Niem and Niem 1990)

Oregon Coast Range Geology (Orr, Orr and Baldwin, 1992)

The most significant offshore feature is the subduction zone beneath the base of the continental slope where the Farallon plate is sliding under the North American landmass. At the end of the early Eocene time period, the westward moving North American plate collided with a volcanic island chain and accreted this volcanic mass onto the North American plate. This 2-mile thick mass of submarine volcanics formed the backbone of the Oregon and Washington coastal mountains and extended the North American land mass by 50 miles.

A trough or forearc basin oriented southeast by northwest was formed between this accreted seamount terrain and the ancestral Cascade volcanoes to the east. From the Eocene through the Miocene epochs, this basin was repeatedly choked with sediments before uplift of the Coast Range brought about a shallowing and eventual closure of the trough.

Orr et al (1992) describe how rotation of the Coast Range during the Eocene, Oligocene and Miocene epochs caused sources of sediments to the basin to change over geologic time. The first phase deposited the Roseburg, Lookingglass and Flournoy formations which were lithic in nature, containing pre-existing cherts, metamorphic rocks and heavy minerals typical of those found in the Klamath Mountains. By the second phase watersheds had extended through the Klamath Mountains into central Idaho and rivers brought white micas and potassium feldspar minerals to deposit in the forearc basin as the Tyee Formation. The third and final phase of sediment deposition in the forearc basin found the early Western Cascades as its primary source and this included ash and pyroclastic deposits (See figure # for three-phase deposition diagrams)

In the Oligocene epoch, a number of intrusive bodies from batholith sources below the forearc basin invaded the softer marine sediments of the Coast Range. Uplift occurred during the Miocene and the ocean retreated to the west. Once the shoreline had withdrawn to the western edge of the coastal block, the older Cenozoic formations were shaped by erosion and river valleys assumed their present positions. The rivers cut through many of the later formations laying bare the resistant Oligocene sills and dikes making up nearly all the prominent peaks of the central range. Differential uplift is still occurring throughout the Oregon Coast Range as studies of river and marine terraces continue to reveal (Personius, 1995; Kelsey et al., 1996).

Qal - **Quaternary Alluvium** (Holocene and Pleistocene) --Floodplain and stream channel sediments composed of clay, silt, sand and gravel, includes tidal flat sediments near mouths of Siuslaw and Umpqua rivers and fluvial terrace deposits; near Sitkum includes lacustrine sediments that filled an ancient lake created by a large landslide (Qls) *WA location: Lower Smith River from the mouth to the junction with N. Fk Smith; lower north-south portion of N. Fk. Smith; Hudson and Otter Sloughs; lower portion of tribs coming into Smith River beneath junction with N. Fk. Smith.*

Qls - **Landslide Debris** (Holocene and Pleistocene) --Chaotic mixture of gravel, sand, silt, and clay with blocks of weathered bedrock of varying composition (mostly sandstone and mudstone). Only areas of approximately 1 sq. mi. or larger are shown due to scale of mapping. *WA location: small area in headwaters of Vincent Cr.*

Ti - **Tertiary Intrusive Rocks** (Paleocene to lower Eocene and upper Eocene to Oligocene?) --Sills and dikes, predominantly basalt in composition. Paleocene to lower Eocene intrusive rocks related to Roseburg basalts; upper Eocene to Oligocene intrusive rocks related to western Cascade volcanism. *WA location: a very large sill transects the northern portion of the Smith WA area and includes peaks such as Goodwin, Grayback, Baldy and Roman Nose. This sill extends beyond the area to the northeast and northwest.*

Tee - **Elkton Formation** (middle Eocene; Ulatisian) --Micaceous siltstone with thin to thick sandstone lenses and rhythmically interbedded thin graded micaceous sandstone and siltstone. Siltstone contains bathyal microfossils. Unit is approximately 3,000 ft thick. May interfinger with upper part of Tyee Formation. Some thicker bedded to cross-bedded better sorted sandstone near top of formation (Baldwin,1974). *WA location: Southeast corner of the analysis area in the headwaters of Vincent and Wassen Creeks.*

Tet_b- Undifferentiated **Tyee Formation** of Baldwin (1974) (middle Eocene; Ulatisian) -- Five to six thousand feet of well-indurated, thick to very thick-bedded cliff-forming, micaceous arkosic sandstone and thin-bedded siltstone. The unit consists of fine- to medium-grained, micaceous (biotite and muscovite), lithic, arkosic sandstone beds with load, flute and groove marks, minor beds of siltstone, and thin to medium beds of graded sandstone (Tet_b). Queried contact between the Tyee and Flournoy formations in the Northern part of the outcrop area has been mapped in work by Niem and Niem (1990) with help of Baldwin but is not conclusive. Molenaar (1985) maintains that Flournoy and Tyee formations can not be differentiated in the northern part of mapped units and that the two units should be mapped together as Tyee. Three members are mapped in the Camas Valley quadrangle (Baldwin and Perttu, 1989). *The dominate ridgetop and hillslope geology for the Smith WA area.*

Tev - **Roseburg Volcanics** (Siletz River Volcanics) -- Tholeiitic pillow basalts, breccias, and some massive subaerial flows (near Drain) interbedded with minor conglomerate and basaltic sandstone. Microfossils (foraminifers and coccoliths) in sedimentary interbeds in the unit indicate Paleocene to lower Eocene (Armentrout and others, 1983; Miles, 1981; Ryberg, 1984; McKeel and Lipps, 1975; McKeel, 1983; Bukry and Snavely, 1988). These tholeiitic to alkalic basalts are interpreted to have formed at an oceanic ridge, forming a seamount terrane. Alternatively, the basalt may have formed in situ along a rifted continental margin (Snavely and Wells, 1984; Snavely, 1984, 1987; Wells and Snavely, 1989). Unit was accreted to the Klamath Mountains terrane in the early middle Eocene (Snavely, 1987). *This volcanic formation underlies the Tyee Formation over the entire Smith WA area.*

APPENDIX B

SOILS / SLOPE STABILITY

- **B1 - SOIL SERIES CHARACTERIZATION**
- **B2 - STABILITY ISSUES AND THE MAPLETON LAWSUIT**
- **B3 - LANDSLIDE SUSCEPTIBILITY MATRIX**

Appendix B1 - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
2E	Absaquil-Blachly-McDuff Cmplx	3-30	49/60/32	20-60	Well	Slight	120/125/109	2,2,3	on plateaus, broad ridges and steep sideslopes
3E	Absaquil-Honeygrove-McDuff Cx	3-30	49/63/32	20-60	Well	Slight	125/119/109	2,2,3	on plateaus, broad ridges and steep sideslopes
16F	Bateman Silt Loam	30-60		20-45	Well	Severe		low 2	low foothills and mountain sideslopes
26E	Blachly Silty Clay Loam	3-30		27-50	Well	Slight			in mountainous areas
26F	Blachly Silty Clay Loam	30-60		27-50	Well	Moderate			in mountainous areas
27G	Bohannon-Preacher-Damewood Cx	60-90	32/60/33	7-30	Well	Severe	113/121/118	hi 3, 2, low2	in mountain areas; ridgetops and sideslopes
28A	Bragton Muck	0-1		5-20	Very Poor		None		old tidal marsh and floodplain areas
39F	Chimneyrock Very Gravelly Loam	30-60		18-35	Well	Moderate			hillslopes
40F	Clevescove-Salander Complex	30-70		7-18	Well	Mod-Sevr	123/127	2,hi 2	sideslopes and headlands of mountainous areas
45A	Coquille Silt Loam	0-1		20-65	Very Poor		None		on floodplains with tidal influence
46A	Coquille Silt Loam, Protected	0-1		20-65	Very Poor		None		on floodplains
49F	Damewood-Bohannon-Umpcoos Cx	30-60	33/32/17	2-30	Well	Mod-Sevr	118/113/61	low2, hi3, 5	ridgetops and sideslopes of mountainous areas
49G	Damewood-Bohannon-Umpcoos Cx	60-90	33/32/17	2-30	Well	Severe	118/113/61	low2, hi3, 5	ridgetops and sideslopes of mountainous areas
54G	Dickerson-Rock Outcrop Complex	30-90	9/0	18-27	Well		None		ridgetops and foothills

Appendix B1 cont. - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
57E	Digger-Bohannon Complex	3-30	28/32	15-30	Well	Slight-Mod	112/113	high 3	on mountains
57F	Digger-Bohannon Complex	30-60	28/32	15-30	Well	Moderate	116/118	low 2	on mountains
58G	Digger-Bohannon-Umpcoos Cmplx	60-90	28/32/17	2-30	Well	Severe	112/113/61	high 3, 5	on mountains
59G	Digger-Preacher Complex	60-90	28/60	7-30	Well	Severe	112/121	high 3, 2	on mountains
60F	Digger-Umpcoos-Rock OC Cmplx	30-60	28/17/0	2-25	Well	Mod-Sevr	112/61	high 3, 5	found on mtn uplands
60G	Digger-Umpcoos-Rock OC Cmplx	60-90	28/17/0	2-25	Well	Severe	112/61	high 3, 5	found on mtn uplands
79E	Fernhaven Gravelly Loam	3-30		15-25	Well	Slight			occur on ridgetops, sideslopes and footslopes
80E	Fernhaven-Digger Complex	3-30	72/28	15-25	Well	Slight-Mod			occur on ridgetops, sideslopes and footslopes
80F	Fernhaven-Digger Complex	30-60	72/28	15-25	Well	Moderate	120/112	3, high 2	occur on ridgetops, sideslopes and footslopes
82C	Fordice Very Cobbly Loam	0-12		18-35	Well		None		found on old alluvial terraces
94E	Hemcross-Klistan Complex	3-30	60/60	12-27	Well	Slight-Mod	131/124	high 2, 2	mountainous areas
97E	Honeygrove Gravelly Clay Loam	3-30		30-60	Well	Slight			on mountainous uplands
99E	Honeygrove-Peavine Complex	3-30	63/31	30-60	Well	Moderate	119/110	2,3	on mountainous uplands

Appendix B1 - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
111F	Jayar Very Gravelly Loam	30-70		13-30	Well	Severe			
121G	Kilchis-Harslow-Rock Outcrop Cx	60-100	18/25/0	15-27	Well*	Severe	90/112	4, 3	* Kilchis - can be excessively well drained; steep mtns
123A	Kirkendall-Nekoma Complex	0-3	60/63	5-35	Well	Slight	140/122	low 1, 2	found on floodplains
124F	Klickitat-Harrington Complex	30-60	60/38	10-35	Well	Mod-Sevr	102/97	low 3	found on mtn slopes
127F	Klistan-Hemcross Complex	30-60	60/60	12-27	Well	Moderate	124/131	2, high 2	in mountainous areas
128F	Laderly Very Gravelly Loam	30-60		12-27	Well	Severe		low 3	in mountainous areas
129G	Laderly-Romanose Complex	60-90	32/22	12-27	Well	Severe	96/99	low 3	found on mountainsides and ridgetops
132E	Leopold Clay Loam	3-30		27-35	Well	Slight		low 3	occur on sideslopes
132F	Leopold Clay Loam	30-60		27-35	Well	Moderate		low 3	occur on sideslopes
141C	Lint Silt Loam	0-12		15-30	Well	Slight		low 1	found on dissected marine terraces
141D	Lint Silt Loam	12-20		15-30	Well	Moderate		low 1	found on dissected marine terraces
147F	McDuff-Absaquil-Blachly Complex	30-60	32/49/60	20-60	Well	Moderate	109/125/125	high 3, 2	Mountainous areas - ridges & sideslopes
148F	McDuff-Absaquil-Honeygrove Cx	30-60	32/49/63	20-60	Well	Moderate	109/125/119	high 3, 2, lo2	gently rolling to very steep complex slopes in Mtns

Appendix B1cont.. - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
153D	Meda Loam	2-20		10-25	Well	Slight		high 2	occur on fans and stream terraces
156G	Millicoma-Reedsport Complex	60-90	36/30	10-35	Well	Severe	114/113	high 3	Ridgetops and Sideslopes in mtnous areas
157A	Natal Clay Loam	0-3		27-60	Poor	Slight	None		On stream terraces; Alder s.i.=85
161A	Nekoma-Gardiner Complex	0-3	60/60	5-20	Well	Slight		low 1	on floodplains
162A	Nestucca Silt Loam	0-3		18-35	Poor	Slight	None		somewhat poorly drained; on floodplains; Alder s.i.=99
179E	Orford Gravelly Silt Loam	3-30		20-45	Well	Moderate			Plateaus, broad ridges and hillslopes
182F	Orford-McDuff Complex	30-60	60/32	20-60	Well	Mod-Sever	125/109	2, high 3	Plateaus, broad ridges and hillslopes
191	Pits	0-100		60	Poor		None		pits assoc. w/ mining or quarries
195E	Preacher Loam	0-30		7-30	Well	Slight			in mountainous areas
195F	Preacher Loam	30-50		7-30	Well	Moderate			in mountainous areas
196E	Preacher-Blachly Complex	12-30	60/60	7-50	Well	Slight	121/125		in mountainous areas
197E	Preacher-Bohannon Complex	3-30	60/32	7-30	Well	Slight	121/113	2, high 3	in mountainous areas
198F	Preacher-Bohannon-Blachly Cx	30-70	60/32/60	7-50	Well	Severe	121/113/125	2, high 3, 2	in mountainous areas

Appendix B1cont. - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
199G	Preacher-Bohannon-Digger Cmplx	60-90	60/32/28	7-30	Well	Severe	121/113/101	2, hi 3, low 3	in mountainous areas
200F	Preacher-Bohannon-Xanadu Cx	30-60	60/32/60	7-60	Well	Moderate	121/113/111	2, hi 3, hi 3	Xanadu - narrow ridges, benches, mtnsides
203F	Reedsport-Millicoma Complex	30-60	36/30	10-35	Well	Mod-Sever	114/113	high 3	Ridgetops and hillslopes
212G	Rock outcrop-Umpcoos Complex	60-110	0/17	2-15	Well	Severe	None/61		Umpcoos - typically on uplands
213G	Romanose-Laderly Complex	60-90	22/32	10-27	Well	Severe	99/96	low 3	Mountainous areas - ridgetops and hillsides
217E	Salander Silt Loam	12-30		10-30	Well	Moderate			Hills, mountains and headlands
217F	Salander Silt Loam	30-60		10-30	Well	Severe			Hills, mountains and headlands
237E	Svensen Loam	3-30		15-30	Well	Moderate			Mountainsides, ridgetops and footslopes
237F	Svensen Loam	30-60		15-30	Well	Severe			Mountainsides, ridgetops and footslopes
238F	Svenson-Millicoma-Reedsport Cx	35-75	56/30/36	10-35	Well	Sever-Mod	145/113/114	1, hi 3, hi 3	Mountainsides, ridgetops and footslopes
242F	Templeton-Millicoma Complex	30-50	60/30	10-35	Well	Severe	129/119	hi 2, low 2	Ridgetops and sideslopes of Mountainous areas
242G	Templeton-Millicoma Complex	50-75	60/30	10-35	Well	Severe	129/119	hi 2, low 2	Ridgetops and sideslopes of Mountainous areas

Appendix B1 cont. - Smith River WA Soil Series Characterization*

Doug.Co Mapping Unit No.	Soil Series Name	Slope	Depth (Inches)	% Clay in Profile	Drainage	Erosion Hazard	Douglas fir Site Index	King Site Class	Comments
253F	Umpcoos-Rock OC-Damewood Cx	30-60	17/0/33	2-25	Well	Mod-Sever	61/none/118	5, low 2	Ridgetops and sideslopes of Mntous areas
253G	Umpcoos-Rock OC-Damewood Cx	60-90	17/0/33	2-25	Well	Severe	61/none/115	5, low 2	Ridgetops and sideslopes of Mntous areas
261A	Willanch Fine Sandy Loam	0-3		5-10	Poor		None		Occur on floodplains
267C	Wintley Silt Loam	0-12		20-50	Well	Slight		low 1	Occur on stream terraces
272E	Xanadu Gravelly Loam	3-30		20-60	Well	Slight		high 3	Occur on narrow ridges, benches and mtnsides
272F	Xanadu Gravelly Loam	30-60		20-60	Well	Moderate		high 3	Occur on narrow ridges, benches and mtnsides
274A	Yachats Fine Sandy Loam	0-3		5-15	Well				Occur on floodplain

APPENDIX B2 - STABILITY ISSUES IN THE WATERSHED ANALYSIS AREA

History of the Mapleton Lawsuit

The Smith-Umpqua block of the old Smith River Ranger District (area lying between the Smith and Umpqua Rivers of this analysis area) was the focus of early stability concerns on the District. One of the earliest documents written on the area was the Multiple Use Plan of 1968 for the Smith River Ranger District. On page 2 of this report it is stated:

"The inland portion of the district, with its dissected topography, knife-edge ridges and relatively thin soil cover, provides the manager with a very tough problem in protection of soil and water."

In response to landslide damage from the storm of 1964-65, the Assistant Regional Forester in charge of Watershed Mangement was asked to research the effects of prescribed fire on the stability of soils in this area. Lloyd G. Gillmor convened a task force of watershed, soils, silviculture and fire specialists who visited the area in July, 1969, and wrote up their findings in what has come to be known as the Gillmor Report. Although hot burns in clearcut units were sited as a contributer to sedimentation occurring in the Smith-Umpqua block, focus was also placed on road building and logging techniques which were a larger part of the problem. Gillmor's conclusions included the following statements:

"It is clearly evident that the present land management procedures cannot be continued on the Smith River District without intolerable damage to the basic resources. Natural rock out-croppings are being enlarged through the logging process; a significant amount of mass soil movement is exposing considerable bedrock in the headwalls as a result of road development; burning is resulting in further soil loss from steep slopes and from sharp canyons where debris removal results in sluicing out and soil deposition in streams supporting anadromous fishery."

Additional findings from the Gillmor Report included:

- High-lead logging, with increased amounts of road built around the tops of units, seemed to show the most severe damage.
- Perhaps the highest frequency of road fill failures in the Region could be found in the Smith-Umpqua block.

- The steepest, most dissected parts of the District occur in the Smith-Umpqua block, and these areas "can not be satisfactorily roaded by today's engineering standards." The recommendation was to place these areas in deffered or non-loggable inventory category, access them by helicopter logging, or carry out full-bench road construction on a 100% end haul basis.
- There are few places in the Smith-Umpqua block where topography is flat enough to stock pile waste.

Although many statements in the Gillmor Report were disputed by some Forest personnel, the Regional Forester placed a moratorium on harvesting in the Smith-Umpqua block as a result of this report. This moratorium was to remain in place until further research in the area could determine if logging was compatible with soil and water resource protection. Throughout the 1970s, studies, surveys and soil mapping occurred in the Smith-Umpqua block and the rest of the Mapleton District (Smith-Umpqua block was added to Mapleton Distict in June, 1972) to answer questions about the effects of management on soils and aquatic resources. Policy changes, such as those written into the USDA Forest Service Region 6 Fish Habitat Management Policy (1974), gave protection of fishery resources a high priority throughout the Region. As part of this policy, the Region was to "commense a viable program to correct condtions on existing roads where present or potential massive soil failures are damaging or may damage fish producing streams." The Forest Service lifted the Smith-Umpqua block moratoium in 1980.

In June, 1974, the Siuslaw National Forest Soil Resource Inventory (SRI) was completed (Badura et. al 1974). Soil mapping units were derived and defined on the basis of soil, landform, geology and vegetation characteristics and have their primary use at the planning level. Of most significance to the Smith River WA area is the fact that a unique mapping unit (47) was developed for the terrain between the Siuslaw and Umpqua Rivers to describe the character of the thin, gravelly soils on steep, highly to extremely dissected slopes. Table4 gives a description and management specifications for this soil type taken from the SRI.

Following a high intensity storm (5-10 year return interval) on the Mapleton District area on November 29-30, 1975, the first of a series of landslide surveys was done for the District. This initial survey was done to test the SRI mapping units and to answer questions about landslide location, triggering mechanisms, volume of material entering stream channels and the effect of this volume during transport and following depostion. (See Table 8 for statistics from these surveys) Results of these landslide surveys were analyzed closely by local and national environmental interest groups.

In February of 1979, the Siuslaw National Forest adopted a 10-year Timber Resource Plan which layed out timber harvest levels and Forest Service objectives for the entire Forest over the decade to come. An Environmental Impact Statement was prepared for this document with involvement of local and national environmental groups. In

December of 1982, the Mapleton District issued a Seven Year Action Plan for the Mapleton District which outlined approximate lengths of proposed roads and volume of timber to be removed from each timber sale. This plan proposed harvest of approximately 100 million board feet per year for each of the seven years. Given the information that existed from landslide surveys and studies conducted in the Smith River area and the rest of the District, the National Wildlife Federation, Oregon Wildlife Federation and Siuslaw Task Force appealed Mapleton's Seven Year Action Plan in January of 1983. These groups sought an injunction with three contensions:

1. The Forest Service violated either the Church Clearcutting Guidelines or the National Forest Management Act (NFMA).
2. Clearcutting impairs the productivity of the land and, therefore, violates the Multiple Use Sustained Yield Act.
3. The Forest Service has not complied with the National Environmental Policy Act (NEPA) by failing to do a separate Environmental Impact Statement for the Mapleton Seven Year Action Plan.

This appeal as well as several other appeals made on individual timber sales in Mapleton were denied at both the Forest and Regional levels. The Forest Service contended that the Mapleton Seven Year Action Plan did not constitute a major federal action but was merely a planning document and NFMA did not apply. The Forest Service also stated that NEPA had not been violated as an EIS had been done for the Forest level Timber Resource Plan and individual Environmental Assessments had been done for each timber sale. In addition, Congress had left compliance of the Multiple-Use Sustained-Yield Act under Forest Service discretion. Legal action was then taken to the federal District Court level (Civil No. 83-1153-SO) where arguments and evidence were presented by both sides.

A final judgement was rendered on April 20, 1984 and is summarized in the following statements:

1. The Mapleton Seven Year Action Plan was ruled to be a proposal of major federal action subject to NFMA.
2. Failure to prepare an EIS for the Mapleton Seven Year Action Plan was a violation of NEPA, and one should be prepared before any major timber sales could occur.
3. With the exception of commercial thinning (no more than 1 million board feet), firewood cutting, greenery sales and limited salvage, the Mapleton Ranger District was enjoined from offering any of the planned timber sales proposed in the Seven Year Action Plan. Additionally, timber sale from the Wassen Creek watershed was forbidden.
4. One of the provisions dictated by the court was that the Pacific Northwest Forest and Range Experiment Station design and lead a study on the implemenation and effectiveness of headwall and stream adjacent leave areas.

Legislation in 1988 reinstated timber sales under the draft Northwest Forest Plan
The injunction on the Mapleton Ranger District was lifted in 1996

APPENDIX B3

Shallow-rapid Landslide Susceptibility Model
for
North Fork Smith Watershed Analysis

This rating is based on the protocol outlined in *Slope Morphology Model Derived from Digital Elevation Data* (Shaw and Johnson, 1995), a copy of which is attached for reference. Relationships between slope form—convex, planar, and concave—and slope gradient are combined using standard ArcInfo GRID analysis routines. The slope classes recommended for this analysis are based on information collected as part of earlier landslide inventories conducted on the Mapleton Ranger District.

The results of this DEM-based analysis are useful for identifying areas in a watershed or drainage basin where landslides are likely to occur.While soil thickness and mechanical properties, and groundwater conditions, are not factored into this analysis, the model is based on two primary assumptions: 1) soils are generally thin (less than about 1.5 meters) on steep slopes; and 2) concave landforms (the heads of drainages, also called 'headwalls') concentrate groundwater flow. During high intensity storm events, water flowing in a concave landform on steep slopes are more likely to destabilize thin soils. This model does not predict that landslides will occur in a particular place or within a short time-frame. It does indicate areas where landslides are likely to occur if soil conditions and precipitation rates are right.

Areas identified as having moderate and high landslide susceptibility should be targets for field examination of soil thickness and strength characteristics, and other factors known to contribute to slope failure. Field examination will usually result in a reduction of the areas identfied by this model as potentially unstable.

Slope Form	Slope Gradient (percent)		
	A (<35)	B (35-65)	C (>65)
convex	low (11)	low (21)	moderate (31)
planar	low (12)	moderate (22)	high (32)
concave	moderate (13)	high (23)	high (33)

Table 1. Shallow-rapid Landslide Susceptibility Rating Matrix

susceptibility rating	map color
low	white (no color)
moderate	yellow
high	red

Table 2. Map legend for Shallow-rapid Landslide Susceptibility Rating

The remap table **rgy_sli.rmt** should look as follows (refer to Table 1 for details):

11:12 - low, no color
13:13 - moderate (yellow)
21:21 - low, no color
22:22 - moderate, yellow
23:23 - high (red)
31:31 - low, no color
32:33 - high, red

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APPENDIX C

HYDROLOGY

- **C1 - FLOOD OF 1996**
- **C2 - STREAM TEMPERATURE MONITORING RESULTS**

APPENDIX C1 - Floods of 1996

Historically, major floods have occurred in the Central Coast Range under conditions of high antecedent soil moisture, rain-on-snow conditions in the Cascade Range affecting the major river systems, and intense, sustained rainfall coupled with high tides. These conditions were all present during the flood of February 3-9, 1996. Before this time period, the Coast Range had received rainfall that was 140-180% of normal while the snowpack in the Cascades was 112% of average. Starting on February 3rd, a strong, subtropical jet stream carried a warm, humid air mass from near the Equator into Oregon. This air mass, often referred to as the Pineapple Express, brought record amounts of rain to Oregon from the Umpqua River all the way up to Seattle, Washington. Although this influx of warm, humid air was not an uncommon event, the three to four day continuous rainfall was uncommonly long for this type of storm. Warm rains on a deeper than average snow pack in the Cascades and abnormally high tides brought about massive flooding for the region.

Rainfall totals for two gauges in the Smith River area are shown in Table XX. Gauges above the Middle Fork of North Fork Smith River and Wassen Creek both malfunctioned in this area and did not provide rainfall information. Compared to other District rain gauge data gathered, the Goodwin Peak gauge (north half of the Smith River WA area) experienced one of the highest hourly rainfall intensities (.98 in./hr.) along with two other gauges within a 20-mile radius extending north of the Siuslaw River. Gauges at the top of Indian and Thompson Creeks received 1-hour intensities of 1.0 and 1.2 in./hr, respectively. Just south of Goodwin Peak, rain intensities were much lower for this storm as evidenced by the Johnson Creek gauge and local reports from the Umpqua and Smith River locals. Damage recorded after the February flood was also significantly less in the southern portion of the WA area. (Refer to the 1996 Flood Assessment Report for the Siuslaw National Forest for larger scale flood affects.)

Table 1 Precipitation records for the February 3-9 Flood, 1996

Location	Elevation (feet)	Storm Total (in.)	Highest Daily Rainfall (in.)	Highest Hourly Rainfall (in.)
Goodwin Peak	1700	12.39	5.64	0.98
Johnson Creek	760	11.88	3.73	0.57

Of more significance to the Smith River WA area was the November 17-20 Flood of 1996. Although slightly smaller, this storm produced record amounts of rain throughout Oregon and high intensity rainfall for the Smith River area. Radar for the 17th shows a range of storm effects generally stretching from Northern California to just above Oregon's northern border. Although data is not available for rainfall, locals report that flows carried by the Smith River were in excess of the 1964 flood. According to local reports, the 1964 flood was more influenced by backing up of the Umpqua River into the Smith River drainage due to rain-on-snow in the Cascades and abnormally high tides. The November, 1996 storm, was described as a direct result of intense rainfall directly into the area causing worse flooding than the 1964 event. Resulting slides damaged roads and private residences and resulted in loss of lives in the Umpqua Basin. A road assessment scheduled for the Smith River area will be done in the summer of 1997 to record road conditions after the two floods of 1996.

APPENDIX C2 - Smith River WA Water Temperature Monitoring Summary for 1975-1979 (summary data; no raw data avail.)

ID #	Location	Sampling Period	Seasonal Max (&Date)	Avg Daily Max for Period	Days > 65 F (& %)	Low Flow (cfs) only 1977
MF1	Mid. Fk., N. Fk. Smith (upper) - 1975	7/26 => 8/16		62.4		
MF2	Mid. Fk., N. Fk. Smith (lower) - 1975	7/26 => 8/16		62.9		
NF1	North Fork Smith - 1977 above bridge #10	7/26 => 8/29	76	67.9	25 (71)	5
NF2	North Fork Smith - 1977 below bridge #10	7/26 => 8/29	77	68.0	22 (63)	7
NF4	North Fork Smith - 1977 below bridge #8	7/13 => 8/29	80	70.9	33 (69)	7.5
MF1	Mid. Fk., N. Fk. Smith (upper) - 1977	7/13 => 8/29	68	62.5	13 (27)	2
MF2	Mid. Fk., N. Fk. Smith (lower) - 1977	7/13 => 8/29	71	64.1	25 (52)	2.5
NF1	North Fork Smith - 1978 above bridge #10	7/12 => 9/2	73.9 (8/8)	68.1*	26 (49)	
NF2	North Fork Smith - 1978 below bridge #10	7/12 => 9/5	74.5 (8/8)	69.5*	30 (54)	
MF1	Mid. Fk., N. Fk. Smith (upper) - 1978	7/11 => 9/5	66.4 (7/25)	63.6*	9 (16)	
MF2	Mid. Fk., N. Fk. Smith (lower) - 1978	7/11 => 9/5	68.2 (8/8&9)	64.0*	13 (23)	
MF3	Mid. Fk., N. Fk. Smith (mouth) - 1978	7/12 => 9/5	75.7 (8/7&8)	70.0*	31 (55)	
NB1	North Branch, Mid Fk, N. Fk. Smith (upper) - 1978	7/11 => 8/31	62.2 (8/8&9)	57.9*	0 (0)	
NB2	North Branch, Mid Fk, N. Fk. Smith (lower) - 1978	7/11 => 9/5	66.7 (8/8&9)	62.9*	5 (9)	
B1	Bob Creek (mouth) - 1978	7/12 => 9/5	63.1 (7/25)	60.5*	0 (0)	
P1	Perkins Creek (upper) - 1979	7/7 => 9/11	65.3 (7/30)	62.7*	2 (3)	
B1	Bob Creek (mouth) - 1979	6/29 => 9/6	62.8 (7/17)	60.0*	0 (0)	

*** Average Max calculated for 7/15 - 8/15**

APPENDIX C2 cont. -Smith River WA Water Temperature Monitoing Summary for 1981, 1992, 1994 and 1996 (raw data available)

ID #	Location	Sampling Period	Seasonal Max & Date	7-Day Avg Max	7-Day Avg Min (SameDay as Max)	Week of Max Temp	Days > 58 F (&%)	Days > 64F (&%)
WB1	West Branch, N. Fk. Smith - 1981	7/9 => 9/29	65.5 (8/10)	63.7	57.6	8/5 => 8/11	34 (41)	4 (5)
MF1	Mid. Fk., N. Fk. Smith (upper) - 1981	6/23 => 9/12	66.2 (8/9)	64.6	59.7	8/7 => 8/13	48 (59)	8 (10)
MF2	Mid. Fk., N. Fk. Smith (lower)- 1981	6/22 => 9/19	75.0 (8/10)	71.9	64.6	8/6 => 8/12	89 (100)	70 (79)
NB1	North Branch, Mid. Fk., N. Fk. Smith (upper) - 1981	7/24 => 9/24	64.4 (8/10)	61.3	56.9	8/6 => 8/12	20 (32)	1 (2)
NB2	North Branch, Mid. Fk., N. Fk. Smith (lower) - 1981	*6/22 => 7/22 (offsets NB1)	62.4 (6/20)	60.8	54.9	7/16 => 7/22	15 (48)	0 (0)
NF5	N. Fk. Smith, Bridge #4 - 1992	*8/31 => 11/5	71.6 (9/2)	68.0	60.3	8/31 => 9/6	34 (48)	49 (70)
NF3	N. Fk. Smith, Bridge #9 - 1992	*8/27 => 11/25	75.7 (8/27)	73.2	59.3	8/27 => 9/3	49 (70)	25 (36)
C1	Cedar Creek (off N. Fk. Smith) - 1994	*7/20 => 10/25	65.5 (7/20)	63.8	56.1	7/28 => 8/3	58 (59)	11 (11)
NF6	N. Fk. Smith - 1 mi. below Br. #3 - 1994	*7/28 => 10/31	76.9 (8/3)	75.5	65.6	7/31 => 8/6	80 (82)	70 (72)
WF1	West Fk. Smith (upper mainstem)- 1996	5/30 => 8/28	67.6 (7/24)	65.5	57.9	7/10 => 7/16		18 (20)
WF2	West Fk Smith - 1996	5/30 => 9/26	69.9 (7/24)	66.7	59.7	8/8 => 8/14		33 (28)
WF3	West Fk Smith - 1996	5/30 => 8/28	68.1 (7/24)	64.9	59.3	7/10 => 7/16		16 (18)
WF4	West Fk. Smith - 1996	5/30 => 8/28	72.4 (7/24)	69.0	59.7	7/10 => 7/16		41 (45)
WF5	West Fk. Smith - 1996	5/30 => 8/28	72.6 (7/24)	69.2	62.4	7/10 => 7/16		43 (47)
WF6	West Fk. Smith - 1996	5/30 => 8/28	74.2 (7/24)	71.4	62.7	7/10 => 7/16		52 (57)
WF7	West Fk. Smith (lower mainstem) - 1996	5/30 => 8/28	74.8 (7/24)	68.2	61.5	7/13 => 7/19		50 (55)
CN1	Coon Creek (mouth) - 1996	5/30 => 8/28	64.9 (7/24)	62.6	57.5	7/10 => 7/16		6 (7)
CR1	Crane Creek (mouth) - 1996	5/30 => 8/28	66.1 (7/24)	62.8	57.4	8/8 => 8/14		7 (8)

APPENDIX C2 cont. -Smith River WA Water Temperature Monitoing Summary for 1981, 1992, 1994 and 1996 (raw data available)

ID #	Location	Sampling Period	Seasonal Max & Date	7-Day Avg Max	7-Day Avg Min (SameDay as Max)	Week of Max Temp	Days > 58 F (&%)	Days > 64F (&%)
M1	Moore Creek (mouth) - 1996	5/30 => 8/28	64.4 (7/24)	62.4	56.4	7/10 => 7/16		2 (2)
BE1	Beaver Creek (mouth) - 1996	5/30 => 8/28	65.9 (7/24)	63.8	58.3	7/10 => 7/16		11 (12)
G1	Gold Creek (mouth) - 1996	5/30 => 8/28	65.3 (7/24)	62.5	56.7	8/8 => 8/14		6 (7)

* Sampling periods most likely missed or only partially covered the peak temperatures for this year

APPENDIX D

AQUATIC RESOURCES

- **D1 - REFERENCE RESOURCE CONDITION DEFINITIONS**
- **D2 - METHOD OF DETERMINING EXISTING RIPARIAN SERAL CONDITION**
- **D3 - METHOD OF DETERMINING EXISTING LWD SOURCE POTENTIAL**
- **D4 - METHOD OF DETERMINING EXISTING SHADE POTENTIAL**
- **D5 - DESIRED RESOURCE CONDITION - FOR WILD AND SCENIC INFORMATION**

APPENDIX D
AQUATIC RESOURCES

APPENDIX D1 - Reference conditions for selected life-stage habitats or indicators of salmon and trout (based on NFP 1994, NMFS 1995, Washington Forest Practices Board 1993, DEQ 1996)

Stream Habitat Component	Properly Functioning	At Risk	Not Properly Functioning
Stream substrate	Dominant substrates are gravel and cobble with very little fine sediments.	Gravel and cobble are subdominant substrates or embedded with moderate amounts of fine sediment.	Sand, silt or bedrock substrates are dominant or most gravel and cobble substrates embedded with fine sediments.
Stream temperature	7-day average of daily maximum temperatures does not exceed 15.5 °C	7-day average of daily maximum temperatures between 15.5 and 17.8°C	7-day average of daily maximum temperatures exceeds 17.8°C
Percent of stream area in pools			
Depositional flat reaches	>55%	40-55%	<40%
Deposition reaches	>40%	30-40%	<30%
Transport/source reaches	>30%	20-30%	<20%
Percent of pool number that are complex[1]	>20%	10-20%	<10%
Winter rearing habitat	Abundant beaver dams, damned pools, or off-channel habitats		Habitat types are infrequent
Large Woody Debris pieces per mile[3]	>80	30-80	<30

[1] Complex pools are >3 feet deep (streams >10 feet wide) or 1.5 feet deep (streams <10 feet wide) and have high woody debris cover (greater than 60% cover from wood plus 3 pieces of woody debris OR ODFW wood rating greater than 4).

[2] Woody debris is greater than 24 inches in diameter and 50 feet long

For existing aquatic habitat condition, if a stream reach met all or most of the highest levels for the four componenets in the above table, then that reach was determined to be fully functioning. If most of the components did not meet the lowest levels for those habitat components, then that stream reach was determined to be not functioning. Stream reaches that fell in the middle of those determinations were labled as partially functioning.

APPENDIX D2 - METHOD TO DETERMINE RIPARIAN SERAL CONDITIONS

Buffer widths for the riparian areas are 1 tree potential distance on each side of the creek in Class IV creeks, 1 site tree potential distance plus 100 feet in Class I-III creeks. (Ideally the riparian vegetation buffers would be based upon confinement of the channel, but due to budgetary and time constraints the confinement could not be done across the entire watershed area. Therefore, that left the stream classes as our only watershed-wide coverage).

APPENDIX D3 - METHOD TO DETERMINE LWD SOURCE POTENTIAL IN STREAM ADJACENT RIPARIAN AREAS

In order to determine the adequacy of the LWD supply potential that currently exists in the Smith River Watershed area current seral stages were grouped into categories of currently adequate, near-term adequate and not-adequate. Currently adequate riparian areas are Conifer or Conifer/Deciduous Mix seral classes with trees greater than 21 inches in diameter. Near term adequate riparian areas for large wood include the Conifer or Conifer/Deciduous Mix with trees 11 to 20 inches in). Riparian areas that are not adequate for large wood supply include the Open, Semi-closed, All (broadleaf), Conifer less than 10 inches diameter, or Conifer/Deciduous Mix less than 10 inches in diameter.

APPENDIX D4 - METHOD TO DETERMINE STREAM SHADING POTENTIAL OF ADJACENT RIPARIAN AREAS

In order to determine the adequacy of the shade that currently exists in the Smith River watershed area current seral stages were grouped into categories of adequate and not-adequate stream shading. We considered the type of tree, conifer or deciduous, and width of valley bottom as well as the actual stream channel in determining shading adequacy. Different categories were used than for the LWD characterization.

In Class II, III, IV streams riparian seral stages that do not provide adequate shading of the stream include the Open, Semi-closed, Conifer/Deciduous Mix <10 inches and 11-20 inches, and Conifer <10 inches and 11-20 inches. Adequate shading riparian areas include the Conifer/Deciduous Mix 21-30 inches and >30 inches, Conifer 21-30 inches and >30 inches, and the All seral stages.

In Class I streams riparian seral stages that don't provide adequate shading include the the Open, All (Deciduous), Semi-closed, Conifer/Deciduous Mix <10 inches and 11-20 inches, Conifer <10 inches and 11-20 inches, Conifer/Deciduous Mix 21-30 inches, and Conifer 21-30 inches. The adequate shading riparian areas include the Conifer/Deciduous Mix > 30 inches, and Conifer >30 inches seral stages.

APPENDIX D5 - DESIRED AQUATIC HABITAT COMPONENTS

Characteristics of a properly functioning stream within the Southwest Oregon Province. This came from the matrix of characteristics that the NMFS, USFS, and the BLM developed to evaluate ongoing and existing actions.

WATER QUALITY

Stream Temperature	50-57 degrees F
Sediment/Turbidity	Less than 12% fines in gravels, turbidity low
Chemical contamination / Nutrients	Low levels chemical contamination, no excess nutrients, no Clean Water Act 303 designated reaches

HABITAT ACCESS

Physical Barriers	Any manmade structures in watershed allow upstream and downstream fish passage at all flows

HABITAT ELEMENTS

Substrate	Doninant substrate is gravel or cobble (interstitial spaces clear), or embeddedness less than 20%
Large Woody Debris	80 pieces of large wood per mile greater than 24" in diameter and greater than 50 feet long, and adequate sources of wood recruitment in riparian areas
Pool Frequency	For this size channel and geology, the pool frequency should average 40 pools per mile and be functioning. The large wood criteria must also be met.
Pool Quality	Pools greater than 3 feet deep with good cover (wood) and cool water, minor reduction of pool volume by fine sediment
Off-channel Habitat	Backwaters with cover, and low energy off-channel areas present (oxbows)
Refugia	Habitat refugia exists and are adequately buffered by intact riparian reserves; existing refugia are sufficient to maintain viable populations or sub-populations

CHANNEL CONDITIONS AND DYNAMICS

Width/Depth Ratio	less than 10
Stream Bank Condition	90% stable (less than 10% of the banks are actively eroding
Flood Plain Connection	Off-channel areas are frequently hydrologically linked to the main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession are allowed to occur

FLOW/HYDROLOGY

Change in Flow	Hydrograph indicates peak flow, base flow, and flow timing characteristics are comparable to an undisturbed watershed of similar size, geology, and geography
Drainage Network	Zero or minimum increases in network density due to roads

WATERSHED CONDITIONS

Road Density/Location	less than 2 miles per square mile of roads, no valley bottom roads
Disturbance History	Less than 15% ECA (Watershed with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian areas; freater than 15% retention of LSOG in watershed
Riparian Reserves	Riparian system provides adequate shade, large wood recruitment and habitat protection in all subwatersheds; percent similarity of riparian vegetation to the potential natural community composition greater than 50%

APPENDIX E

WILDLIFE HABITAT STATUS

E1 - SPOTTED OWL HABITAT
E2 - MARBLED MURRELET HABITAT

APPENDIX E1 - Acres of Existing Owl Habitat and Percent of Median Home Range for 34 Owl Activity Centers on Federal Lands in Smith River Watershed.

	Suitable Habitat within Median Home Range of Each Activity Center	
Owl Pair Area Number	Acres	Percent Suitable Habitat
27	2,439	51%
28	2,248	47
29	3,105	65
30	2,259	47
31	2,520	53
32	2,994	63
36	1,930	40
40	1,870	39
49	1,748	37
57	3,216	67
77	3,735	78
78	2,166	45
89	3,306	69
100	3,995	84
103	2,203	46
104	1,178	25
116	1,970	41
120	2,348	49
121	1,421	30
122	3,851	81
124	1,765	37
532	2,125	44
2178	886	18
3164	909	19
9028	3,398	71
82343	2,033	43
82345	1,195	25
82346	2,619	55
83156	2,875	60
83163	1,102	23
83369	2,396	50
86222	781	16
86223	1,187	25
86227	1,623	34

APPENDIX E2 - Acres of Suitable Murrelet Habitat as a Percent of Murrelet Reserve Area for 27 Murrelet Reserves on Federal Lands, Smith River Watershed

Murrelet Reserve Area Number	Suitable Habitat within the Reserve Area Around Each Occupied Site	
	Acres	Percent Suitable Habitat
1	319	63%
2	104	21
3	333	66
4	43	9
5	76	15
6	209	41
7	217	43
8	263	52
9	168	33
10	105	21
11	153	30
12	67	13
13	175	35
14	93	18
15	93	18
16	231	46
17	166	33
18	254	50
19	257	51
20	242	48
21	253	50
22	237	47
23	115	23
24	175	35
25	273	54
26	274	54
27	147	29
28	163	32
29	172	34
30	184	36
31	371	74
32	338	67
33	299	60
34	295	59
35	276	55

APPENDIX E2 CONT. - Acres of Suitable Murrelet Habitat as a Percent of Murrelet Reserve Area for 27 Murrelet Reserves on Federal Lands, Smith River Watershed

Murrelet Reserve	Suitable Habitat within the Reserve Area Around Each Occupied Site	
Area Number	Acres	Percent Suitable Habitat
36	298	59
37	326	65
38	462	92
39	435	86
40	44	9
41	132	26
42	349	69
43	244	48
44	425	84
45	416	83
46	419	83
47	260	52
48	428	85
49	280	56
50	184	37

APPENDIX F

NOXIOUS WEEDS

APPENDIX F - Noxious Weeds and Undesirable Non-Native Plant Species

Some general input and a list of weed species known or suspected to occur within the watershed. List 1 includes species which, once established, have the capacity for long term site occupancy (20+ yrs) and the potential to disrupt natural successional development. List 2 includes species which are aggressive colonizers of disturbed sites but require frequent disturbance (such as grazing or roadside brushing) for long term site occupancy. Species on lists 1 and 2 are generally recognized as "problem species" of ecologic and/or economic importance. Highlighted species are those currently listed on the Oregon Dept. of Agriculture - Noxious Weed List.

List 1 - Potential for long term site occupancy	Notes
Scott's broom (d), Cytisus scoparious	Terrestrial
Giant knotweed (s), Polygonum sachalinense	Riparian
Japanese knotweed (s),Polygonum cuspidatum	Riparian
Himalayan knotweed (s), Polygonum polystachyum	Riparian
Purple loosestrife (s), Lythrium salicaria	Aquatic, riparian
Himalaya berry (d), Rubus discolor	Terrestrial
Evergreen Blackberry (d), Rubus lacinatus	Terrestrial
Reed canary grass (d), Phalaris arundinacea	Riparian
South American waterweed (s)Elodea densa	Aquatic

List 2 - Short term site occupancy (unless frequently disturbed) notes	
Canada thistle (d), Cirsium arvense	Terrestrial
Bull thistle (d), Cirsium vulgare	Terrestrial
Tansey ragwort (d), Senecio jacobaea	Terrestrial
St. Johnswort (d), Hypericum perforatum	Terrestrial
Poison hemlock (d), Conium maculatum	Terrestrial

(d) = documented within the watershed
(s) = suspected or, high probability of occurrence within the watershed

* You may want to talk to some of the people who have been working in the watershed (ie. the fish folks could probably confirm the presence of some of the knotweeds and/or Elodea). They also may be aware of some additional species to put on the list.

Dan

APPENDIX G

LICHENS

APPENDIX G - Epiphytic macrolichens documented in the Smith River Watershed as part of the Multi-Forest air monitoring study.

Plot 1080040
Cavernularia lophyrea
Hypogymnia enteromorpha
H. occidentalis
H. tubulosa
Hypotrachyna sinuosa
Menegazzia terebrata
Parmelia sulcata

Plot 1084052
Alectoria sarmentosa
Hypogymnia enteromorpha
H. inactiva
H.tubulosa
Lobaria oregana*
Parmelia pseudosulcata
P. sulcata
Platismatia glauca
P. stenophylla
Sphaerophorus globosus
Tuckermannopsis orbata
Usnea hesperina**
Usnea wirthii

*Survey and manage species strategy 4.

**Survey and manage species strategy 1,3

Recently a more complete survey of lichen species has taken place across the Forest. This survey documented all lichens growing within a site. Lichens listed as abundant or common would be expected to be found within the Smith River Watershed. Those listed as infrequent, rare or unknown may or may not exist within the Watershed.

Plot No.	Sci	Subsp	Substrate	Abundanc	M/S
1080040	Cavernularia lophyrea		PSME	3	
1080040	Hypogymnia enteromorpha		Alnus	3	
1080040	Hypogymnia occidentalis		PSME	2	
1080040	Hypogymnia occidentalis		PSME	4	
1080040	Hypogymnia tubulosa		Alnus	3	
1080040	Hypogymnia tubulosa		PSME	1	
1080040	Hypotrachyna sinuosa		Alnus	3	
1080040	Hypotrachyna sinuosa		PSME	3	
1080040	Menegazzia terebrata		Alnus	1	
1080040	Menegazzia terebrata		PSME	2	
1080040	Parmelia sulcata		Alnus	2	
1080040	Parmelia sulcata		PSME	2	
1084052	Alectoria sarmentosa				
1084052	Alectoria sarmentosa		TSHE	3	
1084052	Alectoria sarmentosa		Tsuga.		
1084052	Hypogymnia enteromorpha		TSHE	5	
1084052	Hypogymnia inactiva			0	
1084052	Hypogymnia tubulosa		TSHE	1	
1084052	Lobaria oregana		PSME	1	4
1084052	Parmelia pseudosulcata		PSME	1	
1084052	Parmelia sulcata		PSME	2	
1084052	Platismatia glauca		TSHE	2	
1084052	Platismatia glauca		TSHE	3	
1084052	Platismatia stenophylla		Tsuga	3	
1084052	Sphaerophorus globosus		TSHE	4	
1084052	Tuckermannopsis orbata		TSHE	2	
1084052	Usnea hesperina			0	1,3
1084052	Usnea wirthii		ZUGE	2	
Roman Nose	Acarospora fuscata				
Roman Nose	Alectoria sarmentosa				
Roman Nose	Aspicilia caesiocinerea				
Roman Nose	Baeomyces rufus				
Roman Nose	Bryoria glabra				
Roman Nose	Bryoria mystery sp.				
Roman Nose	Bryoria sp.				
Roman Nose	Buellia badia				
Roman Nose	Candelariella vitellina				
Roman Nose	Cladina mitis				
Roman Nose	Cladonia bellidiflora				
Roman Nose	Cladonia borealis				
Roman Nose	Cladonia carneola				
Roman Nose	Cladonia chlorophaea				
Roman Nose	Cladonia furcata				
Roman Nose	Cladonia gracilis				
Roman Nose	Cladonia squamosa				
Roman Nose	Cladonia subsquamosa				
Roman Nose	Cladonia transcendens				
Roman Nose	Diploschistes muscorum	subsp. muscorum			
Roman Nose	Diploschistes scruposus				
Roman Nose	Evernia prunastri				
Roman Nose	Fuscopannaria leucostictoides				4
Roman Nose	Fuscopannaria praetermissa				
Roman Nose	Hypogymnia apinnata				
Roman Nose	Hypogymnia enteromorpha				
Roman Nose	Hypogymnia inactiva				
Roman Nose	Hypogymnia physodes				
Roman Nose	Hypogymnia tubulosa				
Roman Nose	Hypotrachyna sinuosa				
Roman Nose	Japewia tornoensis				
Roman Nose	Lecanora pulicaris				
Roman Nose	Lecanora rupicola				
Roman Nose	Lecanora semitensis				
Roman Nose	Lecidea fuscatoatra				
Roman Nose	Lecidea tessellata				
Roman Nose	Lecidella elaeochroma				
Roman Nose	Leptogium gelatinosum				
Roman Nose	Leptogium lichenoides				
Roman Nose	Lobaria hallii				1,3

Plot No.	Sci	Subsp	Substrate	Abundanc	M/S
Roman Nose	Lobaria oregana				4
Roman Nose	Lobaria pulmonaria				4
Roman Nose	Lobaria scrobiculata				4
Roman Nose	Loxosporopsis corallifera				1,3
Roman Nose	Megaspora verrucosa				
Roman Nose	Melanelia fuliginosa				
Roman Nose	Melanelia multispora				
Roman Nose	Micarea sp.				
Roman Nose	Mycoblastus sanguinarius				
Roman Nose	Neofuscelia verruculifera				
Roman Nose	Nephroma bellum				4
Roman Nose	Nephroma helveticum				4
Roman Nose	Nephroma laevigatum				4
Roman Nose	Nephroma parile				4
Roman Nose	Nephroma resupinatum				4
Roman Nose	Ochrolechia oregonensis				
Roman Nose	Ochrolechia upsaliensis				
Roman Nose	Parmelia hygrophila				
Roman Nose	Parmelia saxatilis				
Roman Nose	Parmelia sulcata				
Roman Nose	Peltigera britannica				
Roman Nose	Peltigera collina				4
Roman Nose	Peltigera leucophlebia				
Roman Nose	Peltigera membranacea				
Roman Nose	Peltigera neopolydactyla				
Roman Nose	Pertusaria subambigens				
Roman Nose	Phylliscum demangeonii				
Roman Nose	Pilophorus acicularis				
Roman Nose	Placopsis gelida				
Roman Nose	Placynthiella uliginosa				
Roman Nose	Platismatia glauca				
Roman Nose	Platismatia herrei				
Roman Nose	Platismatia stenophylla				
Roman Nose	Polychidium muscicola				
Roman Nose	Pseudocyphellaria anomala				4
Roman Nose	Pseudocyphellaria anthraspis				4
Roman Nose	Pseudocyphellaria crocata				4
Roman Nose	Psilolechia lucida				
Roman Nose	Pyrenopsis sp.				
Roman Nose	Rhizocarpon macrosporum				
Roman Nose	Rhizocarpon obscuratum				
Roman Nose	Rimularia insularis				
Roman Nose	Sphaerophorus globosus				
Roman Nose	Stereocaulon intermedium				
Roman Nose	Stereocaulon sterile				
Roman Nose	Sticta fuliginosa				4
Roman Nose	Sticta limbata				4
Roman Nose	Tephromela atra				
Roman Nose	Trapeliopsis granulosa				
Roman Nose	Tuckermannopsis chlorophylla				
Roman Nose	Tuckermannopsis orbata				
Roman Nose	Umbilicaria polyphylla				
Roman Nose	Umbilicaria polyrrhiza				
Roman Nose	Usnea filipendula group				
Roman Nose	Xanthoparmelia sp.				
Roman Nose	Xanthoria polycarpa				
Roman Nose	Xylographa parallela				

APPENDIX H

VEGETATION STATUS

- **H1 - SERAL DEFINITION - CLAMS**
- **H2 - DETAILED % SERAL CLASS BY OWNERSHIP (CLAMS)**
- **H3 - SERAL DEFINITION - SIUSLAW VEGETATION INVENTORY**
- **H4 - MANAGED STAND ACRES BY YEAR (FEDERAL ONLY)**

APPENDIX H1 - SERAL CLASS DEFINITIONS (CLAMS)

SERAL CLASS	DEFINITION
Semi-closed, meadow, etc	
Small	<10"
Medium	11-20"
Large	21-30"
Very Large	>30"
Conifer Mixed	>70% conifer
Mixed Broadleaf	>70% broadleaf
Mixed	<70% broadleaf or conifer

APPENDIX H2
CLAMWSHD

Table . Seral conditions by fifth field watershed. CLAMS data for all land owners.

clams code	Species and Size (DBH	Butler	Coon	ESlick	Johnson	Joyce	Kentucky	LNFSmith	LWassen	Murphy	Okie_s	Otter	Peach	Sheep
1,2,5	Shadow,water cloud	145	300	17	170	426	359	188	12	306	274	384	229	91
3	Open	1700	983	227	612	1762	491	1943	321	1730	695	2748	1924	554
4	Semi-closed	634	995	915	1091	1103	835	1927	429	2902	570	1284	978	903
6,7,8	broadleaf (all size)	33	144	75	103	181	203	263	1	208	43	251	162	391
9	conifer/decid mix <10"	206	418	321	353	612	623	675	194	1452	280	1331	496	1168
10	conifer/decid mix 11-20	304	345	359	415	565	680	591	414	1592	368	1039	728	506
11	conifer/decid mix 21-30	372	374	434	438	440	677	651	509	1285	455	951	1072	270
12	conifer/decid mix >30"	9	77	29	34	60	124	145	1	106	30	399	127	167
13	conifer <10"	159	196	135	151	294	1539	181	152	756	449	930	471	1418
14	conifer 11-20"	211	121	197	195	139	1091	134	403	763	235	493	888	820
15	conifer 21-30"	77	66	113	104	54	267	103	196	328	77	183	398	146
16	conifer >30"	3850	4019	2822	3666	5636	6889	6801	2632	11428	3476	9993	7473	6434
	Total by Owner													

UWas	Vincer	Wasse	Wass	WBrad	Weiss	WF_S	WSmith	
99	905	162	134	42	198	271	23	
699	2812	498	510	243	1492	1357	180	
635	1473	168	748	673	1102	1607	340	
25	631	14	153	110	63	227	99	
586	1751	121	598	437	467	1054	380	
1044	731	313	637	500	580	744	211	
1107	608	491	513	444	685	730	206	
13	816	4	122	176	71	143	72	
896	1559	255	946	434	269	798	159	
1306	400	543	738	381	453	346	82	
488	174	265	189	132	221	167	62	
6898	11860	2834	5288	3572	5601	7444	1814	

Appendix H3 Development of Federal Lands Assessment North Coast Province Seral Stage Classifications

Current Seral Stages

The current seral stage coverage for the assessment study area was developed by combining polygon vegetation datasets from both the Salem and Eugene District BLM and the Siuslaw National Forest. All vegetation datasets were developed from 1:12000 aerial photo interpreted data.

Items names from the BLM datasets were changed to match the Siuslaw's dataset and items that were not common to both datasets were dropped. The items that were common to both datasets and that were retained in the combined dataset were: primary and secondary species, mean sizeclass, age of stands, and type (managed vs. natural).

These remaining items were used to designate seral stages using the following criteria:

	USFS	BLM
Perennial Grass/Forb	developed sitex (XAD) grass/forb (XME) or brush (XBR)	same as USFS
Very Early Seral	natural stands 0-5" dbh plantations <= 10 yrs old	0-5"dbh or 0-10 yrs old
Early Seral (pole)	conifer 5-10"dbh plantations 11-24 yrs old	5-11" dbh 11-25 yrs old
Conifer mix (pole)	conifer/hdwd 5-10"dbh	same as above conifer/hdwd
Young conifer	conifer 10-18" dbh plantations 25-50	25-50 yrs old conifer
Young conifer mix	conifer/hdwd 10-18" dbh	25-50 yrs old
Mature conifer	conifer dbh >18" dbh	conifer >50 yrs old
Mature conifer mix	conifer/hdwd >18" dbh	conifer/hdwd >50 yrs old
Deciduous mix	hardwood dominated mixed stands (spp1 = ALRU or TREED or HDWD, or ACMA) spp2 = conifer	
Pure hardwood	hardwood stands (spp1 = ALRU or TREED or HDWD or ACMA)	
untyped	spp1 and spp2 blank	

APPENDIX J

RECREATION ASSESSMENT

APPENDIX J - RECREATION ASSESSMENT

Cities and Towns

The towns or hamlets of Franz, North Fork, and Sulphur Springs are within the watershed along the Smith River, and their locations show the importance of rivers and coast to settlement of the area. Franz is near to the mouth of the Umpqua River and North Fork and Sulphur Springs are located just west of the extent of tidal influence on the Smith River.

There are a number of small towns surrounding the watershed, with the greatest population centers to the east and west. The towns of Scottsburg and Greenacres are south of the watershed on Highway 38. The towns of Gardner, East Gardner, and Reedsport are just southwest of the watershed on Highway 101. The town of Mapleton on Highway 126 and Florence at the junction of Highways 101 and 126 are north and northwest of the watershed. Dunes City on Highway 101 is west of the watershed, and the towns of Canary, Siltcoos, Ada, and Booth are west of the watershed in the vicinity of Siltcoos Lake. The towns of Twin Sister, Gunter, and Scottsburg to the east of the watershed and further east is the Willamette Valley with a number of small towns and the City of Eugene.

Recreation Sites

All recreation sites within the assessment area are associated with land features and attributes. Most recreation sites are part of river corridors and associated with recreation, scenic, fishery, and ecological values of the rivers. Bureau of Land Management recreation sites are part of a corridor of recreation sites that extends east to Smith River Access Road. The river corridors have associated travel corridors --roads or trails-- which have recreation values for hiking or driving for pleasure, and enjoying the scenery.

Trailheads - Kentucky Falls Trailhead, North Fork Smith Trailhead managed by the Siuslaw National Forest. Kentucky Falls is a hiking trail with viewing opportunities for waterfalls. There is a restroom at the trailhead.

Noel Ranch Boat Ramp - on the Smith River. The site offers picnicing, boat ramp, fishing. Restroom on site. The site is managed by the U.S. Forest Service.

Riverside Wayside - on the Smith River. Boat ramp, camping, trailers, viewpoints. Restroom. Non-federal.

Smith River Falls Campground - on the Smith River. Elevation 100. 75 acres. Open all year. 8 camp units on the Smith River. 2,500 visits (1990). Picnicing, fishing. Douglas County. The site is managed by the Bureau of Land Management.

Vincent Creek Campground - Elevation 180. 4 acres. 6 camp units, 5 picnic units. Restrooms. 800 visits (1990). Fishing, swimming. Camping, picnicing. On Federal land, managed by the Bureau of Land Management.

Smith River Marina - on the Smith River.

Unimproved sites

Camp Site - There are a number of dispersed camp sites associated with the North Fork Smith River corridor. These campsites have been mapped (1959, 1979, and 1989) and maps are on file in the recreation department at the Mapleton Ranger Station. The existence of the campsites, and the repeated inventories of them are evidence of the long and continuing interest in the value of the North Fork Smith for recreation.

Boat launches- There currently two known dispersed boat launches on North Fork Smith River: at bridge "Number 2" which has been graveled, and across from the "Rhododendron Loop" on the north side of the river. Both are in Section 33. Other dispersed boat launch sites were blocked or removed during fisheries improvement in the late 1980's.

Devil's Staircase - waterfalls in the Wassen Creek Area

Potential sites

Fawn Creek Boat Ramp - potential recreation site. 5 acres. 1000 visits (1990). Day use area and boat ramp at the confluence of Fawn Creek and Smith River. Managed by the Bureau of Land Management.

Smith River Boat Ramp - 1 acre. Boat ramp, parking area upstream of the Smith River Falls.

Smith River Falls Log Dump - potential recreation site operated on federal land managed by the Bureau of Land Management.

Vincent Creek Boat Ramp - 1 acre. Boat ramp at the confluence of Vincent Creek and Smith River.

Roman Nose-Kentucky Creek Trail - a proposed 6 mile hiking trail from the base of Roman Nose to the Kentucky Falls trail. This trail would link recreation opportunities on land to the east managed by the Bureau of Land Management with those on National Forest land in the area.

Special Designation Lands

Two large portions of the assessment area, south and north within the assessment area, have been found especially important for aesthetic values.

Former Wassen Creek Roadless Area

Also called Smith Umpqua Roadless Area, this land and adjacent lands were identified as important to retain as an undeveloped large block for semi-primitive recreation opportunities--and wildlife values--in the Federal Lands Assessment, 1995. The roadless or undeveloped area is 7,546 acres (acreage calculated by GIS, 1997).

All of the National Forest land proposed in the RARE II assessment is within the Wassen Creek sub-watershed. The area has low recreation use. Devil's Staircase is on Wassen Creek within the roadless area. The section of land, where Devil's Staircase is located, is noted as the most truly roadless section within this proposed roadless area boundary.

Under the Siuslaw National Forest Plan, the western half of the RARE II proposed roadless area was to be management for owl habitat and given the objective of roaded natural recreation opportunity setting. Under the Northwest Forest Plan, this area is designated as late-successional reserve. The eastern half was designated as having a roadless objective with semi-primitive, non-motorized recreation opportunity setting objective. Under the Northwest Forest Plan this area is recognized as administratively withdrawn. The Federal Lands Assessment, 1995 recommended that both areas have a semi-primitive non-motorized objective, found to be the most consistent with recreation and wildlife objectives for the area.

The existing southern boundary of this area weaves awkwardly north and south, having been drawn to accommodate or reflect the existence of timber sale areas and associated road building. With an overall objective of late successional reserve, the boundary would make much more sense and be more clear, following the ridge between the Smith and Umpqua Rivers.

Land managed by the Bureau of Land Management, east of the National Forest portion of Wassen Creek area is also a relatively undisturbed large block of older trees, and also considered part of Wassen Creek area. This land is estimated at 3,440 acres. This Wassen Creek land is designated as an Area of Critical Environmental Concern (ACEC) (USDI 1995). The values of the area have benefited from similar treatment of land and to the east on Bureau of Land Management land. Coordinated management of this area by the US Forest Service and Bureau of Land Management will benefit many resources.

Kentucky Falls Special Interest Area

The boundary for this area was defined as one quarter mile from the river. It would better fit the attributes of the area to have a boundary defined in relation to topography, with limits that relate to landform.

Scenic Areas

Kentucky Falls Special Interest Area and Wassen Creek Area and their associated waterfalls are especially scenic points within the assessment area. The river corridors and associated vegetation and waterfalls also have high scenic value, as shown on the "Visual Quality" inventory maps done by the Forest Service in the 1980's. There, the river and road corridors are given a higher scenic rating than the remainder of the watershed. Smith River Road, especially the western half, and the Smith River Falls along the Smith River Road are recognized as having scenic value. The North Fork Smith corridor has a number of scenic views along it. Here, and elsewhere in the assessment area, the rivers have high scenic value. There are also a number of spots that are special places: there are at least twelve major waterfalls, and several groves of old-growth in the eastern half of the watershed.

Sight distances other than from peaks are generally short within the watershed. The land, as in much of the coast range, is generally seen from low points, so that viewing opportunities are limited. This makes Roman Nose and Baldy particularly important as scenic features by which to orient oneself.

Scenic Viewpoints

Scenic viewpoints include points along the N. Fork Smith River Road in sections--and along the Smith River Road, and from Baldy Mountain.

Natural Landmarks

Roman Nose and Baldy Mountain are landmarks within the assessment area. Travel and orientation is also very much related to the creeks and rivers within the watershed.

Scenic Corridors

The Smith River Road is a proposed "Back Country Byway."

County Road 4800 and Forest Road 2300 are rated 'Sensitivity Level 2' roads as is the road north, to Sweet Creek. According to standard estimates for this type of road, at least 1/4 to 3/4 of the users have major concerns for scenic qualities. These are considered scenic routes. The scenic value of the North Fork Smith road corridor was recognized by special features in road construction along this corridor: pedestrian walkways on bridges allowing people to comfortably view the river from along the road.

Road and river scenic value are related. North Fork Smith River was inventoried as :

"Variety Class A" and the road as "Variety Class B" as well as "Sensitivity Level 2." See North Fork Smith River Anadromous Fish Overview.

Throughout the watershed, road use for viewing scenery and to visit recreation sites is hindered by the repeated occurrence of landslides and failures. Slides are much in evidence traveling on the Smith River Road, and can make it inaccessible, as well as hazardous.

Scenic Rivers

The assessment area is crossed by three rivers all of which are eligible to be Wild and Scenic Rivers: N. Fork Smith River, Smith River, and Wassen Creek. Land along these rivers must be managed in such a way that the Wild and Scenic River qualities of these rivers are protected. The rivers dominate the landscape and have a cumulative effect on the scenic value of the watershed, giving the area repeated scenes of beautiful rivers and their settings. The Smith River corridor, in particular, has dramatic pastoral views made up of the river, river flats, the surrounding hills, the houses and farms which still have the quality of homesteads, and the vegetation patterns which people have affected.

The North Fork of the Smith

The North Fork of the Smith is an eligible wild and scenic river. The north third and south segment on National Forest land are eligible as recreation river segments. The central portion through the Kentucky Falls Special Interest Area is eligible as a scenic river segment. The North Fork has outstanding values for scenery and fish.

Wassen Creek

Wassen Creek is eligible as a wild river at the eastern most portion on forest land for about 7 1/4 miles, and as a recreational river from that section to where it joins the Smith River. Its outstandingly remarkable values are scenery, recreation, wildlife, and ecological. The portion of Wassen Creek on land managed by the Bureau of Land Management was found not suitable for designation as a Wild and Scenic River (USDI 1995).

Rivers that may be found eligible for Wild and Scenic River status but have not been formally studied:

Smith River

The Smith River was not evaluated as part of the National Wild and Scenic River System due to limited National Forest land. It is possible that when combined with portions flowing outside of National Forest lands, it might be eligible. The part of the river associated with the National Forest meets the free-flowing criteria. The Smith River potential classification is as a recreation river. The portion of the Smith River managed by the Bureau of Land Management is considered not suitable for designation as a wild and scenic river (USDI 1995).

Scenic Condition

Land to the east and the west within the assessment area has obviously been managed, but is in many places regenerating or regenerated to the extent that the most obvious scenic impact particularly viewing east from the Roman Nose area is or will be existing roads.

A large portion of the Siuslaw National Forest has been managed to heavily managed. (Based on scenic inventory, see the Final Environmental Impact Statement, Siuslaw National Forest Land and Resource Management Plan, 1990, and the Recreation Opportunity Spectrum map, 1995, based on ca. 1990 data.) Bureau of Land Management land to the east within the assessment area has been heavily managed. For the Coos District, as a whole, less than 1% of the land is preservation quality, 5% is retention quality, 20% is partial retention quality, and 75% is allowed obvious modification. (USDI 1995). Most of the land within the watershed that is managed by the Bureau of Land Management is managed at what is called "Visual Management Class 4." Land located along the Smith River was given a higher inventory rating for scenery (USDI 1995).

The Kentucky Falls Special Interest Area is in a wilderness quality scenic condition as is much of the Wassen Creek Area extending outside the assessment area.

Throughout the watershed, private land generally appears as cleared or partially cleared patches of land. Recent federal land purchase of formerly private land along the North Fork of the Smith River will result in revegetation of several sections of land much of which is viewed from the river.

Recreation Opportunity Spectrum

This watershed is unique in offering a large amount of land in semi-primitive condition. To the south, Wassen Creek area which extends south of the assessment area boundary, and to the north associated with the Kentucky Falls Special Interest area. Most of the remainder of the federal land was inventoried as in a "roaded - modified" condition (undated inventory map, data probably gathered for the Siuslaw Forest Plan, ca. 1980's.

In the Siuslaw National Forest Land and Resource Management Plan, 1990, the Kentucky Falls Special Interest Area and the eastern half of the Wassen Creek area have the objective of providing a "semi-primitive, non-motorized" recreation setting. The western half of the Wassen Creek Area and most of the land immediately adjacent to the Kentucky Falls Special Interest Area has a "roaded - natural" recreation setting objective. All other National Forest land in the watershed has a recreation opportunity setting objective of "rural."

Travelways

Trails

Trails within the assessment area include the Kentucky Falls Trail, the North Fork of the Smith trail which shows up on maps but which is not a maintained trail, and Wassen Creek Trail, not completed, on Bureau of Land Management land. Wassen Creek is a proposed 12 mile trail for hikers from Wassen Lake crossing land managed by the Bureau of Land Management and National Forest land.

Roads

The watershed is fairly isolated from its surroundings. The area is bounded by Highway 101 to the west, Highway 126 to the north, and Highway 38 to the south with generally private land to the west and a mix of federal land managed by the BLM and private land to the east.

Highway 38 from the Willamette Valley to Reedsport follows the Umpqua River just south of the assessment area.

Highway 48 follows the Smith River and the first approximately six miles of the North Fork of the Smith River. It joins other roads further north to make connection with Highway 126 and Mapleton and Florence. It forms a travel route across the center of the assessment area.

Forest Road 23 follows the North Fork of the Smith River west to east in the north portion of the project area and then travels north to Baldy Mountain. This road has been laid out in a way that better fits the setting for recreation use and driving for pleasure than are most forest roads.

Road 4100 leads east west immediately south of the assessment area from the Umpqua corridor, and joins the Smith River corridor.

The major connections for travelers and residents and people using the area are the two routes described above leading north to Mapleton and the route crossing the watershed along the Smith River. Local road linkages are also important as the road giving access west in the west central portion of the assessment area.

Recreation Use

Recreation use in the North Fork Smith River watershed includes fishing, boating in the lower sections of the river as well as camping, hiking, viewing, scenery, hunting, and gathering forest products throughout. Salmon fishing, both tidewater and driftboat fishing has been observed in the area (Public Meeting, 1997). Drift boating is very popular on the North Fork of the Smith River due to the rivers ability to clear quickly early in the spring.

Littering by campers was noted as a concern in the watershed (Public Meeting 1997). Also, road closure by the Forest Service were a concern - there are many short spurs being closed on private land and others being opened. Landslides and road failures are also an issue for recreation use of the area.

RECREATION FEATURES FROM PUBLIC MEETING (1/22/97)

Special Places:

- Whittaker Creek
- Sweet Creek
- Scare Creek

Important Routes through the watershed

- Beaver Creek to Roman Nose cutoff to North Fork loop
- North Fork Road
- West Fork Road to Roman Nose
- Scottsburg to Wells Creek
- Vincent Creek Road
- Otter Slough Road

Smith River Issue 1

Late Successional Species Habitat

- Mature Stands lt 2000 acres in size
- Mature Stands ge 2000 acres in size
- Managed Stands older than 25 years
- Managed Stands younger than 25 years
- Partial Cut Units

Apply vegetation management which limits wind and light into adjacent mature stand- increase interior forest habitat

LEARNING OPPORTUNITY

Thin adjacent to large mature blocks

Ensure hemlock in the understory

Establish wildlife security blocks - close access to area

Protect mature conifer habitat

Plant understory in mature forest where light is adequate

Apply silvicultural techniques to attain old-growth characteristics

Employ variable thinning densities

Maintain dispersal habitat

Establish canopy gaps and dense areas

Restore species diversity - under plant

Maintain dense canopy, treat a small % of the area

Apply silvicultural techniques to attain old-growth characteristics

Thin as a whole block

Provide for big-game - close access; create stringer meadows from old roads; maintain openings; control noxious weeds

Adjust MLSR boundary to logical units, protect mature conifer

Maintain dispersal habitat

Establish corridor for small home range species

Investigate potential to acquire mature in Eslick Creek

Restore wetland plant communities

SMITH RIVER

Designate entire block as bald eagle habitat

Reedsport

Establish wildlife security blocks - close access

UMPQUA RIVER

Maintain dispersal habitat

Apply silvicultural techniques to attain old-growth characteristics

LEARNING OPPORTUNITY

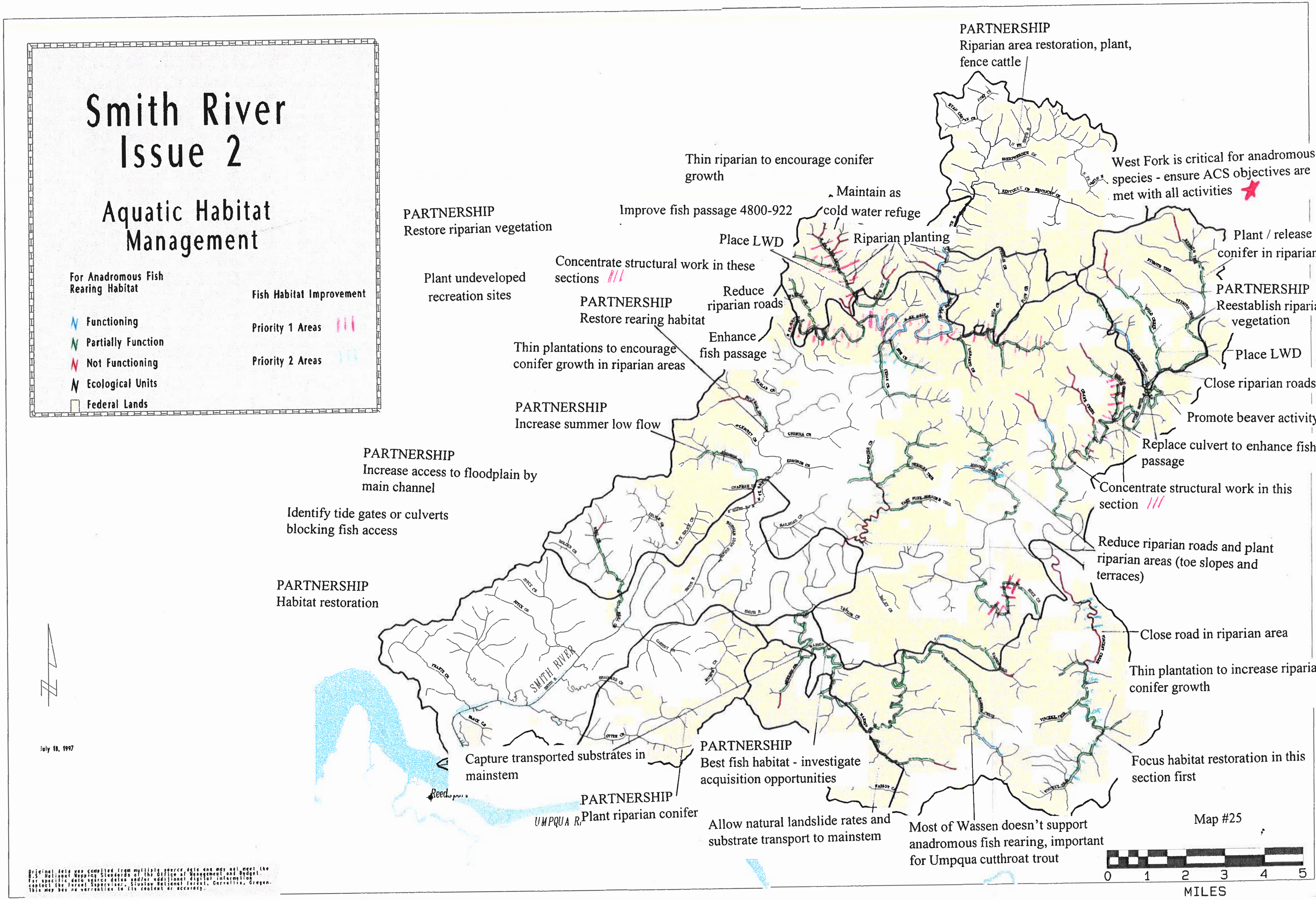
Do not thin adjacent to large mature blocks

July 18, 1997

Map #24b

0 1 2 3 4 5

MILES


Smith River
Issue 2
Aquatic Habitat Management
For Anadromous Fish Rearing Habitat
Functioning
Partially Function
Not Functioning
Ecological Units
Federal Lands
Fish Habitat Improvement
Priority 1 Areas
Priority 2 Areas
July 18, 1997
PARTNERSHIP
Riparian area restoration, plant, fence cattle
Thin riparian to encourage conifer growth
West Fork is critical for anadromous species - ensure ACS objectives are met with all activities
Maintain as cold water refuge
Improve fish passage 4800-922
PARTNERSHIP
Restore riparian vegetation
Place LWD
Riparian planting
Plant / release conifer in riparian
Concentrate structural work in these sections
Plant undeveloped recreation sites
Reduce riparian roads
PARTNERSHIP
Reestablish riparian vegetation
PARTNERSHIP
Restore rearing habitat
Enhance fish passage
Thin plantations to encourage conifer growth in riparian areas
Place LWD
Close riparian roads
Promote beaver activity
PARTNERSHIP
Increase summer low flow
Replace culvert to enhance fish passage
PARTNERSHIP
Increase access to floodplain by main channel
Concentrate structural work in this section
Identify tide gates or culverts blocking fish access
Reduce riparian roads and plant riparian areas (toe slopes and terraces)
PARTNERSHIP
Habitat restoration
Close road in riparian area
SMITH RIVER
Thin plantation to increase riparian conifer growth
Capture transported substrates in mainstem
PARTNERSHIP
Best fish habitat - investigate acquisition opportunities
Focus habitat restoration in this section first
Reedsport
PARTNERSHIP
UMPQUA R.
Plant riparian conifer
Allow natural landslide rates and substrate transport to mainstem
Most of Wassen doesn't support anadromous fish rearing, important for Umpqua cutthroat trout
Map #25
0 1 2 3 4 5
MILES

Smith River Issue 3

Landslide Susceptability

N

System Roads

Class 1 & 2 Streams

High Susceptability

July 18, 1997

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 an accuracy to its content or accuracy.

Identify sidecast pullback in upcoming road assessment

Develop quarry plans for basalt aggregate sources in EU #1

Waterbar spurs of 4880

Ensure proper road maintenance on 4800-910 - needs waterbars

Partner with private - stabilize mid-slope road at stream crossings

Locate stable waste disposal sites or locate sites outside of EU #2

Monitor unstable waste area off 4890

allow non-ATM roads to grow closed naturally

Evaluate existing waste areas for pullback

Develop riparian vegetation to reduce scour potential

Maintain slope stability

Take 4820 off ATM system and waterbar

Close and storm proof roads not used

Do not block spurs with waste at beginning until site evaluation occurs

Stabilize / decommission priority roads

Maintain ATM roads

Identify future stable waste area sites

Ensure proper drainage on roads

Continue to stabilize and monitor large unstable waste area above Smith River main stem

Identify undersized culverts in upcoming road assessment

Stabilize mid-slope roads, decommission problem roads to reduce density here

SMITH RIVER

Reedsport

UMPQUA RIVER

Monitor culverts and waterbars on Forest Road 41 and its spurs

Ensure wetland function is maintained at road crossing

Consider deferring future vegetation management in EU #6 due to extremely high instability and low productivity

Map #26

0 1 2 3 4 5

MILES

Smith River Issue 4

Recreation Strategy Focus Area

- Primary Forest Road
- Secondary Forest Road High Clearance
- Scenic River
- Recreation River
- Administratively Withdrawn
- Proposed Special Interest Area

Identify character of river corridor. Emphasize character in management.

Construct any fish habitat structures to look natural. Review with landscape architect. Minimize disturbance of surrounding area.

Update N. Fork Smith pamphlet for scenic and aquatic resource concerns

Environmental education to help reduce impacts

Limit trail development adjacent to river, following Aquatic Conservation strategy.

Site location meets Aquatic Conservation Strategy.

Restoration work needed to meet ACS

Restoration needed. Possible projects found include: closure of user created ramp to creek, possible walk-in route to river, subsoil existing blocked road.

PAXTON CR

Site location meets Aquatic Conservation Strategy.

Dispersed boat ramp access with minimal impact to fisheries.

Maintain boat access to this area

PEACH

Site location meets Aquatic Conservation Strategy.

Restoration work needed to meet ACS

Restoration needed. Possible projects found include: subsoil/block connecting road, gate east site to seasonally close (September to Memorial Day)

SMITH R

N FK SMITH R

Site location meets Aquatic Conservation Strategy.

Dispersed site with minimal impact to fisheries. Determine hazards from existing trees. Vegetation management may be needed to retain as site.

Retain and enhance native vegetation along river.

Block access to dump site and waterbar

Retain and enhance native vegetation along river

Provide for drift boat access if fish habitiat structures are constructed here

Site location meets Aquatic Conservation Strategy.

Dispersed boat ramp with minimal impact to fisheries.

Restore, retain boat ramp access

Interpretation at bridges of rivers and recreation opportunities in area.

Site location meets Aquatic Conservation Strategy.

Restoration work needed to meet ACS

Restoration needed. Possible projects include: Re-block access to created meadow. Establish turn around for recreationists. Re-plant compacted spots in created meadow. Consult landscape architect in project planning.

M.FK

BOB

UNA

Site location meets Aquatic Conservation Strategy.

Dispersed site with minimal impact to fisheries. Campsite and use is away from stream. Opportunity to expand inside loop if needed. Has river access west and east of camp. Gate available if seasonal concerns develop.

Retain and enhance native vegetation. Enhance rhododendron areas, big leaf maple woods, evergreen forest areas along the river.

Greatest negative impact or potential negative impact to fisheries of dispersed site in this segment of North Fork, between bridge 2 and 10.

Restoration needed. Possible projects found include: Subsoil road. Greatest opportunity for in-stream fisheries restoration. Site also has recreation opportunities.

Encourage use of existing recreation sites. Limit expansion of recreation areas.

Maintain vegetation along river and discourage boat access between designated launch sites.

July 28, 1997

Map #28

0 1/2 1 MILES

Smith River
Issue 4
Recreation Strategy

- County
- Main BLM
- Primary Forest Road
- Secondary Forest Road Low Clearance
- Secondary Forest Road High Clearance
- Scenic River
- Recreation River
- Undeveloped Area
- Administratively Withdrawn
- Proposed Special Interest Area
- Area of Critical Environmental Concern

Review recreation setting designation for additional semi-primitive non-motorized.

Maintain link to Whitaker-Mapleton-Discovery Route.

Eligible Wild and Scenic River, Recreation River

Eligible Wild and Scenic River. This segment meets scenic standard of quality.

Complete Wild and Scenic River designation process

Potential trail linking base of Roman Nose to Kentucky Falls. BLM. Trail would tie with National Forest sites.

Thinnings need to enhance scenic quality

Adjust SIA boundary to ridge and road

Limit dispersed sites to designated areas located away from stream side to protect scenic area, water, and other resources and maintain aquatic conservation strategy.

Opportunity to reduce contrast in vegetation pattern between old harvest units and surrounding forests.

Wilderness quality scenic condition.

ATV trail establishment in conflict with resource concerns and existing recreation use and character

Recreation focus Area

Insert(s) see map

Eligible Wild and Scenic River. This segment meets recreation standards of quality.

Opportunity to maintain recreation access roads. Control erosion.

Opportunity to add entrance signs to Kentucky Falls SIA

Consider Back Country Byways as part of travel management

Possible cooperative management of recreation sites between agencies

Possible Recreation River in Wild and River System

Proposed Back Country Byway

Eligible Wild and Scenic River as Recreation River.

Wassen Creek Trail, proposed, BLM
Trail would tie with National Forest sites.

Wilderness Quality Scenic Condition

Proposed south boundary of unroaded area

Eligible Wild and Scenic River. This segment meets scenic standard of quality.

Complete Wild and Scenic River designation process

Review recreation setting designation for additional semi-primitive non-motorized.

Map #27

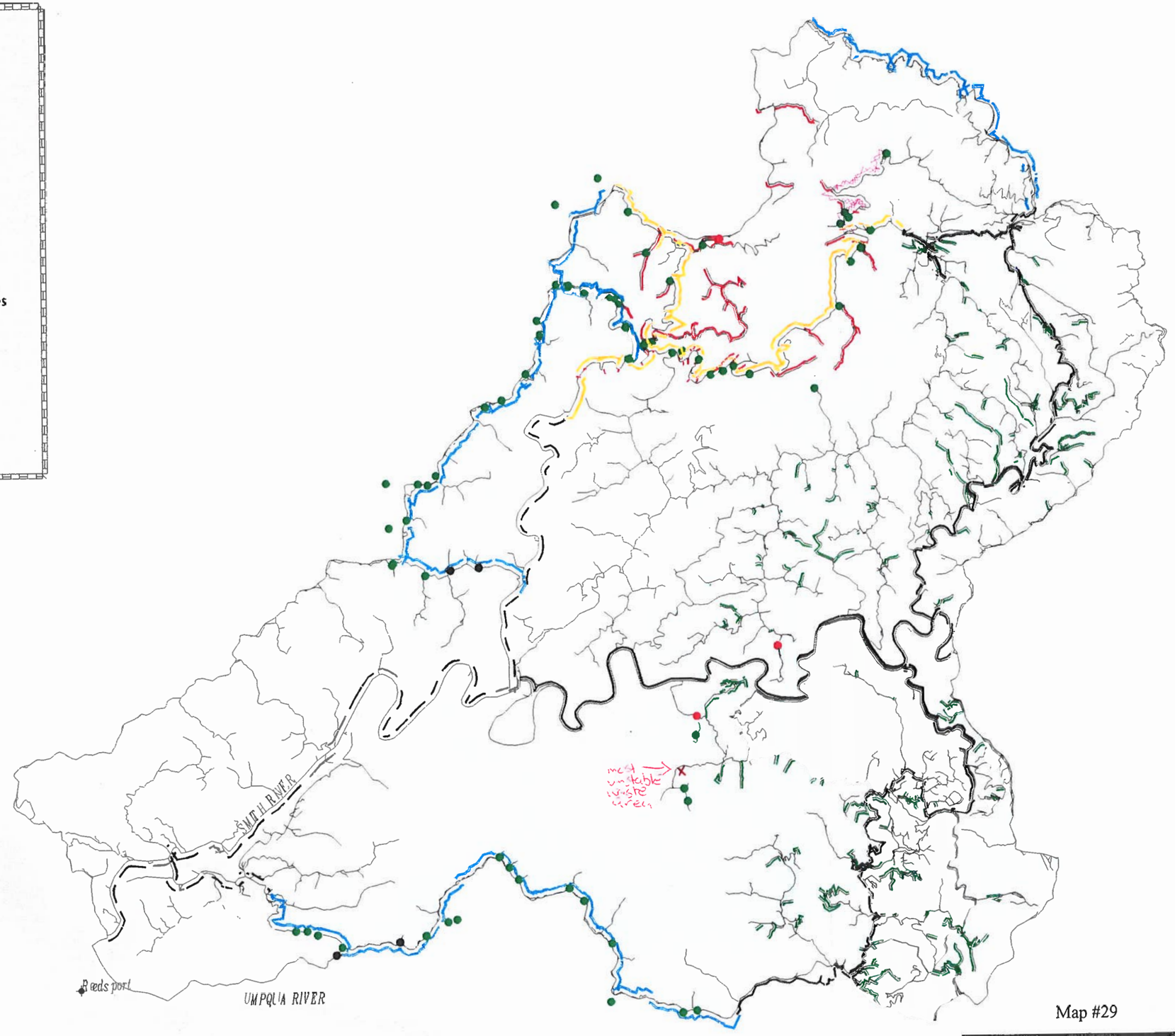
July 18, 1997

0 1 2 3 4 5
MILES

Smith River

Road Stablization and Waste Areas

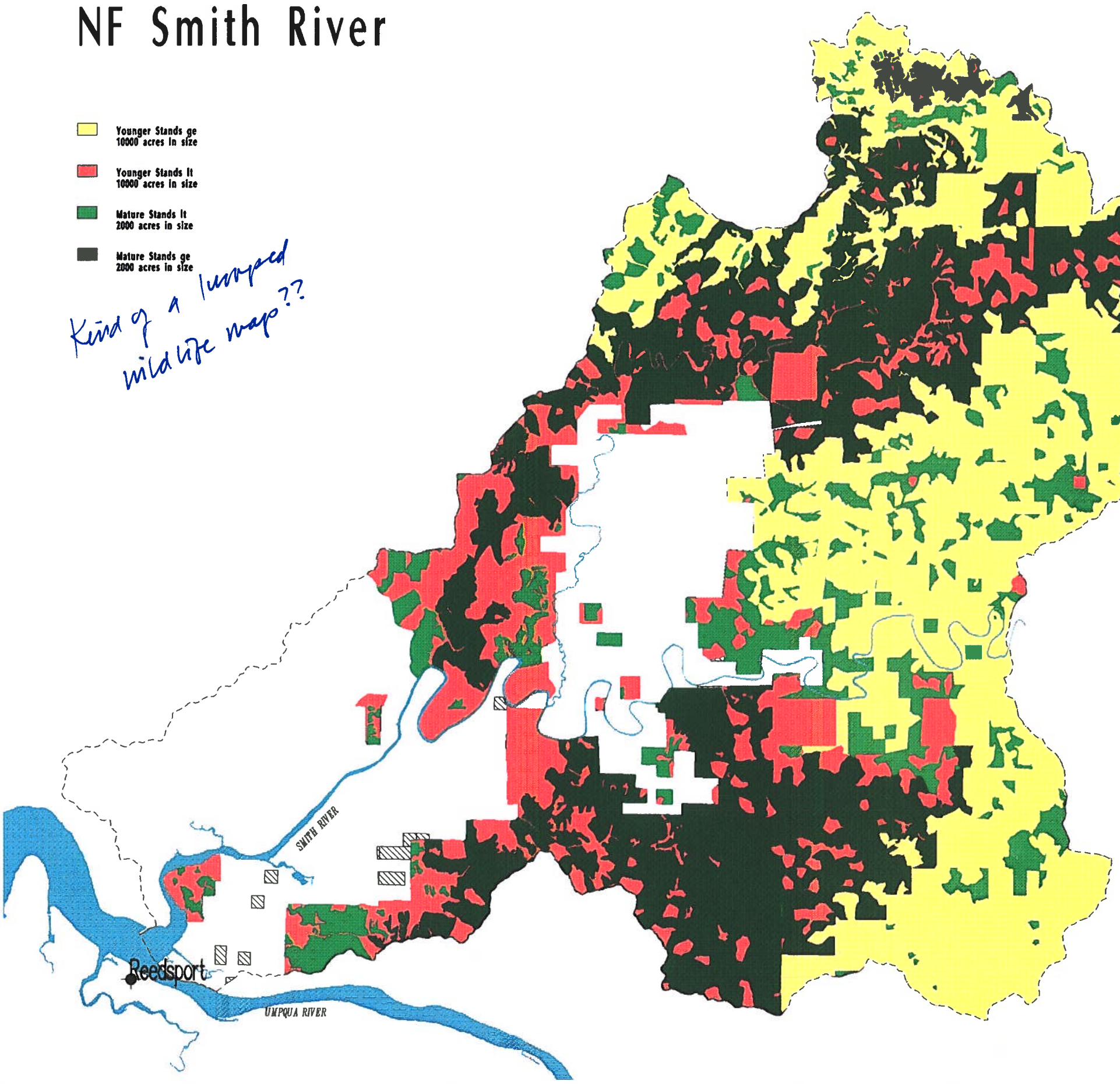
- County Roads
- Main BLM Roads
- Primary Forest Road
- High Secondary Forest Road
- Low Secondary Forest Road
- 94 Road Stabilization
- Proposed Roads Closures
- Federal Lands
- Potential USFS Waste Sites
- Existing Waste Sites (Mostly USFS)
- Unstable Waste Sites (USFS and BLM)



June 13, 1997

Map #29

NF Smith River



Kind of a lumped wildlife map??