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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 monitoring and restoration programs,
- provides the foundation from which Riparian Reserves can be delineated.

The Lobster-Five Rivers watershed analysis is the fourth out of five watershed analysis efforts that will be conducted by the Siuslaw National Forest and Bureau of Land Management (BLM) on federal lands in the Alsea Basin. 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.

This watershed analysis frequently refers to, and takes guidance from, the larger assessments and watershed analysis documents covering adjacent drainages (Indian Deadwood and North Fork of the Alsea). It is important to maintain the context of each watershed analysis to adjacent watersheds as well as to the larger Provincial scale.

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 listed before current conditions and natural disturbances are discussed in the reference conditions section, while post-European settlement-related activities are discussed under current conditions.

In this initial step of the analysis, the watershed location and size is set in context to the Alsea Basin, the Oregon Coast Province and the State of Oregon. Private and federal ownerships are delineated. NFP objectives, regulatory constraints and land allocations are identified. The watershed context is used to identify the primary ecosystem elements needing more detailed analysis in subsequent steps.

LOCATION AND SIZE

The Lobster-Five Rivers watershed lies in the southern portion of the Oregon Coast Province. It is located about 35 miles southwest of Corvallis, about 10 miles southwest of Alsea and 12 miles inland from Waldport (Map 1). Portions of Benton, Lane and Lincoln Counties are found within the watershed boundary. The watershed occupies 76,326 acres of land.

Map 1, ALobster Five Rivers Analysis Area@ goes here.

The watershed is bounded by Cannibal Mt. (elevation 1946′) on the northwest, Prairie Peak (elevation 3400′) on the east, Divide Peak (elevation 1750′) on the south, and Klickitat Mt. (elevation 2307′) on the south west. The lowest elevation is to the north where Five Rivers meets the Alsea River (elevation 100′).

LAND ALLOCATIONS - NORTHWEST FOREST PLAN OBJECTIVES

Eighty-one percent of the watershed is managed under federal ownership. Seventy-five percent of that federal land is managed by the USDA - Forest Service and 25% is managed by the USDI - Bureau of Land Management. The remaining 19% of the watershed is under private ownership with 29% of the private land in private industrial forest land use (Map 2, Table 1).

LATE-SUCCESSIONAL RESERVES

The majority of the federally managed land in the watershed, 72%, is allocated to Late-Successional Reserve (LSR)based on the Northwest Forest Plan (Map 3, Table 1). 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.

RIPARIAN RESERVES

Approximately 74% of federal lands are within Riparian Reserve Boundaries. Riparian Reserves overlie all other land use allocations. Outside of Late-Successional Reserves, 22% of the Federal land base is in Riparian Reserve (Map 3, Table 1).

Riparian Reserves include those portions of a watershed directly coupled 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 to benefit other riparian-dependent species and to retain adequate habitat conditions for dispersal of late-successional forest species throughout the LSR network.

Map 2, AOwnerships@ goes here

Table 1: Land Ownership and Land Use Allocation

Land Use Allocation	BLM	USFS	Total Federal	Private Industrial Forest	Other Private	Total Private	Grand Total
LSR	15,250	29,138	44,388 (72%)	N/A	N/A	N/A	44,388 (58%)
Riparian Reserve outside LSR	61	13,727	13,788 (22%)	N/A	N/A	N/A	13,788 (18%)
Matrix	17	3,914	3,931 (6%)	N/A	N/A	N/A	3, 931 (5%)
Other	N/A	N/A	N/A	4,130	10,089	14,219	14,219 (19%)
Total Acres (Percent of Total)	15,328 (20%)	46,779 (61%)	62,107 (81%)	4,130 (6%)	10,089 (13%)	14,219 (19%)	**76,326** (100%)
Percent of Federal/Privat e Ownership	25%	75%	100%	29%	71%	100%	

MATRIX

In this watershed, 3,931 acres or 6% of the federal lands in the watershed have been allocated to Matrix by the Northwest Forest Plan (Map 3, Table 1). 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. Most scheduled timber harvest takes place in the matrix.

PRIMARY ELEMENTS TO CARRY THROUGH THE ANALYSIS

_ Upper Lobster Creek is identified in the NFP as a key watershed (Map 6). It is one of three Key Watersheds identified for the Alsea Basin (Drift Creek and Tobe Creek are the other two). Upper Lobster Creek has had a significant amount of in-stream habitat restoration work done in the past, has been an ODFW Index Stream and OSU has conducted smolt and spawning surveys.

_ Within the Alsea Basin, the Lobster / Five Rivers watershed provides an important contribution to the populations of native fish. However, water quality problems, relating to stream temperature, have been documented in several sub-watersheds and along the main stems of both Lobster Creak and Five Rivers. The level of disturbance in the watershed has contributed to the degradation of quality habitat.

_ As a result of the Northwest Forest Plan, 94% of the federally managed land in the watershed is designated as either Late-Successional or Riparian Reserve (Table 1). Since the majority of this watershed is federally owned, the ability to manage late-successional habitat is enhanced. This watershed is centrally located within a much larger late-successional reserve system.

_ The Five Rivers area, particularly west of the river is noted throughout western Oregon for having good populations of Roosevelt elk and is one of the best hunting areas in the central Coast Range.

_ This watershed is highly productive and several commodities have historically been extracted. Within the last 50 years, billions of board feet of timber has been removed. Elk and fish are harvested on a regular basis. Mushrooms, moss and greenery are important forest products that are removed from this watershed. Emphasis on the maintenance of habitat for both terrestrial and aquatic dependent species has abruptly halted the extraction of forest products in this area. There are opportunities to manage for multiple commodities, however, the scale will be significantly reduced from past levels. There is also an opportunity to assess the transportation system necessary to facilitate the use and enjoyment of this area.

CHAPTER II: ISSUES AND KEY QUESTIONS

This step of the watershed analysis process helps to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed.

Five issues critical to the future management of this watershed were identified. They are:

_ **Protection or enhancement of wildlife habitat**
_ **Protection or enhancement of salmonid fisheries and aquatic species habitat**
_ **Stream Temperature limitations for fisheries**
_ **Production of timber in Matrix land allocations**
_ **Access within and through this watershed**

This list of issues was developed by the watershed analysis team with input from: local residents; BLM staff, Alsea Ranger District staff; ODFW; and USFWS

The following is a broader description of each issue and the key questions that pertain to each of the issues. The analysis team also formulated analysis questions or steps that were utilized to answer the key questions and respond to the issues. Those analysis questions are available in the Alsea Ranger District files.

Expected outcomes from this analysis, that result from each of the key questions, will 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.

Habitat for late-successional forest species has been altered substantially in this watershed. The patches of remaining mature forests are heavily fragmented and isolated. 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. The watershed has also been identified as an important area for elk and other species of concern.

KEY QUESTION: Do the changes in vegetative patterns, structural and compositional characteristics that have occurred on the landscape over the past century affect the long-term health and sustainability of forest conditions and its ability to function as suitable wildlife habitat? Terrestrial vegetation has been heavily altered by management activities over the past few decades and may be outside the range of natural variability for the Coast Range ecosystem.

OUTCOME: Delineation of priority treatment areas and identification of appropriate techniques to protect or enhance wildlife habitat. This will apply to lands within the LSR to improve the current and future condition of habitat for late-successional species, and to lands outside of the LSR for other species of concern.

KEY QUESTIONS: What is the current condition of late-successional species and habitat in the watershed? How does late-successional forest habitat in the watershed function in the larger landscape/regional context? Where and how can late-successional habitat within the watershed be improved in order to hasten the development of suitable habitat?

OUTCOME: Determination of the best remaining habitat areas, i.e. biological Ahot spots@. Delineation of priority areas for late-successional habitat restoration and the time frame required to achieve those goals.

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)?

OUTCOME: Determination of management objectives for different areas. Projection of future habitat condition based on management objectives. Delineation of conflict areas.

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.

KEY QUESTION: Have the changes in riparian vegetation characteristics over the last century affected the long-term health and sustainability of these areas and their ability to function as suitable habitat for terrestrial species? Riparian areas have a variety of functions for terrestrial and aquatic species and provide connectivity across the landscape.

OUTCOME: Determination of key areas to support terrestrial species connectivity

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. Anadromous fish species populations are depressed. Habitat restoration at the watershed scale is critical to protect or enhance 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: 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 Ahot spots@ and potential watershed scale refuge areas.

KEY QUESTION: Do the riparian areas currently provide for stability of stream adjacent slopes and supply coarse woody material to the stream channels? Riparian areas have been heavily impacted by management activities over the past few decades and may be functioning outside the range of natural variability.

OUTCOME: Delineation of priority areas for riparian restoration. Determination of areas lacking large woody debris (snags and logs >20@ dbh and >20= long or tall) in the streams and identification of areas lacking the ability to provide for future CWD.

ISSUE 3: High stream temperatures reduce water quality and affect beneficial uses.

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.

KEY QUESTIONS: Do high stream temperatures affect movement or distribution of aquatic species in this watershed?

OUTCOME: Fish species distribution in the watershed

ISSUE 4: Production of timber is an objective for lands designated as Matrix by the Northwest Forest Plan.

KEY QUESTION: What sustainable level of timber can be expected from this watershed (from matrix, from riparian reserves, from LSR)

OUTCOME: Determination of conditions that would trigger management activity - prioritized. A list of types of appropriate treatments. Delineation of priority treatment areas. Determination of the transportation system necessary to facilitate implementation of activities.

KEY QUESTION: How does the incidence of Phellinus influence management of commercial forest products or attainment of late-successional conditions.

OUTCOME: Management objectives for Phellinus root rot areas.

ISSUE 5: Access within and through this watershed is important to both the people living within the boundaries of the watershed and for people who use this area for recreational and business purposes.

KEY QUESTION: What role does the federal road system play in access to the area?

OUTCOME: Identification of roads of concern to local and extended users. Current condition of roads. Determination of the transportation system necessary to facilitate implementation of activities planned for the watershed.

KEY QUESTION: What are the major recreation (including hunting) resources and uses of the watershed? What condition are these resources in?

OUTCOMES: Display of historic and current recreation areas. Documentation of potential recreation opportunities.

ISSUES/QUESTIONS CONSIDERED BUT DROPPED FROM ANALYSIS

KEY QUESTION: What role does this watershed play in supplying "other" forest products i.e. mushrooms, greenery, firewood.

OUTCOME: Expected levels of yields of Aother@ forest products. Areas where extraction of products is appropriate/ inappropriate.

This question was dropped due to the recent Environmental Assessment done on forest products by the Forest (Siuslaw 1995).

CHAPTER III: REFERENCE RESOURCE CONDITIONS

This chapter develops reference conditions for various resources within the watershed. The purpose of this step in the watershed analysis process is to identify the dominant physical, biological and human components and processes active in the watershed that affect ecosystem functions or conditions. In future steps of the analysis, the reference condition will be compared to current conditions and used to explain how ecological conditions have changed over time.

This chapter is broken up into three main sections:

I. First is a characterization of the physical, biological, and social components of the landscape. It consists of the basic, underlying characteristics of the area and how they interact. For example, how does geology and climate work together to form stream density patterns or the potential vegetation that might be expected at a given site?

II. The second section characterizes the natural disturbance processes i.e. landslides, floods, fire and wind, etc. that were active on this landscape prior to European settlement. Understanding disturbance processes helps us to interpret the patterns and distribution of resources across the landscape.

III. The third section of this chapter establishes a reference condition for the patterns of vegetation on the landscape and the condition of terrestrial and aquatic habitat based on how natural disturbance processes influenced the basic resource components. The expected aquatic and terrestrial species that utilize those resources and their distribution are also documented.

I. CHARACTERIZATION OF RESOURCE COMPONENTS

PHYSICAL COMPONENTS

CLIMATE

The area is influenced by a marine climate. Winters are cool and wet, and summers are warm and dry. The average air temperature is about 53^o F with a range from an average low in January of 34^o F and an average high in August of 76^o F (USDA 1973). During the winter, considerable cloudiness and frequent rains occur as moist air moving in from the ocean rises and cools. The area receives 80 -120 inches of precipitation, mostly as rainfall occurring during the months of October through May. Monthly totals of 25 inches of precipitation during December and January are not uncommon. Usually rain intensities are low. Snow makes up only a small part of this total precipitation and generally is not persistent. Winds of gale force are less common than along the coast.

During the summer, this area generally is clear. If coastal fog and clouds penetrate this far inland, they usually dissipate by about midmorning. Only one tenth of the total annual precipitation is expected from June through September.

GEOLOGY

Geology and climate interactions create the physical elements of ecosystems. In the Oregon Coast Range, the temperate marine climate rapidly weathers the soft sedimentary rocks to form soils famous for their fertility. Permeable soils and high rainfall rates result in numerous landslides, the dominant landforming process in the physiographic province. The result is an erosion-sculpted landscape of steep slopes and high stream density.

The lithology of the area includes the following (Map 4):

- Tyee Formation **C** The Five Rivers and Lobster Creek Watersheds are largely underlain by the Tyee Formation, which is a thick sequence of rhythmically bedded medium- to fine-grained sandstone and micaceous carbonaceous sitstone. Shallow-rapid landslides are common on steep slopes; larger earthflows occasionally develop on low-angle slopes in thick soils. Boulders, cobbles, and gravels of this rock type break down in streams in tens to hundreds of years, depending on the rate of bedload movement.

- Igneous Intrusives **C** A large east-west trending igneous body (a massive gabbro) intrudes the Tyee Formation in the upper Lobster Creek valley, forming Prairie Peak. This intrusive is more resistant to erosion than the softer Tyee Sandstone around it, which explains its exposure as a prominent ridge. The steep flanks of Prairie Peak ridge have both massive earthflows (not active) and shallow-rapid slides. Gravels, cobbles, and boulders of this material are slow to weather and break, so stream sediments in the area have a high coarse particle size fraction.

  Numerous small igneous dikes intruding the Tyee Formation are probably equivalent to the larger Prairie Peak intrusive in both chemical composition and age. They are mapped on the ridges and in the stream channels, perhaps because they are most easily visible in those locations. These small features are likely to influence local geomorphology and stream channel conditions for the same reasons as their larger counterpart in the Watershed. Their resistance to erosion may help hold ridges higher than ridges without dikes. This resistance to erosion causes these small dikes to act as a local control of stream gradient, and can also cause local channel confinement. They are also good sources of durable sediments in streams.

- Siletz River Volcanics **C** An exposure of the Siletz River Volcanics, the oldest rock unit mapped in the Oregon Coast Range, occurs just north of Prairie Peak. A much larger exposure of this formation occurs just to the north, where Marys Peak is the most prominent feature. There is an unconformable contact between the Siletz River Volcanics and the younger Tyee Formation. The Siletz River Volcanics consists of massive and pillow basalt flows, pyroclastic units, and interbeds of basaltic siltstones, sandstones and local conglomerates. The varied lithology of this unit is more susceptible to erosion, and its weathering products somewhat less durable, than the intrusive at Prairie Peak.

_ Recent Sedimentary Units C Unconsolidated sedimentary units are found locally in the Watershed. There is a mappable occurrence of alluvium (river sediments) in the Lobster Creek valley easterly from the confluence of Preacher Creek. Because they are small, these units will only influence local groundwater flow and stream channel morphology. A landslide deposit (presently inactive) covering several hundred acres occurs to the south of the alluvium in the upper Preacher Creek drainage. Groundwater flow patterns on and around this deposit will likely not follow surface topographic features, as is typical of adjacent terrain.

Geologic structural features control some of the landforms found in the watershed. The Tyee Formation=s sedimentary strata exhibit a general eastward dip of about 19 degrees from horizontal in this area; the result of regional uplift driven by Continental Drift. The (relatively) flat-lying massive sandstone strata cause the low stream gradients typical of much of the Five Rivers drainage and the Alsea Basin.

Several northwest-trending faults have been mapped in the watershed. There is no record of historic earthquake activity or movement along these faults. Two northwest-trending anticlines are identified, based on locally measured dip angles on units of the Tyee Sandstone. The orientation of these features is consistent with others in the Coast Range. These structural features do not appear to significantly influence landforms or the frequency of landslide occurrences in their vicinity.

SOIL/CLIMATE ZONES

The soil/climate zones were developed to characterize differences in climate and soil moisture across the Oregon Coast Province (Siuslaw 1995). They consist of groupings of geologic and topographic landforms called Landtype Associations (LTAs) (Table 2, Map 5) that have similar geology, climate, and resulting soil type and drainage patterns. The Lobster/Five Rivers analysis area lies within two soil/climate zones. The Southern Interior Zone has greater fluctuations in soil moisture from winter to summer, due to somewhat more shallow, rocky soils and slightly less permeable bedrock than the Central Interior Zone. The Central Interior Zone has higher available water holding capacities throughout the year due to the deeper soils and more permeable bedrock.

Map 3, AForest Plan Land Allocations@

Map 4 AGeology@

Map 5 ASoil Climate Zones@

Table 2: Soil/Climate Zones

Soil Climate Zone	LTA	Acres	Fire Regime Type	Soil Moisture	Topography and Relief	Stream Pattern
Central Interior	3C1	23,033 (30%)	Infrequent Stand replacing	Wetter soils	Gentle terrain, low relief	Dendritic. High stream density. Numerous steep headwalls
	3C	21,660 (28%)	Infrequent Stand replacing	Moist soils	Gentle terrain, low relief	Same as above
	3L	20,813 (28%)	Human influenced	Wetter soils	Gentle, broad ridges and low relief	lower stream densities, dendritic
Southern Interior	3F	10,331 (14%)	Infrequent Stand replacing.	Drier soils	Includes Prairie Mt. High backbone ridges and steep terrain	dendritic, steep, highly dissected

Several Land Type Associations (LTAs) have been delineated within this watershed. In the area of Prairie Peak (LTA 3F), igneous intrusives dominate the landscape and control the density and character of the stream channels. The slopes are long and steep. Soils are gravelly and shallow. Impermeable bedrock controls local ground water movement, causing numerous drainages to develop.

North-west of Prarie Peak and in the Little Lobster sub-watershed (LTA 3L), the landforms are underlain by Tyee Sandstone. In this area of the watershed, however, the slopes are more gentle, shorter from ridge to stream and less highly dissected. Soils are deep and local groundwater storage potential is high.

In the Preacher Creek Area (LTA 3L), a large ancient landslide deposit dominates the landscape. Complex slopes characterize this area with short steep slopes intermingled with flat areas. Local ground water movement is unpredictable and seeps and springs can be found throughout. Drainage density is moderate. Soil strength in these old landslide deposits may be lower than in soils developed in place. As a result, susceptibility to both shallow-rapid and deep-seated landsliding is increased over that indicated by predictive models such as the one used later in this analysis.

The majority of the Five Rivers sub-watershed (LTA 3C and 3C1) is also underlain by Tyee Sandstone. Slopes in this area are somewhat longer than the Little Lobster area and the number of drainages is higher. Slopes are moderately steep. Local groundwater movement will generally follow landform patterns.

Although not delineated as a land type association, depositional features dominate in the valley bottoms. Deep, highly permeable soils are found in this area. Slopes are generally flat or very slightly sloping.

Understanding these delineations of the landscape is critical to understanding the dominant physical processes active on the landscape. These processes include: soil formation, erosion, landslides, groundwater and surface water flows, and fluvial transport and storage of sediment.

SOIL QUALITY

Soil productivity in this watershed is largely determined by soil organic matter levels and soil nitrogen levels. Soil organic matter levels remain fairly constant over time except in areas with surface soil disturbance. Soils on ridgetops (>1,750 feet) naturally have lower organic matter levels than at lower elevations. Soil nitrogen levels are maintained by additions through precipitation, nitrogen fixing plants, and decomposition of organic matter in soil. Soil nitrogen levels likely declined after severe fires.

HYDROLOGY

Five Rivers is a major tributary to the Alsea River. This watershed occupies 25% of the Alsea Basin. Two separate watersheds compose the Lobster - Five Rivers analysis area, the Lobster Creek watershed and the Five Rivers watershed (Map 6). Lobster Creek has 9 major subwatersheds, Five Rivers has 10 major subwatersheds. Appendix A displays acreage and percent of total watershed for each subwatershed. Most of these subwatersheds are hydrologic boundaries, however, a few have been divided based on the size of area for planning purposes. For example, the mainstems of Five Rivers and Lobster Creeks are divided into upper, middle, and lower sections when they are hydrologically one unit.

Rainfall which occurs in the winter is the dominant form of precipitation within the analysis area. Runoff patterns follow the maritime climate (Figure 1). Over 80 percent of the annual runoff occurs in the November through March period.

Map 6 ASubwatersheds and Streams@

Map 7 AMajor Streams@

Figure 1:
Stream Flow in Lobster/Five Rivers

STREAM NETWORK

There are nearly 900 miles of stream in the Lobster-Five Rivers Watershed (Map 7). The drainage pattern is mainly dendritic or trellis-dendritic. The frequency and form of drainages are related to soils and type of bedrock.

Streamflow in winter is large compared to that in summer and tends to respond quickly to precipitation except in early fall and late spring. Runoff in the fall remains low until soil becomes saturated and excess precipitation can drain. In spring, when precipitation is lower, runoff may continue to be high due to the drainage of excess water from saturated soils and seepage from fractured bedrock.

In order to relate physical channel characteristics to aquatic and riparian conditions, Ageomorphic segments@ have been defined. Geomorphic segments are a combination of

Map 8 AGeomorphic Stream Segments@

stream channel gradients and channel confinement classes (Montgomery 1993). Confinement is based on the width of the valley floor relative to size of the stream channel yielding Aconfined@; Amoderately confined@; and Aunconfined@ categories.

By integrating confinement with stream gradient, the resulting geomorphic segments can be grouped into functional groups (Map 8). The following functional groups relate to sediment and large woody debris routing through the watershed and indirectly to the distribution of aquatic species at one or more of their life-stages. For example, the less confined the channel and the lower the stream gradient, the greater the opportunity for the stream to meander and create diverse aquatic habitats, although terraces may constrain movement in some wide valley forms.

- **Source areas** - 8%+ gradient headwater channels, expect debris torrents and mass wasting. Occupies 54% of stream channels.
- **Transport reaches** - mostly 4-8% gradient range, narrow/mod confined areas - keeps sediment moving, short term storage of sediment, wood. Occupies 5 % of stream channels.
- **Deposition and Depositional Flat Reaches** - less than 4% gradient channels, primary area for sediment storage, pool formation, and diverse aquatic habitats. Occupies 8% of stream channels.

The geomorphic segment classification (Map 8) indicates that the watershed is dominated by source areas on the highly dissected hillslopes. However, depositional areas extend far into valleys supporting a large quantity of potentially diverse aquatic habitat. Of note is the fact that there are very few depositional areas in upper Lobster Creek. That area is dominated by source and transport areas. Most depositional areas occur on the west side of watershed, a result of the hillslope and fluvial processes interacting on the more erodible Tyee Sandstone. Further, LTA boundaries, drawn in part on the basis of stream density, follow these basin-scale differences.

BIOLOGICAL COMPONENTS

PLANT ASSOCIATIONS

The majority of this analysis area is in the western hemlock plant series. Plant series is a designation of the potential climax species that would dominate the site if allowed to progress through natural successional processes without disturbances. Plant series classifications alone, however, are not sufficient to characterize the analysis area. The following discussion on the groupings of plant associations provides a more complete assessment of conditions in the analysis area.

Plant Association Groups (PAGs) are combinations of plant associations (Table 3). Plant associations are finer scale classifications of potential vegetation communities. PAGs are

Map 9 APlant Association Groups@

useful in identifying differences in stand structural characteristics, species composition and successional pathways.

Table 3: Plant Associations Included in the Plant Association Groups (PAGs)

PAG	Common name for PAG	Environment	Slope Position	Plant Associations included in PAG
RUSP	@The Salmonberry PAG@	Wet	Lower slopes and riparian areas	_ TSHE/OPHO _ TSHE/RUSP _ TSHE/RUSP-ACCI
POMU	AThe Swordfern PAG@	Moist	Mid slope	_ TSHE/OXOR _ TSHE/POMU _ TSHE/ACCI-POMU
RUSP/ GASH	AThe Salmonberry-Salal PAG@	Dry	Upper slopes	_ TSHE/RUSP-GASH
GASH	AThe Salal PAG@	Dry	Upper slopes and ridgetops	_ TSHE/BENE _ TSHE/BENE-GASH _ TSHE/GASH _ TSHE/ACCI-GASH.
RHMA	AThe Rhododendron PAG@	Dry	Mid-Upper Slopes	_ TSHE/RHMA

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

The distribution of the plant association groups have recently been mapped and modeled for the Siuslaw National Forest and are being developed on BLM managed lands. For Five Rivers, the model predictions were field-verified and accuracy was determined to be relatively high. The model was then extended, based on topographic and aspect parameters, to BLM lands in the Lobster Creek sub-watershed. The only area not included in the model was Prairie Peak above 3000 feet. Because the vegetation sampling and model verification has not been completed for the Lobster Creek portion of the watershed, accuracy of the information on Plant Association Groups is only assured for the west half of the analysis area. The description of PAGs in Table 3 and the display on Map 9 comes from fieldwork, output of the PAG model and a brief review of published research on succession and characterization of the PAGs that occur in the watershed.

SUCCESSIONAL PATHWAYS AND STAND COMPOSITION

Successional pathways have been developed from examination of data summaries in the Plant Association Guide (Hemstrom and Logan, 1986) and knowledge of plantation success and reforestation difficulty in each of the PAG types. The flowcharts in Appendix C indicate the successional pathways we expect for species composition through time for three types of environments (dry, moist, wet). These pathways may be used to guide restoration treatments of plantations where the objective is to restore species composition common to natural stands of similar age. Due to lack of information, they should be regarded as hypotheses that need to be tested and present excellent opportunities for monitoring and adaptive management.

The Indian Deadwood Watershed Analysis and LSR Assessment are previous efforts that have examples of proposed successional pathways. For Lobster / Five Rivers the pathways are basically the same as seen in adjacent watersheds. However, some things are unique to this analysis area. The wet environments (indicated by the RUSP PAGs) appear to be dominated by conifer or a conifer/deciduous mix in early successional stage. Repeated successions of pure alder appear to be an uncommon occurrence under natural conditions. Small-scale disturbances common in floodplains do seem to be dominated by hardwoods & brush. Debris torrent areas and unstable wet slopes seem to have more hardwoods now. Early logging and homesteading in valley bottoms and lower hillslopes came back primarily as alder dominated stands . This has had a considerable effect, on many riparian areas where conifer are important for large woody debris and year round shade. The successional pathways for the dry and wet environments are similar to those outlined in the Indian Deadwood and LSRA documents.

From an ecological perspective, stand structure includes species richness, canopy cover and trees per acre. Richness is a measure of diversity which accounts for the number of species that occur. The drier PAGs tend to be more species rich in all layers but particularly in the herb and shrub strata. Richness increases greatly in the dry TSHE/RUSP-GASH and TSHE/GASH, where canopy cover is relatively low but tree density is relatively high. Shrub cover and density are both exceptionally high.

STAND STRUCTURE

A few clues about the previous stand (killed in 1868 fire) indicate it was old-growth that had a large cedar component. Numerous remnant snags 20- 40 feet tall and 50@ in diameter at breast height (dbh) are scattered across the eastern and southern portion of the watershed. These snags were apparently the seed source of the current understory which, where it exists, is almost exclusively cedar. Any Douglas-fir snags that could provide evidence of the forest structure previous to 1868 have decomposed beyond recognition while the Cedar snags and logs are still evident. Agricultural Homestead application reports in the Cascade subwatershed refer to Aheavy stands of Douglas-fir and western red cedar destroyed by fire@ (USDA 1908) and Athick stands of snags 36-144 inches in diameter (USDA 1914).

Upper Lobster provides three examples for the development of old-growth in the Coast Range. First, are stands with multi-layered canopies and large volumes of snags and down logs. Examples are in East Fork Lobster Creek which has old-growth Douglas-fir with understory western hemlock 20-30@ dbh. Cedar and western hemlock are equally dominant in the understory, and 115 yr. old Douglas-fir are found in gaps in the understory of these very old stands. In riparian areas in East Fork Lobster, cedar is the most common overstory species while Douglas-fir are senescing and contributing considerable coarse woody debris on the forest floor. Second, are the near-climax stands dominated by 450-500 year old western hemlock in South Fork Lobster. Third are a few underburned stands in West Fork Lobster which were on the perimeter of the Yaquina Fire, and developed into 2-storied stands after underburning. In these stands Douglas-fir dominate the overstory and western redcedar dominate the understory. Many of the older cohort of charred Douglas-fir >50@ dbh have been salvaged.

Table 4 displays some of the dominant stand characteristics found in different environments for old growth forests in the Oregon Coast Range (from Spies and Franklin, 1991), indicating the reference conditions of forests in the western hemlock series. For a comparison of mature to old growth structural characteristics see the LSR Assessment (Siuslaw 1996).

In addition, coarse woody debris on the forest floor is a critical component of old growth forests. For a reference condition, we refer to data collected by Spies et. al. 1988. Table 5 references the size and quantities of snags and coarse woody debris in the Oregon Coast Range for various age classes.

TABLE 4: MEAN AND 95% CONFIDENCE LIMITS OF SOME STRUCTURAL COMPONENTS OF OLD-GROWTH STANDS IN THE COAST RANGE BY MOISTURE CLASSES (From Spies and Franklin 1991)

STRUCTURAL COMPONENT	DRY	MODERATE	MOIST
Basal area of shade-tolerant tree species (ft^2/ac)	9.6 [0 - 47.5]	69.7 (26.1-139.4)	135.0 (43.6-274.4)
Basal area of shade-intolerant (Douglas-fir) tree species (ft^2/ac)	261.6 (147.8-369.7)	222.4 (117.5-322)	169.6 (17.4-317.6)
TOTAL basal area (ft^2/acre)	283.1 (200.4 - 405.1)	304.9 (222.2 - 418.2)	313.6 (196.0 - 500.9)
> 40 inches dbh Douglas-fir density (#/acre)	12 (4-23)	10 (4-19)	7 (1 - 10)
> 40 inches dbh total tree density (#/acre)	12 (4 - 23)	11 (4 - 21)	10 (2 - 25)
Density subcanopy trees (#/acre)	17 (0 - 59)	21 (2 - 61)	0

TABLE 5: SNAG AND DOWN WOOD IN THE OREGON COAST RANGE BY AGE OF STAND

AGE OF STAND	SNAGS PER ACRE (# of snags)		DOWN LOGS PER ACRE (# of pieces)		
	>20@	>20@ and >16 feet tall	12@-24@ diam	>24@ diam	Total Number
Young (<80 yrs.)	7	2	39	7	46
Mature (80-120 yrs.)	7	3	41	10	51
Old-growth (>200 yrs)	7	4	45	15	60

HUMAN COMPONENTS

We know little of the Native American influence on this watershed. The Kalapuya inhabited the Willamette Valley and coastal foothills while the Alsea were coastal, with permanent settlements at the mouths of major river drainages. The valley=s extensive network of wetlands and side channels once provided ideal nesting and overwintering habitat for millions of waterfowl and migratory birds, and also attracted large numbers of grazing animals, such as deer and elk. With so much bounty in the valley and along the coast, the Native Americans did not require permanent settlements in the interior of the Coast Range. Early records indicate the major river valleys were accessed from both the coastal strip and the Willamette Valley by a system of trails. The Alsea Valley likely served as a meeting or trading area for the two groups. There is no evidence that these tribes pursued any activities within the Lobster Five Rivers Watershed, however, it is speculated that early Native American uses of the drainage was probably limited to seasonal rounds involving harvest of plant and animal resources along Five rivers and Lobster Creek.

The limited documentation of native American use of these interior Coast Range areas comes mostly from early encounters with area pioneers. The contacts came well after the larger populations of native Americans had been reduced by exposure to diseases they had no resistance to and consequently the settlers were observing only a remnant of the previous culture. Since little is known about land uses employed by the native culture it is difficult to determine the human impacts on the landscape prior to the pioneer settlement era.

While the Kalapuya were known to have used fire in the Willamette Valley to create or enhance habitat for species central to their existence (camas, tarweed and grasslands for deer and elk), the Alsea did not burn and obtained most of their needs from their coastal environment and trading. It is possible that some fires, started by the Kalapuya during east wind conditions, may have come over Prairie Peak and burned portions of the watershed on a periodic basis.

II. NATURAL DISTURBANCE PROCESSES

FIRE

Fire has been the primary large scale disturbance event influencing the vegetation of the Oregon Coast Range. Lightning activity is low, but occasionally fires may occur during east winds and summer drought. Although infrequent, these fires generally were large, high intensity, stand-replacement fires when they occurred. A fire return interval cannot be accurately determined for the Oregon Coast Range because the fire record contains only one or sometimes two fire events in a given area, too small of a sample size to show a pattern. Consequently, fires are described as Aepisodic@ and are believed to be linked to climatic cycles, particularly periods of drought or extreme lightning activity. Fires are expected to occur less frequently than in the southern Cascades (150 years), but more frequently than in the northern Cascades (750 years). Most of the fire records for the Coast Range are related to post-European settlement, obscuring our knowledge of natural fire regimes.

WIND

Wind speeds in excess of 100 mph are regularly recorded during winter storms along the Oregon Coast and on the tops of peaks such as Prairie Peak, Cannibal Mountain, Grass Mountain, Klickitat and Marys Peak. These wind speeds often result in blowdown patches, particularly along forest edges and on the leeward sides of ridges where the eddy-effect results in erratic wind patterns. Blowdown also seems a common occurrence on lower hillslopes and streambanks which may have more saturated soils. As a result, wind disturbance is an important source of large woody debris in stream channels. Wind plays a role in creating small-scale disturbance patches throughout the watershed. Blowdown patches contain much higher levels of large woody material than the surrounding landscape and provide small openings for the establishment of shade-tolerant understory vegetation. These small canopy gaps are magnets for many species as they provide habitat diversity without major edge effects.

INSECTS AND DISEASE

Endemic levels of several insects and disease organisms are found throughout the watershed and are a critical component in creating stand diversity. Included are:

_ Laminated Root Rot (*Phellinus weirii*).

_ Brown Cubical Butt Rot (*Phaeolus schweinitzii)*

_ Douglas-fir Beetles *(Dendroctonus pseudotsuga)*

Phellinus is identified by a shoe-string like white fungus found at the base of the tree. Patches of *Phellinus* killed trees are circular in nature and the trees remain as standing dead snags for several years before blowing down. *Phellinus* is spread by root to root contact and is most aggressive in Douglas -fir stands.

Brown cubical butt rot is identified by the characteristic blocky to crumbly, brown-colored advanced decay bordered by reddish incipient decay and associated flat, brown fruiting bodies. Brown cubical butt rot is damaging mainly in fairly old stands. The pathogen is spread by windborne spores and gains entrance into the host via wounds and fire scars. Development of major decay columns takes may years. The disease is usually not a direct killer but, by causing heartwood decay in the butt and roots, it can predispose trees to breakage, windthrow, or attack by other pests. Brown cubical butt rot is best controlled by avoiding long rotations.

Douglas-fir Beetles (*Dendroctonus pseudotsuga*) are identified by their long, vertical adult galleries with alternating groups of horizontally branching larval galleries. For the most part, Douglas-fir beetles are not primary tree killers. They usually attack and breed in severely weakened or windthrow trees. However, if there are many such suitable trees in a stand, beetle populations may build up to high levels. The beetles then infest nearby healthy trees.

LANDSLIDES

Landforms in the Oregon Coast Range are the result of landslides and erosion (hillslope processes) and streamflow (fluvial processes), moving sediments from the slopes to the valleys and, eventually, out to the ocean. The rate at which these processes shape the landscape is dependent on climate, particularly rainfall levels and the physical properties of the soils and rocks in the area.

Landslides are a natural landforming process. The rate at which landslides occur under natural conditions is, however, difficult to determine. We assume that landslides occur at some low level under forested conditions, and at a higher level in response to disturbances such as wildfire and high intensity storms. Reliable occurrence rates after major natural disturbances have not been made; it is impractical to inventory landslides more than fifty years old and tie them to a particular storm or fire.

Most landslides in the Coast Range originate in small, unchanneled valleys, sometimes called Aheadwalls@, upslope from the inception of streamflow. Streamflow typically begins between 100 and 300 feet downslope from the ridge (Dietrich 1989). A headwall consists of a hollow bounded on either side by ridges, often with short sideslopes between ridge and hollow. The convergent topography of a headwall causes soil moving downslope (dry ravel and displacement during root throw events are the dominant soil movement mechanisms) to collect in the hollows, forming progressively thicker deposits.

This convergent topography also concentrates precipitation and groundwater toward the headwall axis causing high pore water pressures in the colluvial (transported) soils during storms. High pore water pressures reduce soil shear strength, which can cause landslides to occur. Thus, most shallow landslides in the Coast Range originate in the hollows at the heads of channels (Dietrich 1989).

Shallow, rapid landslides, occurring as described above, are called debris avalanches or debris slides (Varnes, 1978). These debris avalanches and debris slides usually initiate in unchanneled valleys with gradients steeper than 60% with the majority occurring over 70%(Sessions and others 1978). Montgomery and Dietrich (1988) show a clear inverse relationship between the size of unchanneled valleys and the local slope angle at the channel head. The smaller the area, the steeper the gradient. For the Coast Range, most hollows are between 0.18 and 2.5 acres in size with gradients ranging from 100 percent in the smaller hollows to 30 percent in the larger hollows.

Shaw and Johnson (1995) describe a method for using digital elevation data in standard ArcInfo analysis routines to model the association between particular landforms and landslide occurrence. The model differentiates convex, planar, and concave landforms in both the horizontal and vertical planes. When those landforms are further classified by slope gradient classes, the result is a display of areas with similar landslide susceptibility. Table 6 illustrates how slope forms have been rated for landslide susceptibility based on slope class. Map 10 depicts the susceptibility of particular area of the watershed to landslides and rates susceptibility as low, moderate or high. The landslide susceptibility map is not necessarily an accurate predictor of landslide occurrence under the particular site conditions created by roads and timber harvest which can significantly change groundwater availability and affect soil permeability and mechanical properties. The landslide susceptibility map provides a generalized view of where landslides are most likely to occur under natural conditions. It will help to focus field-based mapping and analysis of landform, slope, soil mechanical properties, and groundwater availability during planning for future management activities including identification of Riparian Reserve areas. Appendix D rates subwatersheds for landslide susceptibility.

Map 10 ALandslide Susceptibility@

TABLE 6: SHALLOW-RAPID LANDSLIDE SUSCEPTIBILITY MATRIX

Slope Form	Slope Gradient (percent)		
	<35%	**35-65%**	**>65%**
Convex	low	low	moderate
Planar	low	moderate	high
Concave	moderate	high	high

Gravity acts to move the slide material rapidly down channels as debris flows. Debris flows moving down channels pickup and incorporate the soil, rock, vegetation and coarse woody debris (CWD) from the stream banks, often resulting in many times the volume of the initiating debris avalanche. Debris flows generally stop moving when channel gradients are less than 10%. The distance debris flows will move downstream is a function of channel gradient and the angle at which the channel enters the next higher stream order. For example, where a tributary channel enters the main channel at angles (>60^0), debris flow material will deposit, sometimes damming the main channel. Where channels meet and the angle is less than 60^0, debris flows will move down the main channel until the gradient is less than 10% (Benda and Dunne 1987).

Slumps and earthflows, also called deep-seated landslides, are also found within the analysis area. They are generally slow-moving features ten to fifty feet thick, and may involve areas from less than one acre up to several hundred acres. This landslide type is generally active when precipitation is greatest, from December through February. These features may become active as a result of road construction and large-scale timber harvest. When the toe of a deep-seated landslide reaches a stream channel, erosion during peak flow periods can create a chronic source of sedimentation or sediment transfer.

FLOODS

Peak flows due to heavy rains and occasional rain-on-snow events usually occur in the late fall and winter. Large floods occur less frequently and result in more significant channel and riparian vegetation changes. In adjacent Coast Range drainages major events have occurred in 1964, 1974, and 1996. Five Rivers stream gauge reflects that a large flood occurred in 1972.

SEDIMENT ROUTING

Sediment reaches the stream system through hillslope processes (landslides) becoming debris flows. Following deposition, sediments move rapidly down channels with steep gradients (>20%) i.e. the steeper sections of ‘source’ reaches, usually within a year or two. Stream gradients between 20% and 8% i.e. the less steep sections of ‘source’ reaches, generally store sediments between flood events with a two to ten-year return interval. Where gradients are less than 8%, in ‘transport’ reaches, sediments are generally in storage for more than ten years. In depositional reaches, as velocities decrease in low gradient meandering depositional channels, sediment is deposited often remaining on flood plains until channel changing events occur. Sediments moves as bedload, and suspended load. Research on another Coast Range drainage, Rock Creek, indicates that 60% of erosion and landslide materials leave the stream system as suspended sediments (clays and fine silts). Viewed another way, only 40% of mass wasting products are available to become bedload and spawning gravels. (Dietrich and Dunne, 1978).

In watersheds underlain by the Tyee Sandstone, the percentage of substrate fines (predominantly sand but includes some silts and clays) can range from 20 to 30 percent, and the percentage of cobbles and boulders is generally low and absent in many stream reaches. Finer sediments are stored behind debris jams and in beaver ponds, and floodplains.

In reaches where gravels and cobbles are absent, LWD becomes a critical channel roughness component. As a whole, LWD provides a dominant roughness component to the channels. This material is derived from landslides and provided a means to retain and route the dominant size class of sediment which was sand. LWD also provided the mechanism to slow flood flow by spreading the flood waters out on floodplains where they occur. In so doing, the local groundwater table was recharged and the local floodplain built up with sediment.

SOIL COMPACTION AND DISPLACEMENT

Soil compaction, except for a few trails from humans and animals, was assumed to be minimal prior to 1900. Soil displacement occurred in the form of a background level of natural landslides and surface erosion (see above) aided by climatic conditions such as heavy rainfalls, windstorms, wildfires and other factors.

III. REFERENCE VEGETATION PATTERNS, AQUATIC HABITAT CONDITIONS AND SPECIES UTILIZATION

TERRESTRIAL VEGETATION

Vegetation is examined within the context of ecological processes, including disturbance and succession. This facilitates an increased understanding of the ecosystem necessary to accelerate the attainment of late-successional characteristics in plantations. In this analysis, we examined vegetation patterns at the landscape and stand level scale to provide recommendations for restoring vegetation structure within large patches and to guide stand level prescriptions.

Fire is by far the dominant disturbance process which effects vegetation patterns on the landscape scale. In general, a high intensity fire at any stage of stand development would probably return the site to the shrub/herb dominated stage of development. In contrast, small scale disturbances, like wind and laminated root rot, usually accelerate a site=s succession. AMulti-layered@ stands identified in the vegetation layer were examined in the field to interpret stand development, and these few stands all indicted evidence of intermediate disturbance (wind, root rot, underburns), which accelerated stand development toward late seral conditions (Franklin and Spies, 1991).

Following a major disturbance event such as fire, shrub fields may have lasted for many decades before conifers became re-established. The next stage (early seral) consists of stand initiation dominated by Douglas fir and/or alder seedlings and saplings. Given no further disturbances, single seral stages tends to dominate the landscape changing over time through the young, mature and old-growth seral phases. Alder tends to be an infrequent component of early seral stands, and is relegated to stream channels or frequently disturbed sites. For all western hemlock PAGs, the theoretical climax consists of all-aged stands of western hemlock or western hemlock/western redcedar. These high intensity conditions seem to be typical of the Five Rivers and Lobster Watersheds.

TERRESTRIAL HABITAT CONDITIONS

Based on remnant stands in and around the watershed, it is believed that the majority of Lobster and Five Rivers was in an old growth forest condition prior to European-American settlement and the Yaquina fire. The Federal Lands Assessment (USDA 1995) identifies this area as consisting primarily of jumbo patch sizes (>100,000 acres in size). An example of the reference conditions that one would have expected to find in this watershed can be seen in the remnant climax stands that exist in the upper Lobster drainage (400-500 years old). These stands have high percentages of shade-tolerant tree species in both the canopy and the understory with western hemlock being the predominant tree species. Stand diversity varies considerably by moisture condition, with sites on the side slopes of Prairie Mountain containing higher proportions of Douglas-fir in the overstory and western hemlock in the understory, while the riparian sites are dominated by western red cedar and western hemlock. Large logs and snags (>24@ dbh and over 20= long or tall) are numerous and the understory vegetation ranges from open, park-like conditions at the higher sites to brush at the riparian sites.

Since the seral class of vegetation was assumed to have been relatively homogeneous at any given time across the entire watershed, edge habitat was limited to vegetation type edges, such as hardwood-dominated riparian stringers intersecting the mature conifer stands. Severe edges, such as those associated with major stand age differences, were very limited in the watershed.

Hardwoods and openings were restricted to areas of disturbance, such as the riparian areas, blowdown, insect or disease patches or landslide tracks. It is hypothesized that less than 15% of the watershed would naturally be in hardwoods (Table 8).

Meadow habitats were small and localized to areas of beaver activity, such as old pond sites, and higher elevation ridgetops, such as Prairie Mountain.

TERRESTRIAL SPECIES DISTRIBUTION

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 European 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 1800s. 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 11 shows the vegetation types and their distribution in the watershed in 1914. Although the map shows some settlement-related fires, it gives us an indication of the patch sizes on the landscape prior to European settlement.

Wetlands were, and still are, often associated with beaver activity. These areas (Map 12) are dominated by hardwoods and brushy streamside vegetation and support a variety of species such as songbirds, waterfowl, amphibians, bats and aquatic species. Since the Coast Range and Willamette Valley lie along the Pacific Flyway, these wetlands were likely used extensively for overwintering and breeding.

Map 11 ΑVegetation in 1914@

Map 12 APotential Beaver Habitat@

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 1800s, prior to the arrival of European settlers. The Alsea and Kalapuya made regular hunting trips up the main river valleys in pursuit of elk and early explorers, such as the Lewis and Clark and Douglas expeditions, depended heavily on them for their survival.

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-1800s.

AQUATIC HABITAT CONDITION

Woody debris, sediments, and riparian vegetation interact with episodic disturbances, and the valley form to create aquatic habitats. Properly functioning habitat sustains a diverse community of aquatic and riparian species. In contrast, habitat that is not functioning properly lacks adequate habitat elements or processes to sustain aquatic plants or animals at one or more life stages. Some stream reaches or entire subwatersheds may not be functioning properly for seasons or decades in a reference condition due to disturbances such as wildfire or debris torrents. However, at the watershed scale the reference condition would be dominated by functional habitat.

Aquatic habitat will be characterized based on the following elements that are critical to at least one life-stage of most aquatic species (Table 7):

- Condition of streambed substrates
- Abundance of large woody debris (LWD) in stream channels
- Range of summer stream temperatures
- Area and quality of pools at summer and winter streamflows

CONDITION OF STREAMBED SUBSTRATES

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 the Prairie Peak and other igneous intrusives are slow to weather and break down, so stream sediments in these areas, particularly in the headwaters of Lobster Creek, have large substrate sizes.

Riffle substrates in deposition and depositional flat reaches in a reference condition are dominated by gravels and cobbles with small amounts of fine sediments, sands and silts (Table 7). This provides a properly functioning condition for fish spawning and egg development, food production, and sub-surface discharge. Adams and Beschta (1980) found the amount of fines (sand and silt) incorporated in riffles ranged from 10-30 percent for streams on undisturbed watersheds in the Oregon Coast Range. Sand and silt are dominant streambed substrates in quiet water habitats like beaver ponds, dammed pools, or off-channel alcoves where fines may be stored in the floodplain for years or decades Fine sediment is only temporarily stored in scour pools.

TABLE 7: 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 ^{o}C	7-day average of daily maximum temperatures between 15.5 and 17.8^{o}C	7-day average of daily maximum temperatures exceeds 17.8^{o}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

ABUNDANCE OF LARGE WOODY DEBRIS (LWD) IN STREAM CHANNELS

Interpreting the reference condition of riparian influence zones (within one site tree of the stream channel) is difficult due to the amount of human disturbance that has occurred throughout the watershed. An attempt at characterizing the amount of hardwood that would be expected in the riparian landscape was undertaken by the team. Assumptions used for this characterization are based on current levels of hardwoods in old growth and mature forests in the Coast Range and extrapolation of the natural condition across the landscape (based on 1934 and current air photo interpretation). Table 8 displays the results of that characterization. Deposition Flats have the most hardwood naturally in the riparian influence zones. Somewhere between 35% and 50% of these areas are expected to be hardwoods. This is due to a combination of the water tables expected in those areas and the frequency with which disturbance events such as floods and landslides influence these areas and establish conditions that result in hardwood dominance on those sights. For similar reasons, deposition and transport areas also have a relatively high hardwood component at about 25% of the area. No more than 10% of the riparian vegetation along source channels would be hardwood dominated. In source channels, hardwoods are restricted to narrow stringers along the active channel and are often completely absent where conifer-dominated stands extending right to the stream.

TABLE 8: HARDWOOD DOMINATED PORTION OF REFERENCE LANDSCAPE

Area	Percent Of Area as a Component of the Total Landscape	Percent of Area Hardwood Dominated	Percent Of Total Landscape In Hardwood Dominated Community
Source Reach	54	10	5
Transport Reach	5	25	1
Deposition Reach	4	25	1
Deposition Flats	4	35-50	1-2
Uplands	33	0-5	0-2
Total Landscape	100		8-11

An analysis done with the PAG Model also showed that the source areas were dominated by the moist and dry PAGs which have a much larger conifer component and that the transport, deposition and depositional flats were dominated by the wet PAGs which are more hardwood dominated. This distribution of environments and dendritic stream pattern lead us to believe that the vast majority of woody conifer material in the streams comes from the source areas in the watershed.

Table 9 displays possible characteristics of large woody debris in a reference condition. There is little historical information on abundance or distribution of woody debris in the Lobster-Five Rivers watershed. Table 6 presents a value of 80 pieces of large wood per mile (of key logs greater than 24 inches in diameter and 50 feet long) (NFP 1995 and NMFS 1996) but in the Oregon Coast Range large woody debris frequencies in old-growth forest streams can range much higher (ODFW 1995). This value may represent a properly functioning condition at the watershed-scale assuming the key logs are distributed with a variety of smaller size classes.

In a reference condition abundance and distribution of woody debris varies through time across the landscape as a function of disturbances in both stream channels and LWD source areas on hillslopes and stream banks. Following wildfires levels of large wood available for introduction to stream channels were high and would provide significant recruitment in the short term. In the reference condition, many channels already contained high levels of persistant 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 similar to levels of terrestrial coarse woody debris.

TABLE 9: REFERENCE CHARACTERISTICS OF LARGE WOOD AND EFFECTS TO SEDIMENT ROUTING AND CHANNEL MORPHOLOGY (from Nakamura and Swanson 1992; Bilby and Ward 1989, Stack and Beschta 1989, Montgomery and Buffington 1993, Leidholt-Bruner *et al* 1992, and Cederholm *et al* 1984)

	Source Reach	Transport Reach	Depositional Reaches	5+ order Depositional Reaches
Examples	All headwater streams	Upper Lobster streams, many 2-3rd order tributaries	Little Lobster, Green River, Preacher Creek	Mainstem Five Rivers and Lobster Creek
LWD Condition	Large wood bridging channel or laying into channel. Smaller, broken or decayed pieces lodged in channels with infrequent small jams	Log jams infrequent, but often large and long lasting, at tributary junctions , constrictions, and at gradient breaks. Also randomly spaced large wood bridging channel or instream collecting smaller wood.	Frequent log jams of conifer and hardwood logs with high size diversity. Large wood also randomly spaced at anchor points in meander bends.	Scattered large wood collects other LWD in complex jams at channel bends, high water mark, or nick points (channel roughness or gradient breaks).
Dominant LWD Recruitment Sources	Stream-side windthrow and landslide prone hillslopes.	Debris flows, windthrow and landslide-prone hillslopes, flood	Upstream from floods, stream-side windthrow, and debris torrents from face drainages.	Upstream from floods, streambank failure, and infrequent debris torrents from face drainages.
Sediment Routing effects	Minor sediment storage behind jams	Sediment storage above log jams.	Large wood controls sediment routing and storage in channels and on floodplains.	Sediment deposited temporarily at log jams; long-term in floodplains
Affects to Channel Morphology	minor channel widening at jams	Step pool formation, channel cutting around jams create narrow terraces. Beavers build dams	LWD commonly forms scour and dam pools. Channel interacts with floodplain and	Forms large scour pools, secondary channels form in wider valleys. . Channel interacts

		against LWD at lower gradients.	terraces at flood flows creating side channels and channel migration across valley floor. Beavers build dams above LWD.	with floodplain and terraces at flood flows creating side channels and channel migration across valley floor.

RANGE OF SUMMER STREAM TEMPERATURES

In the reference condition, a relatively continuous riparian canopy shaded stream channels creating cold stream temperatures optimal for native aquatic communities. Stream temperature is similar to the groundwater temperature, possibly in the 50 - 55 degree F range (10-15^0 C). 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.

Stream temperatures in some stream reaches or subwatersheds in a reference condition may be warmer than optimum for years or decades depending on the severity of disturbances affecting the riparian canopy and exposure of perennial channel. Debris flow tracks and channels stripped of adjacent riparian vegetation become points of stream heating. Large-scale wildfires would have the biggest effect on riparian vegetation and stream temperature in the watershed. For all levels of disturbance, cool water habitats in disturbed areas or surrounding undisturbed subwatersheds provided refuge areas for aquatic species. For example, despite the loss of canopy after a fire, stream temperatures in some channels may remain relatively cool due to secondary shading from higher levels of large wood and cool groundwater releases under newly formed logjams. This process of cooling is being exhibited in a large exposed debris jam at RM19.5 on Lobster Creek following the 1996 flood.

AREA AND QUALITY OF POOLS

Reference conditions for summer and winter rearing habitats for salmon and trout are displayed in Table 7. Deep pools with abundant woody debris create complex rearing habitats critical for salmon and trout. Large woody debris and beaver dams create slow water habitats, side-channels, and off-channel alcoves critical for winter fish rearing and amphibian breeding ponds. The frequency and area of pools is dependent on stream gradient and drainage area, generally as stream size (order) increases pools become larger but more infrequent (Stack and Beschta 1989). In smaller order channels large wood in the stream channel increases pool frequency (Montgomery and Buffington 1993).

Beavers have a profound impact on pool frequency and area in a watershed and dam activity is concentrated in smaller order deposition and deposition flat reaches (Beier and Barret 1987, Suzuki 1992). Map 12 depicts the potential beaver habitat in the watershed. Pool depth and complexity is also a function of the abundance of woody debris and sediment routing. Large pulses of sediment moving through a stream system can restrict pool depth and ultimately limit habitat capability (see Table 9).

SPECIES UTILIZATION

AQUATIC SPECIES

Fish species known or expected to occur in the Lobster-Five Rivers Watershed include: Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), and coastal cutthroat trout (*O. clarki clarki*). Spring Chinook are thought to have historically occurred in the Lobster-Five Rivers Watershed; however, it is unknown whether or not they are still present (Bob Buckman, Oregon Department of Fish and Wildlife, personal communication). Three species of sculpin (*Cottus aleuticus, c. perplexus, and c. gulosus*), speckled dace (*Rhinicthys osculus*), Pacific lamprey (*Lampetra tridentata*), and western brook lamprey (*Lampetra richardsoni*) also occur.

Aquatic species were well distributed in reference condition channels generally limited only by life-stage requirements (Table 10). Low gradient streams extend far into the valley headwaters and natural physical barriers are limited (Map 22). A falls at the mouth of Cascade blocked anadromous access. Falls in upper Five Rivers and Lobster Creeks and in some small tributaries also restrict access.

Fall Chinook salmon generally occurred in the lower to middle mainstem reaches of Five Rivers and Lobster Creek, as well as some of the larger tributaries such as Little Lobster Creek, Buck Creek, and Crab Creek (Map 7). Although not documented in surveys, fall Chinook also utilize the lower sections of other tributaries such as Green River, Camp Creek, and Preacher Creek. Spring Chinook may have been limited to more mainstem habitats with deeper pools. 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. All deposition, depositional flats and most transport reaches were utilized (Map 8). Cutthroat trout distribution overlaps those of Chinook, coho, and steelhead and extends beyond them into some of the smallest tributaries. Cutthroat populations below barriers are most likely sea-run and resident, while those above barriers are resident.

Anadromous salmon and trout distribution would be temporarily blocked in some streams from logjams, 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 infrequently. Habitat recovery is relatively swift.

Native aquatic species have evolved to accommodate these natural disturbance events through migration or rapid colonization.

TABLE 10: HABITAT REQUIREMENTS FOR KEY LIFE STAGES OF FISH SPECIES

(Habitat information based on ODFW (1995), Nickelson *et al* (1992), Meehan (1991), Trotter (1989), and Wydoski and Whitney (1979)

Species	Spawning or Breeding Habitat	Spring Rearing Habitat	Summer Rearing Habitat	Winter Rearing Habitat
fall and spring Chinook salmon	Abundant, clean, larger gravels in 4-6th order depositional flat reaches	Stream margins and backwater areas	Mainstem pools and deep riffles then migration to Alsea Bay; cool stream temperatures	No freshwater rearing
coho salmon	Abundant clean gravels in 2-4th order deposition & depositional flat reaches (sometimes in transport reaches)	Stream margins and backwater areas	Pools with woody cover in natal streams; cool stream temperatures.	Beaver ponds, dam pools, and off-channel quiet water habitats with complex woody cover. Migrate to winter refuge areas during fall freshets
Oregon coast cutthroat trout	Abundant clean gravels in 2-3rd order deposition & transport reaches (sometimes in lower source reaches)	Stream margins and backwater areas	Pools with woody cover; cool stream temperatures. May migrate downstream to mainstem habitats	Beaver ponds, dam pools, and off-channel quiet water habitats with complex woody cover. Migrate to winter refuge areas during fall freshets
Oregon Coast steelhead	Abundant clean gravels in 3-5 order deposition, depositional flat, and transport reaches	Stream margins and backwater areas	Pools with woody cover and deep riffles for 1-2 years; cool stream temperatures.	Clean cobble and boulder substrates or large wood complexes in pools and riffles.
lamprey	Clean gravel in 2-5 order deposition and depositional flat reaches	Backwater sand and silty areas for up to 6 years	Backwater sand and silty areas for up to 6 years	Backwater sand and silty areas for up to 6 years
speckled dace	Clean gravel and cobble in 3-6 order deposition and depositional flat reaches.	Stream margins and backwater areas	riffles and pools, cool to warm stream temperatures.	Clean cobble and boulder substrates in riffles and pools
sculpin	Cobbles and boulders or large wood in 2-5 order streams in all reach types less than 20% gradient.	Stream bottom substrates in pools and riffles	Gravel to boulder substrates in pools and riffles	Gravel to boulder substrates in pools and riffles

CHAPTER IV: CHANGES IN DISTURBANCE REGIMES

This chapter documents the changes in the disturbance regimes that have occurred in this watershed following European settlement. The basic resource components, i.e. climate, geology, potential plant communities, have not changed from the reference condition. However, changes in disturbance regimes effect the arrangement and distribution of resources that occur on the landscape today. Understanding this change both spatially and temporally helps in the interpretation of species responses to their current environment.

HUMAN INFLUENCE

Pioneer settlement in the two main river valleys of the watershed did not begin until the 1870s due to the remoteness and difficult access. Settlement of the Willamette Valley, the coastal zone and major river valleys to the north and south had progressed through the 1840s to 1860s, leaving very limited opportunity for acquiring suitable agricultural lands in western Oregon. The last push to homestead lands in this watershed came during the early 1900s. At that time economic conditions and the popular belief productive agricultural land was plentiful in the coast range led to settlement of the remote tributary drainages.

Crab Creek, Buck Creek and Camp Creek are examples of the few homestead locations in the larger tributaries that provided for a marginal existence and remain in private holdings. Smaller tributaries like Wilson Creek, Bear Creek and Cherry Creek were also settled but eventually reverted to federal ownership when homesteaders opted to sell out by the mid 1930s. A 1917 entry in the Land Classification for the Siuslaw National Forest said "the area has been so well combed by settlers that the possibility of any land of agricultural value is very slight".

SETTLEMENT-RELATED FIRES

Fire was often used by the settlers to clear forests for livestock grazing or homesteading activities. Prior to fire suppression efforts, most of these fires escaped and grew to larger proportions before they were extinguished by major changes in the weather (Map 13).

To examine the fire history of the watershed, we used fire history studies and historical documents of the fire history of the Coast Range (Juday 1977, Teensma 1989, Ripple 1994), and a series of 1939 aerial photos of the analysis area. In the field, trees were cored and rings on stumps were counted to determine the structure of mature and old-growth stands (ecological plots and Vegetation Resource Survey data).

Map 13 APost-settlement Fires@

As with the majority of the watersheds in the central Coast Range, the Lobster/Five Rivers drainage was affected by the Yaquina Fire of the 1868, which burned approximately 148,000 acres. It is believed that this fire resulted from homesteading activity in the Willamette Valley and along the Coast. The Five Rivers watershed lies at the center of the Yaquina Fire of 1869, where the fire was intense and stand replacing. The upper portions of the Lobster Creek subwatershed, however, lies to the east of the burned area, and was essentially untouched or only underburned by that fire. The Coast Range fires of the mid-1800s including the Yaquina (of which several fires from 1949-1868 share the name, Tillamook, Yacolt and others) were documented by early foresters (Munger, Isaac).

Following the Yaquina fire, other settlement fires reburned the lower and central portion of the Five Rivers drainage and the valley bottoms of Lobster Creek. A state map of vegetation patterns from 1914 indicates the northwest portion of the watershed was burned in 1914, a fire related to the Alsea Valley. Another series of settlement fires burned again in the early 1930s

When considering the practice of burning for site-preparation after logging, several areas in the watershed were burned 3-4 times since the mid-1800s, a twelve-fold increase over natural levels. This has resulted in a conversion of some areas from conifer-dominated stands to hardwood forests and has virtually eliminated the seed source for western hemlock from large portions of the Five Rivers drainage.

AGRICULTURE

Settlers during the period from 1870 to 1920 were interested in agriculture. Timber was removed on the flat portions of the homestead tracts to make way for crops and livestock grazing. "Stump Ranches" and "Slash and Burn Farming" were common terms applied to this form of subsistence agriculture. Most of the homestead locations had only a few acres of cropland and a small slashed and burned grazing area. Agriculture and livestock grazing was the primary means of subsistence for residents in the watershed prior to the onset of logging.

To this day, many of the private landowners in the watershed are direct descendants of the early settlers of the area. While homesteads were relatively large in the Lobster Creek subwatershed, early access was more difficult in Five Rivers and the settlements were generally smaller and confined to the narrow drainage bottoms. Many of the subsistence farms in the smaller drainages did not make it through the depression and were sold back to the government in the mid-1930s.

ACCESS

Initial access followed Indian trails inland from the coast and from the settlements in the Alsea and Siuslaw River Valleys. Wagon roads were built along the same general routes within a few years but were generally passable only during the summer months. A system of trails linking homesteads developed and a more extensive trail system was built and maintained by the federal land management agencies (FS, BLM) to service administrative sites and lookouts from about 1910 to 1940. The trails were slowly replaced by wagon roads and eventually automobile and truck routes. Access roads became more passable in the early 1900s as state and county routes were established and maintained using taxpayer money. However, road access to homesteads in the watershed was minimal and relatively primitive prior to the 1930s, with some areas only accessible during the dry season. Roads from the Alsea and Deadwood areas and inland from the coast developed between 1910 and 1940 with gravel replacing dirt.

Following WW II, the extensive road system now in place developed as a means to access harvestable timber. Extensive road systems beyond settlement and agricultural transportation needs were not in place prior to the era of industrial logging. As an example 1924 Siuslaw NF statistics listed 218 miles of trail and 100 miles of roads on the forest. By 1994 there were 2400 miles of road and 117 miles of trail (Map 14).

QUARRIES

A few quarries are within the watershed boundary. One large quarry is found on Klickitat Mtn., others are on Prairie Peak. Due to the limited quantities of hard rock sources in this area, these are important hard rock sources. The material quarried from these sites can not only benefit sediment control following road construction, but also provide a source of large coarse fragments for fish habitat restoration work.

TIMBER HARVEST

Prior to logging road access, numerous timber claims were established with the expectation of income from logging. Most of these claims reverted to federal ownership without being logged. Even though the homestead era has been fairly well documented the real effects on lands now in federal holdings was short term and not nearly as extensive as the later impacts of road building and timber harvest.

Early uses of the forest resources for subsistence income and personal use included logging of cedar for shakes, collection of cascara bark and logging/milling small quantities of lumber for construction of buildings. Logging did not develop as an industry until about 1940 when mills were established in upper Lobster valley and upper Five Rivers. Building of roads and logging of the low lands followed. Logging activity peaked on private lands during the 1940s and ›50s. While reforestation was practiced on many of the industrial forest lands, many of the smaller in-holdings were left to seed back naturally following logging and most of these lower valley areas came back to alder or mixed conifer / hardwood stands. As with the agricultural history, forest management practices started early in Lobster Creek and was generally on a larger scale than in Five Rivers, due in part to the large industrial timber ownership blocks, checkerboard BLM lands and early access.

Small communities, such as Fisher and Paris in Five Rivers and Hazel Glenn and the mill town in the Lobster Creek drainage, were thriving settlements during the early logging days. They were primarily associated with the active mills and were often self-sufficient, with schools, stores, company housing, grange halls, churches and small cemeteries.

Commercial harvest moving upland to the federal government holdings by the early 1950s (Map 14). Logging activity steadily increased and experienced major peak during the ›70s and early ›80s on federal lands. Logging in the Lobster drainage focused primarily on the remnant old growth stands and by the mid-1970s the majority of these forests were gone. Large scale timber harvest and road building continued through the 1980s, though the mills in both major drainages closed and logs were trucked to mills in the Willamette valley and along the coast. By the late ›80s and early ›90s, the private stands were being harvested a second time, while logging on federal lands slowed to a stand-still due to court injunctions related to environmental concerns.

Removal of cedar for shakes was a wide-spread practice in this watershed. Live cedar trees, blowdown, wood from landslide deposits, and snags were removed for shake material in the 1970s and early 80s. Much of this material was helicopter logged from stream channels. In addition to removal of large woody material from cedar salvages, the Forest Service and the Bureau of Land management actively removed log jams and clean out streams in what was considered at that time Abest management@ to improve stream channel habitat for fish. Large wood was also removed as a result of road-side salvage and Ahazard@ tree removal.

RECREATION

Dispersed recreation in the form of hunting, fishing and gathering of forest products is currently and historically the primary recreation use. The biggest change over time is access to the interior forest provided by logging road construction. There is no developed recreation within the watershed.

The primary recreational activities in this watershed are hunting and dispersed recreational activities such as driving and sightseeing. These activities are seasonal and occur mainly during the summer and fall. Berry picking, fishing, camping, and other activities occur on a limited basis. Prairie Peak is an important local hang-gliding area.

Map 14 ATimber Harvest and Road...@

INSECTS AND DISEASE

Insect and disease surveys were conducted on the Alsea Ranger District in the fall of 1982, 1984, and 1985. The following species were documented:

Laminated Root Rot (*Phellinus weirii*). In the Deadwood area surveys, the most commonly encountered and damaging forest pest was laminated root rot (Phellinus weirii). Laminated root rot centers encountered in the surveys contained both dead standing trees and windthrows. Many root rot pockets were difficult to detect from a distance because down trees were hidden by heavy underbrush. Also, a substantial proportion of the large disease pockets had been salvage-logged in the past. Of the 28 surveyed stands, only three stands had no disease, six were lightly diseased (< 10% of area), six were moderately diseased (10-25% of area) and 13 were severely diseased (> 25% of area). Overall, compared to other areas in Region 6, these disease levels are extremely high.

In Douglas-fir plantations adjacent to the surveyed stands, many were already exhibiting very spectacular evidence of disease (Goheen et al., 1982). Goheen et al., (1982) report that laminated root rot can spread radially one foot per year.

Brown Cubical Butt Rot (*Phaeolus schweinitzii*). Most surveyed stands in the Deadwood area contained some Douglas-firs infected by P. schweinitzii.

Douglas-fir Beetles (*Dendroctonus pseudotsuga*). Scattered dead standing Douglas-firs that had been infested by Douglas-fir beetles were found in many of the survey stands and concentrations of infestation were observed in the Divide Up and Divide Ridge Timber Sales. In the survey areas, beetle-caused mortality was most common near steep slopes where there was evidence of substantial amounts of past blowdown, in disturbed areas along roads, and in and around laminated root rot centers.

LANDSLIDE - EROSION RATES

Slope stability analyses methods and predictive models cannot predict exactly where or when a landslide will occur. We can, however, identify areas in a watershed where landslides are most likely to occur, based on landslide inventory information. Since we know that landslides are usually associated with hollows or unchanneled valleys in the Coast Range, and that they generally occur on slopes steeper than 60 percent, we can consider those areas most likely to fail some time in the future.

The Landslide Susceptibility Map is not necessarily an accurate predictor of landslide occurrence under the special site conditions created by roads and timber harvest, which can significantly change groundwater availability, and even affect soil mechanical properties and permeability. The Landslide Susceptibility Map provides a generalized view of where landslides are most likely to occur under natural conditions. It will focus field-based mapping and analysis of landform, slope, soil mechanical properties, and groundwater availability during planning for future management activities.

Most watershed- and landscape-scale landslide inventories are done by interpreting aerial photographs. Since air photos have only been available since the early 1940s, the period of record is relatively short. Timber harvest and road construction have been increasing since the 1950s further reducing the ›sample base= of undisturbed land. It is also difficult to see the ground through the tree canopy on air photos, so the inventoried number of naturally-occurring slides is always thought to be lower than actual numbers. Some researchers have estimated that the actual number of naturally-occurring landslides is 50 percent higher than inventory figures. Some inventories do not identify natural landslide occurrences.

Photo-interpreted landslide inventories for the Five Rivers (Forest Service) and Lobster Creek (BLM) watersheds identify very small numbers of naturally-occurring slides over 30+ year and 45 year periods, respectively. BLM inventories for this area, suggest that management-related slide occurrence rates are between 4 and 40 times greater than natural rates; Forest Service inventories have no natural rates for comparison. While the rate of management-related increase may not be based on realistic natural occurrence rates, we can safely say that the rate of landslide occurrence increases after land management activity. This conclusion is supported by numerous published studies done from the late 1970s to present.

Figures 2 and 3 illustrate the Forest Service (Five Rivers) and BLM (Lobster Creek.) slide inventory results. Both graphs indicate an apparent downward trend in the number of road-related landslides from the late 1960s and early 1970s respectively, while the number of harvest-related slides has stayed in the same range during that period. No consistent relationship is apparent between the number of landslides found after the major storm/flood events of 1964 and 1974. It is tempting to conclude that the reduction in the number of road-related landslides is the result of improved road location and construction practices implemented in the mid 1970s. Further analysis of this data together with studies of the effects of the 1996 storm should be done before we feel comfortable with that conclusion, however.

Figure 2: Landslide Inventory USDA-FS

Figure 3: Landslide Inventory USDI-BLM

The lack of LWD is considered a significant problem in many stream reaches. Landslides and their resultant debris flows (debris torrents) in the ›source= and ›transport= reaches are the primary delivery mechanism for LWD in the Coast Range. So, landslides must be seen as a natural process with an important function in the riparian and aquatic ecosystem. Our goal should be to keep the number of landslides within a range of natural variability, not to prevent their occurrence. Insuring that landslides function as in nature is also part of our goal. Roads crossing stream channels should be designed to allow debris flows (torrents) to pass over and reach the stream, delivering all the sediment and organic material they carry. LWD functions best when delivered during peak flows, so that the streams can distribute them and begin the complex processes of erosion and sediment deposition.

SEDIMENT ROUTING

Routing of these landslide sediments through the stream system may have also been changed from reference conditions. The reference condition shows wide, unconfined channels with wide depositional floodplains low in the system. When determining valley confinement, attention has to be paid to the stream channel form. It is possible to have moderately wide channels in wide valleys that should be unconfined by definition but, if the channel is entrenched due to down cutting through older deposits and the channel is not interacting with it=s flood plain, then it would act like a confined channel. Currently, depositional reaches in the Lobster-Five Rivers watershed become progressively more constrained by streamside terraces as they flow downstream and stream order increases. This entrenchment of the stream channels in the unconfined valley floor limits flood plain width and channel migration. Channel entrenchment is low to moderate above Summers Creek in Five Rivers and, with some exceptions, it is high downstream of Green River. Lobster Creek is normally moderately to highly entrenched below Little Lobster Creek.

CHAPTER V: CURRENT CONDITION, SYNTHESIS AND INTERPRETATION OF RESOURCE INFORMATION

In this step of the analysis, current conditions were compared to reference resource conditions. This chapter documents the current range, distribution, condition and trend of various resources within the watershed.   An effort is made to explain significant differences or similarities in ecological processes and / or patterns and related resource or species trends and their causes. By relating this information, a determination can be made about the capability of the system to achieve key management plan objectives.

This Chapter is organized according to the five issues and attendant key questions that were presented in Chapter II. The watershed analysis up to this point has captured the key components of the resources or the key processes that are important to understand in order to answer the key questions for each of the issues. This step in the process synthesizes and organizes that information by issue.

The five issues critical to the future management of this watershed that were identified are:

_ **Protection or enhancement of wildlife habitat**
_ **Protection or enhancement of salmonid fisheries and aquatic species habitat**
_ **Stream temperature limitations for fisheries**
_ **Sustainable production of timber in Matrix land use allocation**
_ **Adequate access within and through this watershed**

ISSUE 1: PROTECTION OR ENHANCEMENT OF WILDLIFE HABITAT

A. VEGETATION PATTERNS, STRUCTURE AND COMPOSITION

1. ECOLOGICAL UNITS

To understand the relationship between abiotic and biotic factors in the watershed, we examined the physical characteristics, and biological response to them (Table 11). We assumed that the unmanaged, or natural, vegetation in the 1939 photos is typical of pre-logging vegetation over the past several centuries. The difficulty with that assumption the 1939 and 1950s photos both show recent fire near areas of homesteading in large river valleys, and, therefore, the influence of post-European settlers could have increased fire frequency and severity and altered vegetation patterns beyond conditions that occurred under aboriginal influence.
To understand the vegetation and how it relates to ecological units, we try to identify which of the vegetation characteristics are features that result from disturbance, and which are intrinsic to the environment. For example, in Cascade, Elk and Bear Creek subwatersheds (3C and 3C1) we expect only a small hardwood component due to the environment. Because we find a large component there, we attribute it to the 1914 fire and assume it was a reburn 40 years after the Yaquina Fire.

TABLE 11: BIOLOGICAL RESPONSE TO VARIOUS LANDTYPE ASSOCIATIONS (LTAS)

LTA	Biological Response
LTAs 3C1 and 3C	Wet environment 26% Moist environment--48% Dry environment--12% Salmonberry and swordfern PAGs are widely distributed over the unit. The dry environments have a low distribution and occur in small stringers along ridgetops. The wet environment extends high up on dissected slopes
LTA 3L **LTA 3F**	Wet environment--27% Moist environment--52% Dry environment--22% Somewhat drier due to shallower soils. Alder are a small component of stands. Wet environments occur more closely adjacent to drainage networks so we expect primarily confers in the riparian/stream influence zone.

2. EFFECTS OF SETTLEMENT FIRES

This section examines the effects of the 1868 and 1914 fires in the analysis area in terms of fire severity, regeneration patterns, and stand structure and composition that developed after the fires (Table 12).

The 1939 aerial photos indicates that the northwestern portion of the watershed regenerated after the Yaquina fire as a single aged cohort of Douglas-fir. In Upper Buck, Crab, Middle and Upper Five Rivers and Green River (southern portion of LTA 3C1) the conifer regenerated rapidly and resulted in a smooth blanket of even-aged and even-sized Douglas-fir across the landscape.

Surviving Aremnant@ trees from older age cohorts are found in clumps in sheltered valleys or individually along creeks. Near the eastern edge of the fire perimeter, some old-growth remained unburned i.e. East Fork Camp Creek. Old-growth is found in the riparian areas extending from Five Rivers to Crooked Creek. Remnant Douglas-fir survivors of the fire remained along the southern watershed boundary from Taylor Butte to the headwaters of Lord Creek. The lack of remnant trees in the center of the burn is probably due to higher fire intensities.

Following the Yaquina fire, the forest regenerated over approximately 30 years. The fairly rapid establishment of these stands seems to have occurred regardless of the distance from living seed sources. Written accounts of the Tillamook fire describe the survival of viable seed in cones high in the forest canopy which were scorched, but not consumed. Another possible explanation for rapid tree establishment is the short-term survival of trees scattered across the burn. Although healthy trees may survive in exposed conditions for many years (Franklin 1963), fire damaged trees have been observed to die within a few years after a fire due to stress (Agee and Huff 1987) and/or

TABLE 12: VEGETATION STRUCTURE AND DISTURBANCE HISTORY IN LOBSTER/FIVE RIVERS WATERSHED

Fire History and Potential Regime	Effects of 1850s Fire Severity and Regeneration	Structure of Mature and Old Growth Stands	Pre-logging Landscape Structure (in 1939 aerial photos)
Stand replacing, infrequent fires with jumbo patch sizes.	North of Fisher: Conifer regeneration occurred more slowly than immediately to the south due to apparent lack of seed source. Age span 110-150 yr. South of Fisher: A single-cohort about 125 years old. More even-aged and sized stands than immediately to north apparently due to rapid regeneration.	North of Fisher: (Burned again in 1914). Large open grown trees, especially on upper 1/3 of ridges (first regeneration after fire) South of Fisher: Many 50@ dbh cedar snags from 1850s fire. Little understory conifer. Western hemlock regeneration on down logs. Low CWD.	Large patches of alder (with Douglas-fir only in creeks.) Large patches of even-aged 18-28@ dbh Douglas-fir. Large patches of pure conifer stands with small and medium sized patches. of alder.
Highly variable. Difficult to separate human from non-human influence	Unknown. Heavily influenced by aboriginal and early post-European settlement activities.	North of Lobster Cr.: (Burned again in 1914). Considerable alder with stringers of old-growth conifer in creeks. South of Lobster Cr.: Conifer with old-growth remnants.	North of Lobster Cr.: Medium sized patches of old-growth, mature conifer and conifer pole. South of Lobster Cr.: Fairly large patches of conifer. Also some large patches of alder.
Highly variable. Difficult to separate human from non-human influence	Fire has been absent for a few decades, especially in creek bottoms. Unaffected by 1850s fires. Underburning evident in some stands. Climax forest conditions in riparian and some upslope stands.	Old-growth with multi-layered canopies. Second story 20-30@ western hemlock and western red cedar. Underburning on Yaquina fire perimeter created 2-storied stands.	1939 photos not available for this area

from outbreaks of Douglas-fir beetle (*Dendroctonus pseudotsugae*) which breed in snags. Survival for only two years after the fire would be sufficient to ensure a large Astress crop@ of Douglas-fir seeds. Douglas-fir seed crops appears to be periodic and the seed crop often occurs uniformly over the Pacific North west region (Isaac 1943).

The current seral condition, north of Fisher, in Cascade, Elk and Bear Creek drainages includes a higher proportion of pure hardwood and hardwood-conifer mix (primarily alder and big leaf maple), which likely resulted from the reburn in 1914. The documentation for this historical map is minimal; however, the legend indicates the burned area was planted. The conifer regeneration was patchy in the area, possibly due to lack of conifer seed source. On the other hand, since red alder is a prodigious seeder almost every year, it may have had an advantage over the Douglas-fir, which may have had delayed regeneration after the first fire (Newton et al. 1967).

Vegetation structure for the Lower Lobster Creek subwatershed in early aerial photos (1939) indicate primarily mature Douglas-fir with scattered remnant old-growth especially in riparian areas. The area was at least partially reburned in 1914. The valley floors of Lobster and other major creek bottoms had been cleared and were being managed as pasture. The Little Lobster and Lower Middle Lobster subwatersheds had considerable alder with stringers of old-growth in the riparian areas. In the Middle Lobster, Preacher, East Fork, West Fork and Upper Lobster

Creek subwatersheds, the landscape was dominated by conifer with scattered old-growth remnants, and some large patches of alder.

Various portions of Five Rivers have large 125-year old Douglas-fir which resemble remnants but are trees that regenerated and grew rapidly after the fire. They are often located on or near the tops of ridges and have large branches and flat tops indicating they were grown in the open. These may be the seed source for the slightly younger trees (95-years old) lower on the ridges. These larger trees add considerable diversity to the structure of the stands, which will probably develop old-growth structure more rapidly because of their presence.

An absence of regenerating western hemlock in the understory of mature Douglas-fir stands is notable in Five Rivers. The understory seems to be slowly filling in from the outer fire perimeter. This indicates there was a lack of seed source available at the time of the fire or western hemlock seedling success was poor. Western hemlock, which has a slower rate of growth than Douglas-fir and begins to produce seed at a later age than Douglas-fir (Minore 1979) tends to not establish as quickly or abundantly on reburns (Gray 1990). Another possibility could be droughtier soils or hot burn/reburns or due to degraded soil conditions, since hemlock is less drought-tolerant than Douglas-fir.

In summary, following large scale fires - either natural or human caused, the forest is reestablished in a relatively even age-class. Over time, late-successional forest conditions would dominate the area.

3. EFFECTS OF COMMERCIAL LOGGING ACTIVITY

Commercial logging on Federal lands has changed the vegetative patterns on the landscape in a completely different way than historic or even the settler influenced fires. Map 15 and Table 13 display the managed stands within the watershed by age class. Each of these age classes have different current conditions that are itemized below.

Managed Stands 0 to 10 years of age, Years of Origin 1986-1996:

Most plantations have an average of 250 Douglas-fir per acre. These trees were planted at a 10 x 10 (435 TPA) or 11 x 11 (353 TPA) spacing and are fairly evenly spaced. The silvicultural objective was to regenerate 250 conifers per acre by age 10. Red alder is the dominant hardwood. In areas where competition from alder or salmonberry prevented successful regeneration of Douglas-fir, hemlock was often prescribed either in the first planting or in a subsequent replanting.

Post harvest management activities included hand slashing, burning, forage seeding for big game, occasionally some vegetation management seeding, fertilizing, mountain beaver trapping, tubing, grazing (usually 2 to 3 seasons), and brush release all prior to the 5 year exam. Forage seeding was predominantly for elk winter forage consisting of annual ryegrass, perennial ryegrass, orchardgrass, white clover, subclover, and big trefoil.

Managed Stands 11 to 25 years of age, Years of Origin 1971-1985:

The majority of the trees in this age class are between 9@ and 12.9 A DBH, the average diameter of this stand is 9.5@. The mean site index for this stand is 156. The height of the tallest 40 trees is 82.4 feet. The mean crown ratio is approximately 26%; crown closure is about 85%. Western hemlock, red alder, and bitter cherry are minor species in the understory having heights of 60= or less.

Most of the measured trees have crown ratios, or percent live crown, between 21-40%. Crown ratio is an indication of the vigor and growth of a tree. Trees with crown ratios less than 30% are generally considered beyond having the capability to respond to management activities.

In most stands, site preparation prior to planting consisted of spraying and burning. Seedlings were tubed to protect from animal damage subsequent to planting. Supplemental reforestation with species other than Douglas-fir (hemlock or cedar and occasionally spruce) was occasionally employed. Hack and squirt prescriptions for alder control was common. Sheep grazing was occasionally employed as an alternative to chemical management of vegetation, i.e., Denzer 1-72 (CI).

Map 15 AManaged Stands on Federal Lands@

The plantations in the watershed have had similar past management (clearcutting, burning) which simplifies their structure in many ways. By age 20 the species diversity in plantations is already expressing itself and giving clues to the potential for further diversifying on the basis of natural succession.

Managed Stands 26 to 40 years of age, Years of Origin 1956-1970:

The stands ranged in site index (SI) from lows of 102 and 121 in Cascade Creek to highs of 150 and 163 in Upper and Lower Buck Creek subwatersheds. The average SI for all stands was 147 indicating generally high site conditions in the watershed analysis area. The quadratic mean diameter was 10.9 inches DBH. The average height of the trees is 89.8 feet. The mean crown ratio is .362. On the average, about 250 trees per acre of all species occupy the sites. Other conifer species included western hemlock and western redcedar. Hardwoods species included alder, big leaf maple, and some bitter cherry.

TABLE 13: ACRES OF PLANTATION BY AGE FOR EACH SUBWATERSHED

Subwatershed	1-10 years	11-20 years	21-40 years	>40 years
Bear	107	91	401	8
L. Five	531	40	723	13
M. Five	289	304	709	25
U. Five	469	823	1355	120
Elk	82	86	109	0
Cascade	311	399	883	11
L.Buck	339	297	996	0
U.Buck	150	517	803	0
Crab	393	808	1111	10
Green	283	588	1913	318
L.Lobster	521	516	755	7
Camp	146	250	810	6
Preacher	139	512	971	179
LMLobster	229	362	594	46
MLobster	506	380	591	0
LitLobster	331	429	168	2
WLobster	0	74	274	0
ULobster	78	450	1220	291
ELobster	143	356	1502	0

Tree density in 30 year old plantations in the analysis is around 200-300 trees per acre. Because of higher initial density of planting and subsequent earlier crown closure, the process of stand biomass development has been accelerated so that in plantations crown stabilization occurs at about 36 years. In contrast, it occurs some time after 60 years in natural stands. Accelerating stand development by higher stocking has been well understood in forest mensuration for many years, but the effect on understory development (shrubs and herbs) and succession has not been so well considered. It seems clear, however that thinning treatments positively affect the shrub and herb diversity as well as tree size.

A portion of the mature (20@ dbh) Douglas-fir stands in this area were commercially thinned in the 1970s to increase tree growth (map 16). Thinning of forest stands in the dry environment, tends to keep salal dominant and understory species such as herbs and mosses suppressed. The stands were thinned from above and below and Douglas-fir were favored in the prescription. Understory conifer development is absent and the understory is dense with shrubs, especially salal. There is very little compositional and structural diversity in the stands due to the thinning treatment and the competition the brush poses to understory conifer and herb regeneration. A few western hemlock have regenerated on decomposing logs and snags.

Eventual canopy closure will probably shade out the salal and provide for more species diversity. The widely observed restriction of juvenile western hemlock to nurse logs (Franklin and Dyrness, 1973, Harmon and Franklin 1986, FEMAT 1993) suggests that its recruitment and survival may be dependent on logs in various states of decay. Decaying logs provide elevated safe sites in a forest understory where seedling establishment is otherwise thwarted by litter burial. Age class distribution of juveniles at any one time (and consequently much of the likely future status of the species in the community) becomes of function of the woody debris turnover since this determines the relative area of the forest floor covered by each decay class of wood (Franklin and Hemstrom, 1981). In addition western hemlock, spruce, and western red cedar routinely establish on wood debris in the Pacific Northwest (Franklin and Dyrness, 1973).

In summary, changes in vegetation over the past century is directly related to human-caused fires, agricultural and forest management practices. This shift in seral types and patch sizes has set the vegetation on a different trajectory than would have been seen after a natural disturbance event. While the natural trend would have been a gradual increase in the amount of mature forests on the landscape over time, this vegetation type has decreased dramatically since the turn of the century. In contrast, the amount of early seral habitat and younger forest types have increased and are currently represented at levels which would never have occurred under natural conditions (Table 14).

B. WILDLIFE HABITAT CONDITION

1. SERAL CLASSES

Approximately 30% of the watershed is in mature forest types (Table 15), with 24% of those stands having originated after the Yaquina Fire and 6% of the stands in remnant old growth

Map 16 ACurrent Vegetation@

patches. Of the remaining mature stands, nearly 300 acres (1%) are in sold 318 timber sales which are currently not scheduled for harvest. Approximately 2,000 acres were commercially thinned in the›70s (9%) leaving 21% of the mature conifer unaltered since the 1868 fire. In contrast, about 38% of the landscape is in plantations or young conifer stands (11 - 80 yrs), 13% is in an early seral condition (pastures and recent clearcuts) and 19% is in hardwood-dominated stands. The current condition of vegetation is summarized by subwatershed and ownership in Appendix E. Map 16 shows the current seral vegetation and their distribution in the watershed. Although only approximately 30%of the watershed currently is in mature conifer stands, when compared to other watersheds in the Oregon Coast Province, this watershed ranks among the top third for this habitat type. This condition is a direct reflection of the history of human influences in the Coast Range.

TABLE 15: CURRENT SERAL CONDITION OF FEDERAL AND PRIVATE LAND IN THE WATERSHED

Seral Grouping	Total Acres	Percent Total	Federal Acres	Percent Federal	Percent Federal of Total	Private Acres	Percent Private of Total
Grass/Forb	2,270	3.0 %	336	0.5%	0.5 %	1,934	2.5 %
Early Seral	7,647	10.1 %	5,976	9.6%	7.9 %	1,671	2.2 %
Subtotal Early Seral:	**9,917**	**13.1%**	**6,312**	**10.2%**	**8.4%**	**3,605**	**4.7%**
Conifer Pole Stands	9,544	12.6 %	8,432	13.6%	11.1 %	1,112	1.5 %
Mixed Pole Stands	1,509	2.0 %	1,322	2.1%	1.7 %	187	0.3 %
Old Plantations	13,439	17.7 %	11,790	19.0%	15.5 %	1,649	2.2 %
Mid-Aged Conifer	4,124	5.4 %	2,656	4.3%	3.5 %	1,468	1.9 %
Subtotal Young Conifer:	**28,616**	**37.7%**	**24,200**	**39.1%**	**31.8%**	**4,416**	**5.9%**
Mature Conifer	14,491	19.0 %	14,163	22.9%	18.6 %	328	0.4 %
Mature Conifer Mix	4,089	5.4 %	3,704	6.0%	4.5 %	385	0.9 %
Multi-Layered Mature	2,147	2.8 %	2,099	3.4%	2.7 %	48	0.1 %
Late, Multi-Layered	1,843	2.4 %	1,811	2.9%	2.3 %	31	0.1 %
Subtotal Mature Forest:	**22,570**	**29.6%**	**21,777**	**35.2%**	**28.1%**	**792**	**1.5%**
Pure Hardwood	11,261	14.8 %	7,531	12.0%	9.9 %	3,730	4.9 %
Hardwood/Conifer	3,710	4.8 %	2,085	3.4%	2.7 %	1,626	2.1 %
Subtotal Hardwoods:	**14,971**	**19.6%**	**9,616**	**15.5%**	**12.6%**	**5,356**	**7%**
Grand Totals:	**76,074**	**100%**	**61,905**	**100%**	**80.9%**	**14,169**	**19.1%**

Since the majority of mature forest stands are currently located on federal lands, the future trend of this habitat type is likely to remain level and slowly increase as younger stands, in areas designated as Late-Successional or Riparian Reserves, mature. Grass/forb and early seral types, currently at about 13%, will decrease on the majority of federal lands but are expected to remain relatively constant on private lands (currently at around 5%). Current levels of young conifer and hardwood forest types make up approximately 52% of the vegetation types found on the landscape. This condition will gradually shift back towards mature conifer-dominated forests in Late-Successional Reserves on federal lands while other vegetation types and their distribution will be strongly linked to ownership patterns and other land allocations.

2. PATCH SIZES AND INTERIOR FOREST

Patch sizes have decreased dramatically from the reference conditions shifting from patches well over 100,000 acres in size to <2,000 acres since the mid-1940s alone. While there are a few larger connected pieces of mature forest, the majority of the unmanaged stands within the watershed are less than 500 acres in size, often connected to each other by narrow stringers. Most of the plantations, pastures and hardwood stands are around 100 acres or less in size.

This decrease in patch size correlates directly to an increase in the amount of edge habitat, or fragmentation, with only a small portion of the remaining mature stands currently functioning as interior forest habitat. Interior forest habitat is defined as the portion of a stand which is beyond the Aedge effect@. Edges have been shown to influence stand dynamics, understory vegetation, predation and competition, humidity and microclimate a distance of two tree lengths or more into a stand (Chen, 1991 and Spies, 1994). To determine the amount of edge habitat, the effects of different edge types were taken into consideration and buffer distances were adjusted accordingly. While the severe edges were buffered two site tree lengths into the stand (approximately 400 feet), edges such as mature stands adjacent to young plantations (10-24 yrs. old), were buffered approximately one and one-half site tree lengths (300 feet) and the least severe edges, such as a mature conifer stand adjacent to a pure hardwoods or older plantation (25-50 yrs), were buffered one tree length (200 feet) into the stand.

Figure 4 displays the current condition of the interior forest habitat by subwatershed. The data is sorted by percent of remaining mature forest habitat in each subwatershed. The majority of larger blocks of mature forest habitat, and thus interior forest habitat, are on federal lands. Less than 2% of the remaining mature forest habitat is on private land and most of these consist of riparian stringers or small patches and are not functioning as interior forest patches. For most drainages, less than 10% of the remaining mature stands are functioning as interior forest. The majority of the larger mature stands are influenced by nearby edges, while stands less than 100 acres in size are considered to be entirely edge (Map 17).

Map 17 AInterior Forest@

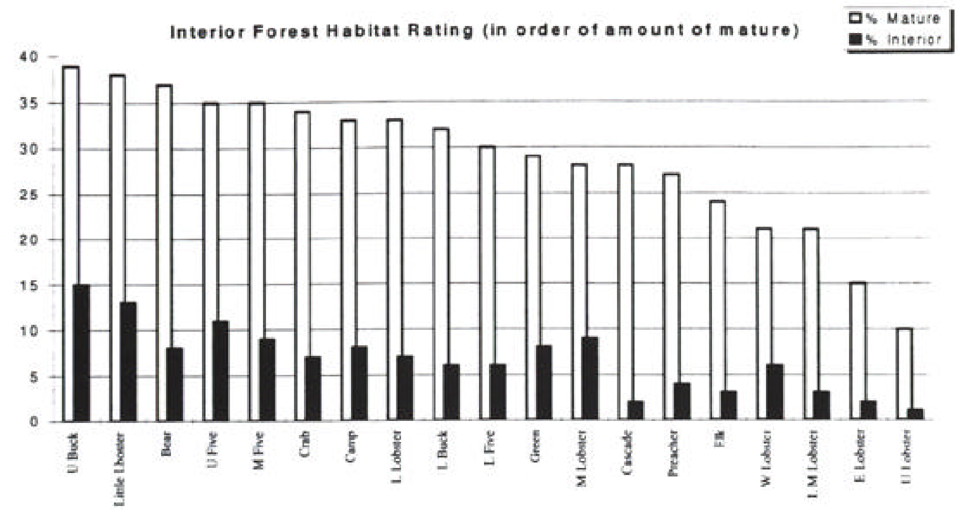

Figure 4: Interior Forest Condition by subwatershed

3. STRUCTURAL COMPONENTS OF FOREST HABITAT

The structural features of a given seral patch often determine whether the habitat can be utilized by certain wildlife species (Table 16). Thus merely listing the amount of a given habitat type does not necessarily mean that all of it meets the life requirement needs of the species which are associated with that habitat type. For example, the snag and large log components, structural and species diversity present in the remnant old growth stands in Lobster add significant habitat diversity to these stands. These structural components are virtually absent in the mature conifer stands in upper Buck Creek in Five Rivers which were commercially thinned in the mid-'70's. Thus a relatively small patch of quality late-successional forest habitat is capable of supporting owl pairs in Lobster while much larger patches of mature forest habitat in upper Buck Creek only support single owls.

Coarse Woody Debris:

Large snags and logs not only provide habitat for a host of non-vascular plants and several species of amphibians, but are also vitally important for cavity-dependent species, including many birds and mammals. Research on owls has shown that the amount of large standing and dead woody material within a stand may be more important than stand age (in stands > 80 yrs old), since these structural elements provide nesting and foraging opportunities.

TABLE 16: TRENDS FOR WILDLIFE HABITAT STRUCTURAL COMPONENTS

Structural Component	Trend Reference -> Current	Major Causes	Ecological or Social Processes Affected	Conditions beyond Federal Control	Possible Actions	Future Trend
Large snags and logs (>21@ dbh and 20= long or tall)	**decreased**	Settlement Fires, Prescribed Burning, Timber Harvest, salvage, yum/pum yarding, safety, cedar salvage	Natural decay and recruitment of new large logs and snags Nutrient cycling	Duration of natural ecological wood cycling	Manage for future recruitment in plantations, top or fell trees now	slowly increasing
Old trees with large limbs, broken tops and/or decay	**decreased**	Plantation management, timber harvest, agriculture	Natural succession, maturation and senescence of trees	Duration of natural ecological processes	Maintain some levels of defect in plantations, tree topping, varied spacing in plantations	slowly increasing
Multiple Canopy Layers and Natural Canopy Gaps	**decreased**	Settlement Fires, Timber Harvest, private mgmt. practices	Loss of hemlock seed source, succession, maturation and senescence	Natural succession	Random spacing in plantations with underplanting of shade-tolerant spp, maintain existing species diversity, allow endemic levels of insect and disease activity	slowly increasing

The analysis area was stratified by areas which have a variety of past disturbance histories. Each area is expected to have differing levels of coarse woody debris (CWD) due to the various disturbance histories. Although levels of CWD are difficult to sample adequately because snags and logs occur in patches and thus require very large sample sizes, they are relatively easily explored with models. Past research (Harmon 1986, Spies, et al 1988, Agee and Huff 1987) has shown that given a known stand age and disturbance history, CWD levels are quite consistent and predictable. Therefore, using the known fire history and stand ages for the watershed, we divided the area into five areas to estimate the current levels of CWD for various portions of the watershed. The areas modeled included: the mature stands established after the 1868 Yaquina fire, the old-growth stands in the Lobster Creek Watershed, the areasreburned in 1914 in the northern portion of Five Rivers and in the Little Lobster valley, the mature stands commercially thinned in the 1970s, and the young plantations 10-40 years old.

The following scenarios help explain the expected and current trends for CWD for an area as well as specific stands. The watershed was modeled as site class 1 and 2 (highly productive).

1. Mature Stands in Five Rivers:

A stand replacing fire scenario typical of approximately 12% of mature stands remaining in the watershed. The single age cohort ranges from 100 to 125 years old. These stands are nearing the lowest point and currently we estimate a volume of 50 cubic feet per acre(Table 17). In these areas, snags averages 0.5 large (>20 inch diameter) snag / acre (Stand exams 1992).

2. Old-Growth stands in Lobster Creek:

Two fire scenarios were modeled for this area, typical of about 6% of mature stands in this watershed. The far east portion of the watershed was on the perimeter of theYaquina fire and some stands (a small portion) were underburned. These were modeled also, estimating 25% mortality from the burn. The live stand structure and CWD levels have now recovered to their former levels. Estimates of current CWD are 110+ cubic feet per acre (Table 17). Snags are estimated at 7 large snags/acre (Table 5).

3. Mature Stands in 1914 Reburns of Cascade, Elk and Bear subwatersheds:

This reburn occurred 46 years after the Yaquina Fire when stands were probably about 30-40 years old. This is a period when stands have a high probability of burning because of the high levels of dry fuels on the ground (Agee, 1993). This scenario occupies about 9% of mature stands in the watershed. In an original burn, we would not expect high fuel consumption, but in a reburn fuel consumption could potentially be much higher. Mortality would have been high as well. While there are some mature conifer and notable old-growth, regeneration of conifers was relatively poor and some stands in this region of the watershed are dominated by hardwoods and hardwood/conifer mix. Model estimates of CWD in these areas are about 30 to 40 cubic feet per acre (Table 17). No snag information exists on these stands

4. Mature Stands Commercially Thinned in the 1970s:

The thinning treatments included thinning from above and from below, which captured mortality and will delay future CWD input to the stands. This scenario occurs on about 9% of mature stands in this watershed. These stands were thinned at approximately age 95. The current CWD levels are extremely low Time did not allow for modeling of this scenario for this watershed analysis, but it will be addressed in a forest wide analysis and modeling effort on CWD in the near future. Snag levels are expected to be less than 0.5 large snags per acre.

5. Plantations 10-40 years old:

The treatment for plantations was clearcut which resulted in all potential mortality being reduced to zero and all subsequent mortality input being reduced to zero. This condition occupies about 51% of this watershed. The CWD in the plantations is the wood that remained on the floor of the plantation from the pre-logged stand plus any logging debris that survived the fire. We estimate that 30 years after logging that volume is approximately 10 to 15 cubic feet per acre (Table 17). That should highlight the importance of providing CWD in restoration thinning in these units to provide continuity of CWD to maintain soil flora and fauna. Fire regenerated stands 10 to 40 years old would have approximately 150 to 275 cubic feet per acre, which would provide a bridge in the function for the next hundred years. Snag were not retained in plantations cut prior to the mid 1980s. Following 1986, 1.5 snags per acre greater than 18 inches in diameter were either retained or created in these plantations.

TABLE 17: SUMMARY OF CWD BIOMASS THROUGH TIME

Disturbance Simulation	Before Fire (cu.ft/ac)	Fire Mortality (cu.ft/ac.)	Year 50 (cu.ft./ac.)	Year 150 (cu.ft/ac.)	Year 300+ (cu.ft/ac.)
Scenarios 1 and 2 Stand Replacement fire at 300 yr. intervals.	80-100	300-325	125	50	110
Scenario 3 Stand Replacement fire and subsequent burn 30 yrs later	80-100	300-325	75-250 (depends on fuel consumption)	20-50	75-110
Scenario 5 Plantations (clearcut & burn)	100 (before logging)	100 (after logging)	35	5	75-??

The CWD in the natural stands in the watershed, though low, is within the range of natural variability. However, in the plantations snag and down log levels are well below natural levels. Clearcutting and fire effectively removed all CWD, removing the legacy necessary to bridge the ecological function that snags and logs provide. Plantations which had cooler burns or more large slash left on the unit might recover more rapidly.

4. SPECIAL HABITATS

Special habitats (Map 18) support a unique variety of plant and animal species, many of which may not be found elsewhere in the watershed. Wetland habitats in particular, support a sufficiently large number of associated species to be classified as separate ecosystems. With a stream density in excess of 7 miles per square mile, riparian habitats make up a significant component of the watershed. Where stream gradients and winter flows are within tolerance levels (gradients <8% and stream orders 3-4), beaver have a major effect on converting riparian systems into wetlands and pond habitats (Map 12). Areas with back-to-back beaver ponds are common in nearly all of the main tributaries to Five Rivers, but decrease significantly in the Lobster Creek drainage. The old oxbow area in lower Five Rivers has also been identified as a wetland habitat of state significance by the Oregon Department of Fish and Wildlife.

Other special habitats found in this watershed include bridges, such as the old covered wooden bridge at Fisher, which may provide roosting habitat for bats. Natural meadows, including the sub-alpine meadow on the top of Prairie Mountain, and old homestead meadows with abandoned orchards, offer unique habitat opportunities in this otherwise forested ecosystem. Finally, due to the scarcity of old growth habitat in the watershed, the remnant old growth patches in upper Lobster Creek are critical habitat types which likely support species found nowhere else in the watershed (i.e. non-vascular plants).

Map 18 ASpecial Habitats@

C. CURRENT CONDITION AND TREND OF WILDLIFE AND BOTANICAL SPECIES

The changes in vegetation seral classes and patch sizes on the landscape has caused a dramatic shift in species composition and distribution across the landscape. Please refer to Appendix C of the Late-Successional Reserve Assessment (Siuslaw 1996) for a current listing of TE&S species which may occur within the watershed. The Northwest Forest Plan and Salem District RMP outline specific management direction to benefit a variety of plant and animal species, especially those species which are associated with late-successional forest ecosystems. By addressing the broad issue of maintaining quality habitat for all species of concern, it is assumed that the overall diversity of plant and animal species within the watershed will be maintained or enhanced over time (Table 18).

For species which have been extirpated from, or are extremely rare in the Oregon Coast Range (such as the wolf, grizzly bear and wolverine), restoration efforts likely are too late. These large carnivores have a very low probability of ever re-inhabiting their former range due to human conflicts and intermixed ownership patterns in the Coast Range.

TABLE 18: TRENDS FOR WILDLIFE SPECIES

Wildlife Species Guild	Trend Reference -> Current	Major Causes	Ecological or Social Processes Affected	Conditions beyond Federal Control	Possible Actions	Future Trend
LS/ Large Home Range (fisher, goshawk, spotted owl)	**Decreased**	Habitat loss and fragmentation, human pressure	Reproductive rates, competition and predation	Land ownerships, hunting / trapping regulations	Habitat restoration, focus on blocking up stands, emphasis on plantation management around large mature blocks	slowly increasing
Extirpated spp. (wolverine, wolf, grizzly)	**Extirpated**	Habitat loss, hunting pressure,	Social conflicts, low reproductive rates	Land ownerships, social stigmas associated with large carnivores	Possible reintroduction for some species	Not likely to reinhabit the Coast Range
LS/ Small home Range (marbled murrelet, Herps.)	**Decreased**	Overall Habitat Loss Limited mobility and isolation (herptiles)	Increased predation and competition from edge-associates	At sea mortality or conditions (murrelets)	Aggregate stand treatments to produce larger patches or corridors	Likely will increase in reserves
Large Home Range Contrast/edge spp. (elk, raptors)	**Increased**	Increase in edge habitat due to timber management and agriculture	Reproductive rates socio-economic values of elk	State hunting regulations, ownership patterns	Maintain meadow and edge habitats, reduce motorized access	Decrease in reserves, remain stable around property bdry
Mosaic Habitat spp (coyote, fox)	**Increased**	Increase in edge habitat and increase in human pressure	Reproductive rates, in-migration from other regions	Migration, state regulations, ownership patterns	Maintain habitat variability, such as hdwds and brush spp in plantations	May decrease or stabilize
Small home range brush/ hardwood spp. (neotropical birds)	**Decreased**	habitat type does not last. Increase in predation and competition.. Loss of wintering habitat	Competition by edge species & non-natives Social value of declining songbird populations	Migration, condition of wintering habitat in other countries	Public education (i.e. use of chemicals) Maintain habitat variability, such as hdwds and brush spp in plantations	Overall trend decreasing. International conservation effort
Medium Home Range Early Seral spp (Waterfowl)	**Stable**	Migratory - use major or river valleys, coastal areas for over wintering	Reproductive rates, social value of gamebirds	Migration, wintering habitat, state hunting regulations	Maintain wetland habitats (i.e. beaver ponds) and old homestead meadows.	May decrease in LSR and Riparian Reserves

Bold trends indicate strong trends   Small Home Range = <100 acres   Medium Home Range = 100-3000 acres   Large Home Range = > 3000 acre

Late-Successional Forest Species:

Northern Spotted Owl: Approximately 80% of the watershed has been surveyed for spotted owls (Appendix F). All known sites are monitored annually by personnel from either the Pacific Northwest Forest and Range Experiment Station or Siuslaw National Forest and are visited a minimum of three times during the nesting season. Surveys are non-existent or inadequate to meet current protocol in four areas of the watershed: Cascade Creek, upper Five Rivers, Preacher Creek and upper Lobster (South Fork). Most of the intensive surveys for the spotted owl began in the mid-80s and continued through the early>90s, with survey efforts very similar on all Federally managed lands.

Currently there are 8 known owl activity areas within the watershed, of which 5 are pair sites and the remaining 3 are resident single sites. Information for two of the pair sites dates back as far as 1975 and one is as recent as 1994. (Appendix G displays the status of owl sites from 1990 to present).

Although the watershed supports 8 owl activity areas, the habitat quantity and or quality of the majority of these sites is considered to be marginal. Only one of the sites contains more than 1900 acres (or 40% of the median home range) of suitable habitat (mature conifer) within a 1.5 mile radius circle of the activity center. However, the majority of the mature stands at this site were commercially thinned in the mid=70s and apparently do not contain the conditions needed to make this site a viable reproductive pair site. The site is currently being used off and on by resident single owls. The remaining sites all contain less than 40% suitable habitat within the home range and are considered to be at risk if further habitat is lost.

There have been no responses at two of the three resident single sites in the past 3 years, but the sites have been active in the past 5 years and are still being monitored. Of the 5 known pair sites, the site with the lowest amount of available habitat (E. Fk. Lobster, with 641 acres) has not produced young since 1975. Based on banding data, this pair is also believed to be relatively old. Another pair site (Lord Cr) has not produced young since 1990 and may have lost the resident female. The remaining three pair sites (Camp Cr, Prairie Mtn and Briar Cr) appear to be stable, with one newly established site discovered in 1994 (Briar Cr). All three of these sites are in areas with remnant old growth and are located in the largest remaining patches (>1,000 ac) of contiguous mature conifer stands.

An owl habitat analysis, which broke suitable habitat into nesting, roosting, foraging and dispersal habitat, was conducted for the watershed (Map 19). Due to GIS limitations in grouping BLM and Forest Service vegetation information, nesting habitat was classified as conifer-dominated stands with a dbh. > 32@ (14% of watershed), roosting and foraging habitat was classified as stands between 21-32@ dbh. (16% of the watershed) and dispersal habitat consisted of stands between 9 and 21@ dbh. (28% of the watershed). Stands which contained remnant old growth trees were then overlaid with the nesting, roosting and foraging habitats. All stands less than 9@ dbh. (compared to the previously-used 11@ dbh. criteria) were classified as non-habitat (42% of the watershed). Although the size breakdowns were

Map 19 "Spotted Owl Habitat"

relatively coarse, this habitat breakdown appeared to be relatively accurate when verified with the known owl locations and conditions of the sites.

In addition to determining how the watershed was functioning with regards to owl habitat, an analysis of habitat connectivity was conducted to determine critical linkages and patch sizes (Map 25). Using GIS, contiguous stands of mature conifer stands > 21@ dbh. were merged to determine linkages between stands and which stands provided the largest patches of remaining habitat. These stands were also buffered for edge effect to determine how much of the remaining mature stands were functioning as interior forest habitat (Map 17 and Figure 5). The patch size and interior forest habitat analysis were used to determine the condition of known sites and proved to be a more accurate representation of site quality than merely determining the amount of habitat within the median home ranges. When verified with the site history information and knowledge of the sites, it was determined that the owl sites with the best current conditions were Prairie Mtn, Briar Cr, Camp Cr, and Lord Cr. The sites with the best potential for long-term restoration were Buck Cr, Crab Cr and Alder Cr. Due to the limited amount of available habitat, the E. Fk. Lobster site had the lowest potential for long-term recovery.

Marbled Murrelet: The watershed lies within recovery zone 3, as outlined in the Draft Marbled Murrelet Recovery Plan (July 1995). Murrelet surveys are limited to sold timber sales and cover approximately 20% of the suitable habitat in Five Rivers (Appendix F). Only 9 stations were surveyed in Lobster Creek, compared to nearly 200 stations in the Five Rivers drainage. Consequently 33 of the 35 known occupied murrelet sites are in the Five Rivers drainage.

This seabird flies from the ocean inland to nest in the canopy of mature forests. Although some birds fly over 30 miles one way to nest sites, the energy expenditure of carrying food to chicks at these distances is close to the diminishing return level for reproductive success and the vast majority of occupied sites are located within 20 miles of the coast.

This species requires large limbs or platforms to nest on and trees which are protected from wind, weather and predators, such as crows and jays. Being an alcid, the family of seabirds which includes auks, puffins, murres and guillemots, the species has a tendency to be semi-colonial in its nesting behavior and sites often contain several nesting pairs. Breeding seasons are highly variable and depend on a combination of factors, including day length and at-sea conditions.

Only a portion of the remaining 22,500 acres of mature conifer stands likely provide the necessary habitat requirements for nesting. Since surveys for this species are difficult, general habitat assessments cannot be accurately made for this species like they can be for the owl. Habitat requirements for this species consist of a set of relatively tight criteria, including geographic location from the coast, patch size and stand structure

Bald Eagle: The only known bald eagle nest site in the watershed was located in 1987 during logging operations in the Lobster Creek drainage. Although operations were suspended when the nest was discovered, the birds did not return to the site, since the nest tree was left exposed after harvest activities were completed. While sightings of adult and immature birds are reported periodically in both the Lobster and Five Rivers drainages, the majority of the sightings are during the winter months and likely represent non-resident birds which are foraging in the area during the salmon runs.

Survey efforts for this species have included both aerial (low elevation helicopter surveys in 1992 and 1994) and ground surveys during the nesting season which were primarily associated with sold or planned timber sales. No bald eagles were located during these survey efforts and all documented sightings have been reported by residents or land management personnel during field work. Since this species is highly visible and vocal during nesting, it is unlikely that a nesting pair would go undetected for long.

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. However, when considering the condition of the fisheries populations in the watershed, especially the ability of the watershed to produce a year-round supply of surplus fish (carcasses), it is more likely that the available food supply is the limiting factor for supporting nesting bald eagles in this watershed.

Northern Goshawk: This species is a candidate for listing (ODFW, USFWS) and has been declining in numbers in many western states due to forest management activities. The northern goshawk is an accipiter which feeds primarily on medium-sized birds and mammals and has a relatively large home range (>3,000 acres) in conifer-dominated forests. This species is relatively intolerant of disturbance, especially near the nest site, and will attack intruders or vacate a site if disturbed.

While this species is found in the Cascades, Siskiyous and the Olympic Peninsula, only two recently-documented nest sites are known for the Oregon Coast Range. Both of these sites were found in 1995 and are located in open mid-seral (60-80yr old) conifer forests. Since this species locates its prey by sight and hunts below the canopy, it prefers forests with an open understory, an uncommon condition in natural stands in the Coast Range. However, it is likely that the forests of the Coast Range will eventually develop the favorable conditions for this species as the stands mature into old growth.

Pacific Fisher and Wolverine: Both of these species are very rare in Oregon and likely have been extirpated from the Coast Range. The last documented sighting for a fisher in the Coast Range was in 1973 and for the wolverine in 1972. These large forest carnivores are members of the weasel family. While the fisher is strongly associated with large tracts of mature and old growth forests, the wolverine has been pushed out of its former range and now inhabitssubalpine and tundra environments. Both species use large snags and logs for dens. Both species were nearly trapped into extinction for their valuable fur and are susceptible to baiting and trapping methods used for other species, such as coyotes, bobcats, marten and bear. With relatively low reproductive rates, loss of habitat and low tolerance for human interactions, it is highly unlikely that populations of these species will recover in the Oregon Coast Range.

White-footed Vole and Red Tree Vole: The white-footed vole is a sensitive species on both federal and state lists. This species is a nocturnal rodent which prefers mature hardwood-conifer mixed riparian areas with a large down log and snag component. Since it is difficult to trap, little is known about the populations of this rodent in the Coast Range.

The red tree vole is a survey and manage species listed in the ROD. This species is arboreal and feeds exclusively on Douglas-fir needles. It builds its nests in the crowns of mature fir trees and rarely ventures to the ground, traveling through the canopy from tree to tree. Surveys for this species are much easier than for the white-footed vole, as the nests can often be seen from the ground. The red tree vole is also a primary prey species for the northern spotted owl. Both species are associated with habitats of regional concern and likely occur within the watershed.

Roosting Bats: The Yuma, long-legged, Townsend's big-eared, fringed myotis, silver-haired and small-footed bats are all regional or state species of concern. Roosting opportunities for these species exist under bridges, in barns or abandoned buildings and in snags or the canopy of mature forests in the watershed (Map 18). These bats require access to open water for drinking and feeding and often forage along forest edges. Since survey techniques for bats are relatively costly and labor-intensive, little is known about the population status of these species in the watershed. Although recommended as survey and manage species during the draft phase of the preparation of the Northwest Forest Plan, these bats are currently not listed in the ROD. They are, however, species of regional and state concern and state-wide populations are being monitored.

Other Species of Concern (Species of Regional or Social Concern):

Roosevelt Elk: The Five Rivers drainage is a primary big game hunting area and has a long history of habitat enhancement and elk transplant efforts. Oregon Department of Fish and Wildlife (ODFW) officials estimate that the populations within the watershed are currently near carrying capacity (approximately9 elk/square mile). While elk are also common in the Lobster drainage, the populations are more widely scattered and utilize adjacent drainages. Elk habitat enhancement efforts in the Five Rivers drainage include approximately 15 years of road closures to reduce harassment, seeding and fertilizing of clearcuts (in cooperation with ODFW) to create forage, and management of old homestead meadows for forage. Two elk transplant sites are also located in the watershed (in Bear Cr and Camp Cr) and radio-telemetry studies have been conducted in the watershed by OSU graduate students to determine forage preferences. This emphasis on big game management in the Five Rivers drainage has resulted in the area being considered by ODFW as one of the better hunting areas in the Alsea subunit.

A state-wide elk management plan was completed by ODFW in 1992. The plan, which incorporated population data, hunting statistics and extensive public input, identified roads (hunter access) and reductions in the amount of quality cover (mature forests) as the two primary factors limiting elk populations. Potential conflicts with landowners and forage availability was listed as the third factor. Thus elk management efforts have focused on road closures and maintenance of quality habitat in areas with low human disturbance.

The plan identified the following objectives for the Alsea Game Management Unit (which covers most of the Siuslaw National Forest north of the Siuslaw River):

1. A 1:10 bull:cow ratio by 1997

This criterion is currently not being met, with bull:cow ratios lower than the desired objective.

2. Population benchmark of 7,000 animal, the third highest in the state of all the game management units with established benchmark levels (49 of 67 units).

Elk populations have fluctuated significantly over the past 100 years since European settlement (Figure 5). Elk were relatively abundant throughout western Oregon and the Coast Range in the late 1800s. However, subsistence and market hunting drove them to near-extinction by the turn of the century and several long-term hunting moratoriums had to be instated from 1900-1936 to allow populations to recover. Transplant efforts, combined with tight hunting restrictions and an increase in available forage due to timber harvest and agricultural activities resulted in a slow increase in populations.

The watershed was rated for elk habitat potential, based on a combination of local knowledge of populations, hunter success, input from ODFW, BLM and Forest Service personnel and a habitat quality assessment (forage, cover and road densities) (Table 19, Figure 6). Subwatersheds were given a rating of high, medium or low, based on a combination of known elk population levels and habitat quality. Consideration was also given to the amount of habitat enhancement work (forage seeding, maintained meadows, road closures, elk tracking studies, etc). Although several elk habitat analysis models exist (i.e. West-side Wisdom Model), they were not used for this analysis because of their extreme insensitivity to major landscape changes. The model also does not consider forested environments to contain forage.

Figure 5: Fluctuations in Roosevelt Elk Populations from 1992 ODFW Elk Management Plan

The overall elk habitat ratings (Table 18) showed an inverse correlation with road densities and direct correlation with the levels of mature forest habitat and available forage (Figure 5). This relationship clearly matches the conclusions outlined by ODFW in their Elk Management Plan.

Figure 6: Comparison of Road Density, Optimal Cover and Forage

TABLE 19: HABITAT CONDITION OF THE SUBWATERSHEDS AND THE OVERALL ELK RATING

Lobster Cr: Subwatershed (Alphabetical)	**Rd Density mi/mi^2 of open roads**	**Miles of rds closed for elk mgmt**	**% Forage (<10yrs) (ac of mgd meadows)***	**% Hdwds (forage and sea-sonal cover)**	**% Optimal Cover (>80yrs)**	**% Hiding Cover (little forage) 11-80 yrs**	**Overall Rating**
East Lobster	4.4	0	13	8	14.5	64.5	**L-M**
Little Lobster	4.4	0	16.2	11.5	37.8	34.5	**M**
Lwr Middle Lob	2.7	0	15.3	30	21	33.7	**M**
Lower Lobster	2.5	5.9	14.7 (20ac)	22.7	33.1	44.2	**M**
Middle Lobster	3.9	0	23	25.8	28	23.2	**M**
Preacher Creek	4.5	0	8.7 (2ac)	17.6	27.7	54.7	**M**
Upper Lobster	4.6	0	7	9	9.7	74.3	**L-M**
West Lobster	4.2	0	5.5	6.3	21.2	67	**L-M**
Five Rivers: Subwatershed (Alphabetical)							
Bear Creek	3.8	9.7	10.8	21.4	32.5	35.3	**L-M**
Camp Creek	2.8	1.1	5.8 (7ac)	20.7	32.8	40.7	**M-H**
Cascade Creek	3.2	7	11.7	24	28	48	**H**

			(12ac)				
Crab Creek	2.7	10.8	10.3	17.7	34.3	48	**H**
Elk Creek	3.1	0	10.3	33.8	24.3	31.6	**L-M**
Green River	2.9	2.9	6.5 (5ac)	23.7	29.1	47.2	**H**
Lower Buck Cr	3.4	5.5	13.8	21	31.7	33.5	**H**
Lower Five R	3.4	6.9	18.5	25.4	30.5	25.6	**H**
Middle Five R	3	1.2	15.5 (37ac)	22	35.4	42.6	**H**
Upper Buck Cr	3.5	1.6	11	12.6	39	37.4	**H**
Upper Five R	2.7	6	9.3	17.7	35.5	37.5	**M**

Waterfowl and Upland Gamebirds: The watershed supports healthy populations of ducks, grouse and mountain quail (coveys of over 30 birds have been seen in upper Green River). With an abundance of beaver ponds in the watershed, there is abundant habitat for nesting waterfowl andducks which are frequently seen in these areas during the breeding season. Populations of these game species are considered to be stable and likely will remain constant within the watershed under current management direction.

Bear and Cougar: Populations of these two game species appear to be stable within the watershed and sightings of both species are relatively common. Based on these figures, State-wide harvest figures, populations are apparently stable and even increasing in some areas following the passage of a measure banning the use of baiting and dogs in hunting these species.

Neotropical Migratory Birds: Neotropical migratory birds is a term used for migratory songbirds (not including waterfowl) which nest in North America and winter south of Mexico. Four long-termmist-netting and banding survey sites for neotropical migratory birds are located within the watershed (Cougar Cr, Crab Cr, Beaver Ridge, and Preacher Cr). Two additional smaller survey sites (COPE) are located in middle Lobster, but data collected at these sites is unavailable to date.

Five years of information for the intensive survey sites indicated that the Cougar Cr site had the greatest number of total captures, followed by Beaver Ridge, Preacher Cr and Crab Cr. Species richness varied from the total captures, with the highest numbers at Preacher Cr (20 different species), followed by the Cougar Cr site (15 spp), Beaver Ridge (13 spp) and Crab Cr (11 spp). The Preacher Creek site is located at a large beaver pond and wetland while the other sites are forested so offers the most diverse habitat to support a greater number of species. Monitoring of neotropical migratory bird species is ongoing in the region. Restoration efforts focus on the larger international issues of maintaining populations of songbirds in both their winter and summer ranges.

Invertebrates: Invertebrates, such as forest soil arthropods, mites, bacteria and nematodes, aquatic macro-invertebrates, mollusks and coarse wood chewers are species which we have very little information about. Many are listed in the ROD for general species surveys starting in 1999.

Botanical Resources

Sensitive Species: Botanical surveys for sensitive species have been conducted on approximately 20% of the upland areas and the majority of the mainstems and major tributaries in the Five Rivers portion of the watershed (Appendix F). Populations of loose-flowered bluegrass, *Poa laxiflora*, have been found along Cascade Creek, Green River, Crab Creek, Five Rivers, Cougar Cr, Elk Cr, Buck Cr, Camp Cr and Lower Lobster. These populations vary in size from just a few culms to larger populations of close to 100 culms. This species is strongly associated with hardwood-dominated riparian areas and is tolerant of low levels of disturbance. It is frequently found in areas with a history of fires, old homesteads and along established elk trails. The Oregon Coast Range is considered to be the center of the range for this species, which ranges from SE Alaska to Central Oregon West Cascades.

A Poa Conservation Management Plan haswas completed by the Siuslaw National Forest in April, 1993. Several populations have been identified in the plan to be buffered or protected during project implementation. These populations are located in Green River, Cougar, Crab and Elk Creek.

No other sensitive plant species have been located during botanical survey efforts in the watershed.

Noxious and Competitive Non-Native Species: Invasive populations of Scotch broom, *Cytisus scoparius,* Himalayan blackberry, *Rubus discolor*, Canadian and bull thistles, *Cirsium arvense* and *C. vulgare*, meadow knapweed, as well as noxious species, such as tansy ragwort, *Senecio jacobaea,* are common along roadsides and disturbed sites, such as pastures and clearcuts within the watershed. Eradication efforts are currently under way by private landowners, the county and federal land management agencies for Scotch broom and tansy. Populations of Scotch broom are particularly dense along Five Rivers, Preacher Creek and along Wilkinson Creek while populations of tansy are increasing along roadsides and in pastures. Canadian and bull thistle are also increasing in pasture and roadside areas. One population of gorse, *Ulex europaeus,* may have been located in the Five Rivers drainage. This species is particularly invasive and is more common along the coast. Early eradication efforts are critical in controlling the further spread of this species. Although it is unlikely that these non-native species will ever be totally eliminated from the watershed, efforts to control the spread of these species are vital to conserving the native flora, particularly within riparian areas.

Botanical note of interest: In the Preacher Creek subwatershed is a population of *Ceanothus Parrgi*. This species is known from northern California and this site is at least one of the few, if not the only siting in Oregon.

ISSUE 2: PROTECTION OR ENHANCEMENT OF SALMONID FISHERIES AND AQUATIC SPECIES HABITAT

AQUATIC HABITAT CHARACTERISTICS

Current conditions of stream habitat were determined from stream surveys conducted between 1980 and 1995 by the Forest Service, Bureau of Land Management, Oregon Department of Fish and Wildlife, and Oregon State University. Most surveys were conducted after 1990. The majority of the stream miles surveyed represent deposition and depositional-flat channel groups (84% and 54% surveyed respectively). Only a quarter of the transport channel miles were surveyed and source channels are poorly represented. The information is a snapshot of the streams at the survey dates and may differ from actual existing condition in some stream reaches. *All of the surveys represent conditions prior to the 1996 flood.* Table 20 summarizes the aquatic habitat condition and future trends.

Condition of Streambed Substrates

Most riffle streambed substrates in the Lobster-Five Rivers watershed are dominated by gravel and cobble. The lower mainstems of Five Rivers and Lobster Creek are dominated by bedrock substrates. Riffles in the East Fork Lobster and Upper Lobster subwatersheds were properly functioning before the 1996 flood. However,most Five Rivers subwatersheds, tributaries in Middle Five Rivers, and Lobster Creek subwatersheds below Middle Lobster have embedded cobble & gravel riffles or riffles dominated by sand. Spawning may be impaired in many of these streams. Some transport and source channels in these subwatersheds have high levels of fine sediments which will eventually be routed downstream to deposition channels. In addition, sand and silt substrates dominate beaver pond and dammed pool habitats which may be within a natural range but in some areas seem to be limiting pool depth and may affect downstream channels when these sediments are mobilized. A large proportion of scour pools are also dominated by sand which could limit depths.

Generally, existing impairment of riffles by sand and silts seems more wide-spread than historic conditions based on qualitative stream surveys. Disturbance levels have been high in the watershed. Relatively high road densities and extensive timber harvest during the past several decades contribute to the levels of fine sediment above reference condition. Current levels of fine sediments may impair pool depth and limit winter rearing areas in watershed tributaries. This condition may continue for 1-3 decades until disturbed hillslopes recover, extensive stored fine sediments are routed through stream systems, and levels of large wood in stream channels increases. Declining agricultural activity in the watershed, declining timber harvest rates on Federal lands, and new changes in land management guidelines on all timber lands (NW Forest Plan Aquatic

TABLE 20: TRENDS IN AQUATIC HABITAT COMPONENTS

Critical Element	Trend Reference -> Current	Major Causes	Ecological or Social Processes Affected	Possible Actions	Future Trend
Substrates	**decreasing**	**Wide-spread watershed disturbance from timber harvest and agriculture, increases in road densities, sandstone dominated geology.**	**Loss of spawning and summer or winter rearing habitat capability, loss of salmon productivity.**	**Reduce road densities, road maintenance Best Management Practices, revegetate riparian areas, restore functional LWD levels**	**Maintain current trend in short-term. Long-term trend to properly functioning**
Large Woody Debris	**decreasing**	**Loss of LWD source areas by agriculture, timber harvest, and wildfire. Stream cleanout and log salvage.**	**Impairment of sediment routing and groundwater recharge. Loss of summer and winter rearing habitat capability, loss of salmon productivity.**	**Protect existing LWD source areas and treat managed stands in future source areas, obliterate roads that impair routing, riparian conifer planting, and place LWD in critical stream channels.**	**Short-term remains decreasing in most subwatersheds. Long-term increasing in and downstream of Federal Lands.**

Conservation Strategy and Oregon Forest Practices Act revisions) indicate a long-term trend to properly functioning streambed substrates in the Lobster Five Rivers watershed.

Debris torrents from the 1996 flood in Upper Lobster, Lower Middle Lobster and West Lobster subwatershed have transported large amounts of sediment down to deposition channels which may impact downstream habitats in the future. Aggrading gravel and cobble bedload in bars, side-channels, or low terraces in some depositional channels have caused localized channel widening, removed streamside vegetation, or forced large channel migrations. These changes have been observed in Upper and Middle Lobster subwatersheds and in Upper Buck, Upper Five, and Green River subwatersheds. A large proportion of beaver dams collapsed during the floods and abundant fine sediments were transported downstream with unknown effects.

Abundance of Large Woody Debris in Stream Channel

Based on the levels of large woody debris determined to be necessary and adequate based on the scientific assessment displayed in Table 7, current LWD levels are low creating not properly functioning conditions in most deposition and deposition-flat segments in the watershed. Mainstem Five Rivers and Lobster Creek reaches not surveyed appear to have low levels of LWD based on visual observations. Stream segments with moderate levels of LWD are predominantly transport and source segments. These segments are smaller order, confined channels where large wood resists transport.

Areas with functional levels of wood are very rare and usually represent log jams in source and transport segments. Large logs were artificially placed in stream source reaches in Camp, Cascade, and Upper Lobster subwatersheds which are considered functioning for LWD. Complex woody debris habitats in upper Lobster Creek are associated with constructed log steps and side-channels. In Five Rivers, these occur in Crab, Green River, and Cascade subwatersheds typically in pools. The largest accumulations are rare but tend to occur in beaver ponds probably where inundation kills streamside alder which eventually fall into the stream channels. Debris torrents from source segments transported large log jams onto deposition and lower gradient transport channels during the winter of 1996in Upper Lobster and West Fork Lobster subwatersheds and smaller jams in Lower Middle Lobster, Green River, and Upper Five subwatersheds. Windstorms in 1996 toppled mature conifer into channels or riparian areas throughout the watershed and were noted in Green River, Upper Five, Lower and Lower Middle, and Little Lobstersubwatersheds.

Large wood meeting the reference criteria presented in Table 7 are predominantly conifer logs that act as key logs in jams resisting transport and collecting smaller wood that is transported through the stream system. Currently, smaller wood 12-24 inches in diameter and greater than 25 feet long is abundant in the system, ranging as high as 100-150 pieces per mile. This size class is large enough to influence sediment routing and storage but probably tends to be more transitory in the system and is comprised of more hardwood logs that decay at a faster rate. The 12-24 inch diameter size-class is most abundant in source and transport segments, especially in smaller order tributaries. In addition to this size class, woody debris less than 12 inches in diameter can provide high levels of habitat complexity and tend to dominate the infrequent jams and accumulations of wood in deposition and depositional-flat segments.

Levels of large woody debris in stream channels are much lower than reference condition and are related to high levels of disturbance in the Lobster-Five Rivers watershed that has either removed LWD from stream channels or removed mature conifer trees from upslope source areas. Current levels of LWD may be naturally lower than reference condition in some Five Rivers subwatersheds due to losses of LWD sources from the Yaquina fire and smaller fires in the northern portion of the watershed. Most declines in LWD, however, are due to cumulative human disturbances. The lower Five Rivers channel may have been cleared for occasional log drives in the early part of the century (Siuslaw National Forest, 1914). Early homesteading, followed by decades of timber harvest and road construction have affected source areas of large wood. In addition, extensive cedar harvest and salvage in the 1970s removed large amounts of LWD and streamside trees. Stream cleanout and log jam removal beginning in the late 1950s and into the 1970s removed LWD from stream channels throughout the watershed.

Levels of LWD will remain well below reference condition for decades in most subwatersheds although the long-term trend shows source areas recovering on Federal Lands. Map 20 shows potential sources of large wood from upslope and streamside areas. High Potential upslope LWD source areas represent stands of mature conifer seral classes that are at least moderately susceptible to landslide activity within a site tree of stream channels. These areas have the best chance to route large woody debris, through debris torrents, to stream channels in the near future (Table 9). Timber harvest has converted most upslope source stands to younger seral vegetation which cannot provide large wood for decades or centuries (Figure 7).

Large woody debris currently stored in source channels could be an additional source in the near term; For example, debris torrents resulting from the 1996 flood delivered large amounts of woody debris to deposition channels in the Upper Lobster subwatershed which had been stored for decades in headwater source channels although current upslope LWD source areas are dominated by younger managed stands. The abundance of LWD in source channels is unknown in the watershed. Levels of coarse woody debris on hillslopes in the Five Rivers and the lower Lobster Creek subwatersheds is considered very low and LWD in headwater reaches probably is similar.

Delivery of LWD to deposition reaches from upslope source areas or from headwater channels is impaired by the numerous channel crossings on forest roads or county highways. Road crossings often capture debris torrents, or at least filter out the large wood from the torrent. This process was observed during the 1996 flood. Map 20 displays the source areas impaired by road crossings; approximately 30 percent of the high potential LWD source areas are impaired.
Map 20 APotential Large Woody..@

Figure 7. Seral class groups in lands most susceptible to landslides

Stream-side sources of LWD play a more important role in the lower valley stream channels. However, in these systems, the source areas have mostly been converted to younger hardwood stands or agricultural lands. In these areas, windthrow of deciduous trees provides important woody debris to stream channels. Areas with the potential to contribute LWD from stream adjacent slopes are also identified on Map 20. Where stream side LWD sources do exist, valley bottom roads often limit delivery of this material to the channel. When large diameter trees, longer than the bankfull channel width, do reach the channels, they resistant transport through the smaller order deposition channels. It is unlikely that this wood will be routed downstream to larger order depositional channels except during rare catastrophic flood events.

Area and Quality of Pools at Summer Flow

Distribution and quality of pools depends on trends of beaver ponds, sediment routing, and levels of large woody debris. Beaver populations have increased in the last few decades (presumably increasing beaver pond habitat) but may be near carrying capacity. Beaver pond density distribution changes, often radically, between seasons and years. Figure 8 shows fluctuations in summer beaver dam abundance over a 15 year period. During this period between 1992-1995 average beaver pond area decreased in the two

Lobster Creek reaches and increased at Cascade Creek. These variations may be due to movements of beavers in a stream channel, changes in beaver food sources, or variations in climatic cycles affecting winter flows.

Figure 8: Changes in beaver dams per mile of stream channel recorded during stream surveys during a 15 year period. Not every year was surveyed.

Beaver dams built against large woody debris may be more stable during winter freshets and the interaction between dams and logjams may facilitate channel migration in smaller order channels (Liedholt et.al. 1992). These processes have been observed in the Camp Creek subwatershed in the years following artificial placement of woody debris. Liedholt et.al. (1992) noted the importance of woody structure in beaver dam placement in Cummins Creek. Woody debris also plays a critical role in routing stored sediments upstream of collapsed beaver dams scouring pools and exposing spawning areas. Stream reaches with low levels of large woody debris will not function properly if beaver dams decline.

Many deposition and depositional-flat channels in the watershed have functional pool areas. Beavers play a critical role in the watershed by creating half of the pool area in these low gradient segments. Beavers ponds do not contribute to pool habitat in the lower mainstems; the role of beaver diminishes as the stream order increases (Map 12).

In Five Rivers beaver dams also comprise almost half the stream area in transport channels during summer flow. These particular transport reaches may represent small order, relatively lower gradient, confined channels with woody debris that favor beaver dam construction. This information represents beaver dams at low streamflows which probably overestimates the amount of available winter rearing habitat.

In the absence of beaver ponds, large wood is critical to pool formation. Large wood maintains deep scour pools, initiates channel migration and off-channel habitat formation, and collects smaller woody debris which provides complex hiding cover. Portions of stream reaches in the Cascade, Crab, and Upper Lobster subwatersheds meet the pool criteria for area and complexity of pools for prime summer rearing habitat (Table 7).

However high stream temperatures severely impair the function of summer rearing pools in most of the Five Rivers subwatersheds and lower Lobster Creek.

Levels of large wood are low in the Lobster-Five Rivers watershed and deep pools with complex woody debris hiding cover are equally rare. As a result, existing pool function is impaired as rearing habitat, stream surveys confirm this. Depositional reaches in Upper Buck, Upper Five, and Green River subwatersheds have inadequate depth for summer rearing. These stream reaches had low levels of beaver activity during the survey and low levels of large wood.

Stream reaches with inadequate pool area are predominantly 2nd and 3rd order tributaries and headwater areas in surveyed transport and source channels most prevalent in Upper Buck, Green River, Lower Lobster, Preacher and Middle Lobster subwatersheds. These reaches have few or no beaver dams. Many of these reaches have relatively higher levels of large woody debris, especially in the 12-24 inch diameter class discussed earlier but the woody debris does not seem to play a strong role in pool formation in these riffle dominated reaches. Perhaps more bedload is temporarily stored in these areas limiting pool scour or these areas represent steeper gradient, more dynamic channels that limit beaver activity.

Presence of Slow Water and Off-Channel Habitats

Side-channel habitat appears more abundant in the upper Lobster Creek subwatersheds comprising 10-20 % of the habitat. Side-channels in the East Fork Lobster, located in the deposition reach, are well developed, created from jams of large woody debris and are providing complex off-channel habitat. The other side-channel areas in the Upper Lobster and Little Lobster subwatersheds are also associated with higher levels of large wood. In contrast side-channels in Five Rivers subwatersheds comprise only a very small percentage of the habitat (normally less than 5%). In both drainages other off-channel habitats (alcoves or isolated pools) are not common. The Upper Lobster subwatershed had constructed alcove habitat that provided off-channel habitat prior to the 1996 flood.

Quiet water pools or side-channel and other off-channel habitats critical for winter rearing salmon and trout are distributed throughout the watershed in deposition and transport channels but possibly are not very abundant during winter flows. These winter rearing habitats are likewise dependent on beaver ponds.

AQUATIC SPECIES DISTRIBUTION

Map 21 shows current distribution of salmon and trout. Sculpin distribution is probably the most extensive. The extent of speckled dace distribution is unknown but seems to be well distributed and very abundant through the mainstems of Five Rivers and Lobster Creek (downstream of Upper Lobster subwatershed) and into most larger order tributaries. Overall, salmon and trout distribution and abundance in the Lobster-Five Rivers watershed are less than reference conditions. Population trends are summarized in Table 21. Distribution is limited by impaired fish passage at culverts , high stream temperatures during summer months, and declines in fish populations. Abundance is limited by habitat degradation in the watershed and a variety of interacting Basin-wide or Province-wide factors including harvest, ocean conditions, and hatchery fish interactions. Population trends are discussed below.

TABLE 21: FISH POPULATION TRENDS

Fish Species	Trend Reference-> Current	Major Causes	Ecological or Social Processes Affected	Possible Actions	Future Trend
Coho salmon, winter steelhead, sea-run cutthroat trout	**Depressed**	**loss of quality habitat, ocean & sport harvest, ocean conditions**	**Loss of commercial and sport fishery, impair aquatic ecology.**	**Habitat protection and restoration, monitoring, ESA protection.**	**Depressed in short-term. Possible long-term increases.**
Fall Chinook salmon	**Increasing or Stable**	**loss of quality habitat**	**maintain commercial and sport harvest.**	**Habitat protection**	**Stable**
Resident Cutthroat	**Unknown**	**loss of quality habitat**	**Loss of aquatic community structure.**	**Habitat protection and restoration**	**Stable**

The watershed geomorphology allows distribution to extend far into the upper drainages of most subwatersheds. Most distribution ends when increasing gradient and decreasing flow limit fish habitat. Map 22 shows that natural falls or bedrock chutes limiting distribution of anadromous salmon and trout are not common in the Lobster-Five Rivers watershed. Fish ladders are present at falls at Cascade Creek and in upper Five Rivers. The upper Five Rivers falls is a man-made barrier. The stream channel was altered in the late 1950s to avoid bridge construction on forest road 3200 (Oakley 1963; Del Skeesick, Willamette National Forest, personal communication). Culverts on county or forest roads may block or impair upstream migration of fishes. Upstream movement from mainstem channels to tributaries at summer low flows is most affected.

Map 21 ACurrent Fish Distribution@

Map 22 APhysical Barriers to Fish@

Distribution and diversity of aquatic invertebrates in Lobster-Five Rivers is almost unknown. Sampling throughout the upper Lobster Creeksubwatersheds in 1983 showed abundant and diverse aquatic insect communities (BLM 1987). Large populations of freshwater mussels have been observed in mainstem Five Rivers and Green River in the deeper riffle habitats. Mussels have been noted in Lobster Creek and Camp Creek. Population sizes of crayfish, the namesake of Lobster Creek, is unknown in the watershed, but crayfish seem widely distributed through most depositional and some transport channels. Finally, fresh-water sponges have been noted in the lowermainstem of Five Rivers below Lobster Creek.

Northwestern Pond Turtle: This species is a listed sensitive species which inhabits ponds, marshes and slow-moving streams. Being cold-blooded, turtles require basking logs or open areas where they can warm up in the sun to become active. This species lays its eggs in sandy banks near the waters edge. Northwestern pond turtles were once common throughout the Willamette Valley and Coast Range but populations have decreased with drainage of wetland habitats, stream diversions and agricultural practices. Pond turtles have been located in the Alsea River just north of the watershed and may inhabit warm water habitats, such as old mill ponds, beaver ponds and backwater areas in both the Lobster and Five Rivers drainages (Map 12). Young pond turtles are particularly vulnerable to predation by introduced bullfrogs, a species which inhabits the same habitat as pond turtles and is a primary contributor to the decline of many native pond species. While adult turtles have few natural predators, they are susceptible to being crushed by livestock or vehicles.

Amphibians: The red-legged frog, tailed frog, southern torrent salamander and clouded salamander are all amphibian species likely to occur within the watershed. They all are either federally listed sensitive species (red-legged frog) or are species listed as sensitive by the Oregon Department of Fish and Wildlife. Red-legged and tailed frogs have been documented in several drainages within the watershed and suitable habitat exists for the salamander species.

Tailed frogs and torrent salamanders inhabit cold, clear, rocky streams where water temperatures do not exceed 60^{0}F. Habitat for these species may be found in the larger headwater streams, particularly along north-facing slopes or in well-shaded riparian areas but is lacking in the majority of the mainstems where temperatures are too high due to loss of streambank shading from agricultural and forest management activities. Tailed frog tadpoles attach themselves to rocks in the stream channel and may take over four years to metamorphose into adults. The southern torrent salamander larvae inhabit the same ecological niches as tailed frogs, feeding on aquatic invertebrates for 3-4 years before becoming adults.

Clouded salamanders are terrestrial salamanders which are strongly associated with large logs and snags. This species inhabits and lays its eggs beneath bark or in crevices of large decaying logs or snags where temperatures and humidity remain relatively constant throughout the year.

The red-legged frog is the most versatile of these four amphibian species, inhabiting hardwood-dominated riparian areas. While it is associated with water during the reproductive season, this species becomes more terrestrial during late summer and fall and may be found considerable distances from water at that time. All of these species will likely benefit from restoration of mature forest habitat and riparian conditions in the watershed.

AQUATIC SPECIES ABUNDANCE

South Fork Lobster Creek was identified as having good numbers of rearing juvenile salmonids (House and Boehne, 1987). Upper Buck and, perhaps, Lower Buck subwatersheds may be relatively good producers of juvenile salmonids based on a fish sampling survey conducted by the Siuslaw National Forest in the summer of 1994. However, habitat differences between sampling sites and the limited data that can be collected in one summer preclude any firm conclusions. Stream surveys in Lobster-Five Rivers in 1992 indicated better fish abundance and diversity in the Upper Buck subwatershed relative to other surveyed streams.

<u>Chinook Salmon:</u>
Standard spawning surveys have been conducted on Lower Lobster Creek and Buck Creek since 1952. Escapement data from these surveys indicate that fall Chinook in the Lobster-Five Rivers Watershed have been generally increasing in abundance since the mid-1970s (Figure 9). Alsea Basin fall Chinook are considered to be healthy with recent run sizes averaging 10,000 fish per year. This may be similar to historic run size (ODFW, 1995). It is unknown if spring Chinook are present in the watershed.

Figure 9. Trends in Chinook salmon spawner abundance.

<u>Coho Salmon:</u>

Coho stocks are depressed in the entire Alsea River Basin although the coho sport fishery in the Lobster-Five Rivers watershed has appeared relatively strong compared to other major Alsea River tributaries. Spawning survey data indicates the East Fork Lobster Creek has relatively strong coho spawning escapement compared to other regularly surveyed streams in the watershed. In addition, House and Boehne (1987) found good numbers of juvenile coho in East Fork Lobster during summer surveys. Although escapement data on South Fork Lobster is only available for two years, it appears to have relatively good escapement. Therefore, East Fork Lobster and Upper Lobster subwatersheds could be important coho producers and contributors to the Lobster-Five Rivers coho fishery.

Coho abundance is extremely variable from year to year. This may be due to fluctuating ocean conditions and/or genetic influences from hatchery fish. Standard spawning surveys conducted on Lobster Creek, Cherry Creek, and Wilson Creek since 1950 show that coho spawner abundance has decreased over the last 30 years (Figure 10). Due to population declines throughout its range, NMFS has proposed Oregon Coast/Northern California coho for listing as a threatened species.

Figure 10: Trends in coho salmon spawner abundance

<u>Steelhead:</u>

From the mid-1970s to the mid-1980s, winter steelhead sport catches indicate an increasing trend in Lobster-Five Rivers (Figure 11). However, since the mid-1980s, there has been a sharp decline in the steelhead fishery. Sport catches of wild winter steelhead in the Alsea Basin in general have declined since the late-1960s (ODFW, 1995). ODFW

Figure 11: Trends in Steelhead sport catch

does not conduct steelhead spawning surveys in Lobster-Five Rivers; however, there is an adult trap located in the fish ladder at Cascade Creek which is used to monitor wild steelhead escapement and hatchery steelhead straying rates. The limited trap data available does not show any trend in the Cascade Creek wild steelhead escapement; however, traps in other Alsea Basin streams indicate a probable declining trend over the past few years. NMFS has also proposed coastal steelhead for listing as a threatened species.

<u>Sea-run cutthroat</u>:

Very little data is available on sea-run cutthroat abundance in Lobster-Five Rivers. ODFW conducted creel surveys on Five Rivers from 1982 to 1994 (excluding 1985-87). Catch rates fell from 3.2 fish/angler in 1989 to 1.2 fish/angler in 1994 (ODFW, unpublished data). The only other long-term monitoring of cutthroat populations in Lobster-Five Rivers has occurred on ODFW's research project on East Fork Lobster Creek and Upper Lobster Creek. Summer juvenile sampling and spring downstream migrant trapping on East Fork Lobster (the control stream) indicated that the cutthroat population in that stream was relatively stable (ODFW, unpublished data). However, due to the limited nature of these data, it is difficult to assess trends in Lobster-Five Rivers cutthroat abundance overall.

<u>Other fishes, amphibians and invertebrate species</u>:
Population trends in other native fishes are largely unknown. Pacific lamprey (*Lampetra tridentata*) populations are declining across the state (ODFW, 1995). Speckled dace, more tolerant to warmer stream temperatures, may have a wider distribution in Lobster-Five Rivers tributaries than reference. Trends in frog and salamander populations are unknown. Overall trends in invertebrate species are unknown.

ISSUE 3: HIGH STREAM TEMPERATURES REDUCE WATER QUALITY

Major factors that may be limiting abundance and distribution of salmon and trout in the Five Rivers watershed include both loss of rearing habitat and habitat quality through high stream temperatures.   Fishes and aquatic-dependent amphibians native to the Lobster-Five Rivers watershed are sensitive to increases in temperature (DEQ 1996). Elevated stream temperatures above the reference condition increase the incidence of disease, egg mortality, decrease growth rates and fry emergence, alter competitive interactions in fish communities, and, at higher temperatures, cause death (Table 22).

Temperatures sampled with stream surveys in the early 1950s (Oakley 1963) suggest that cooler temperatures were more widespread than those measured today during the maximum stream temperature period July-September. Prior to 1950 most headwater areas were undisturbed mature conifer or mixed hardwood/conifer although agricultural use of bottomlands was at a peak. This suggests that tributary streams, mostly Federal lands, may be important controllers of stream temperature in the watershed. If riparian areas and lower hillslopes on Federal lands were closer to a condition similar to before 1950 in a near reference condition, cooler stream temperatures might be as widespread as seen in these early stream surveys.

Most stream temperatures in the watershed currently are above preferred temperatures for native fishes. Decreases of stream canopy closures from a reference condition and reduction of cooling from groundwater and possible changes in low flow regimes interact to create warmer stream temperatures. Channel widening and exposure has occurred in depositional channels and in some source channels along debris flow tracks particularly after the 1964 flood event and more recently during the February 1996 storm in the Lobster Creek drainage.

Through the combined efforts of a number of agencies including ODFW, USFS, BLM, & OSU, considerable water temperature data has been collected in the WA area during the last five years. This analysis represents a compilation of the data. In an effort to make this wide variety of data useful, it has been reduced to unit values representing a moving average of seven daily maximum temperatures. This conforms with DEQ temperature standards analysis (DEQ 1996). Temperature monitoring sites are located on Map 23. Graphs of temperature monitoring data for various streams are available at the Siuslaw National Forest and Salem BLM offices.

TABLE 22: TEMPERATURE THRESHOLDS FOR AQUATIC SPECIES

Species	Temperature	Impact	Reference
Coho	14^{o} C	Upper Limit Preferred	Bjornn & Reiser,1991
Steelhead	13^{o} C	Upper Limit Preferred	Bjornn & Reiser,1991
Coho	20.3^{o} C	Cease Growth	Bjornn & Reiser,1973 Brett,1952
Steelhead	22^{o} C	Actively Avoid	Mantelman,1960 cited by Beshta et al 1987
Coho	$12\text{-}15^{o}$ C	reduced migratory & sea water survival; Parr to Smolts	Zaugg & Wagner, 1973 as cited in CWRD,1988)
Steelhead	12.7^{o} C	reduced migratory & sea water survival; Parr to Smolts	Zaugg & Wagner, 1973 as cited in CWRD,1988)
Steelhead	16^{o} C	decline in .37 lb/100 ft^2 at this max	Li et al. , 1992
Tailed Frog	19^{o} C	threshold for normal egg development	Brown, 1975

Based on existing water temperature data (91-96), Table 23 provides the tributaries or reaches which are considered to be properly functioning or nearly functioning providing temperatures near the optimum range ofcoho and steelhead through the summer period of rearing. These tributaries could be considered cold water refugia. Some tributaries and the headwaters of streams in the Lobster / Five Rivers watershed provide important cold water refuge areas that may sustain depressed populations of salmonids. Upper Lobster, East Fork Lobster, West Fork Lobster, and the southern portion of Middle Lobster subwatersheds provide cool water areas and show relatively better populations of salmonids (Map 26). The Upper Buck subwatershed is similar. The Elk and Upper Five subwatersheds, the Cougar Creek drainage in the Crab subwatershed, and upper Camp Creek and Preacher Creek also contain currently cool water stream reaches that may be important refugia. Salmonid abundance are unknown in these areas although stream surveys indicate relatively low densities of salmon and trout.

Other tributaries in Lower Middle Lobster, Lower Lobster, and Lower and Middle Five subwatersheds are important as *potential* cold water refuge areas in the lower watershed. Stream temperatures are currently above the reference condition and some exceed the water quality limited threshold in some years. Long-term trends in vegetation and land use indicate that these tributaries could provide water temperature in the preferred range for salmonids in the future.

TABLE 23: TRIBUTARIES WITH STREAM TEMPERATURES NEAR REFERENCE

Confluence River Mile	High 7-day Mean Maximum, ^{o}C	Tributary Name	Subwatershed
19.8	18.2	Upper South Fork Lobster	Upper Lobster
17.7	16.3	J Line Creek	West Fork Lobster
17.4	15.0	East Fork Lobster	East Fork Lobster
15.6	16.0	Bear Creek	Bear
2.2*	15.7	Upper Preacher Creek	Preacher
1.1*	17.5	Upper Camp Creek	Camp
2.2	16.1	Elk Creek	Elk
16.9	16.3	Summers Creek	Upper Five
5.3*	18.6	Upper Buck Creek	Upper Buck
10	17.7	Cougar Creek	Crab

*RM on tributaries

Table 24 Displays tributaries or reaches which during the period of monitoring contained temperatures above the reference condition (not properly functioning) and exceeding the Oregon DEQ standard.

Stream temperature monitoring stations results in comparison to the State water quality standard for the mainstem of Lobster Creek and Five Rivers are displayed in Figures 12, 13, and 14. These channel below RM 19.7 on Lobster Creek and RM 19.5 on Five Rivers do not provide suitable aquatic habitat due to temperature limitations for at least a portion the rearing period. At present only Cascade Creek is designated as water quality limited in the current 303d report (DEQ, 1996). Using the current temperature standard, it appears that potential exists for this designation in some of the tributaries in Table 24 and in mainstem Five Rivers and Lobster Creek.

TABLE 24: TRIBUTARIES OR REACHES WITH ELEVATED STREAM TEMPERATURES

Five Rivers Tribs.	Confluence @ RM	High 7-day mean max, ^{o}C	Lobster Creek Tribs.	Confluence @ RM	High 7-day mean max, ^{o}C
Cascade Creek	6.6	20.5	Phillips Creek	3.4	19.8
Buck Creek	9.7	23.2	Lower Camp Creek	5.1	20.0
Green River	14.6	20.6	Little Lobster	7.8	19.0
Upper 5 Rivers	19.5	20.5	Lower Preacher Cr.	9.8	21.3
			Debris Flow Trib.	19.75	20.5

Figure 12: The number of days of exceedance (mean for 5 years) for the water quality standard of 17.8C along the main channel of Lobster Creek. Based on this period of record it appears that this channel could be considered for water quality limited status from RM 0 to RM 12.

Figure 13: The number of days of exceedance (94 & 96) for the water quality standard of 17.8C along the main channel of Five Rivers. Based on these values it appears that this channel could be considered water quality limited up to RM 19.5.

Figure 14: Data taken in the upper Lobster Channel during the summer following the flood impacts of 1996. The main channel throughout the system exceeded the standards. The major flood effect occurred at RM19.6 from a debris flow tributary. Cooling occurred in the debris jam below.

High summer stream temperatures in mainstem Lobster Creek and Five Rivers restrict rearing of juvenile salmon and trout in the lower mainstem habitats (Figures 12-14). Spring Chinook are potentially excluded from the watershed. Spring Chinook enter the Alsea River Basin in May through July then spawn in September and October. Mainstem summer temperatures are above disease and spawning thresholds and, at times, potentially block migration for this species. Late-spawning wild winter steelhead egg and fry mortality is probably higher in the lower mainstems and many tributaries which exceed 12.8^{o}C in May and June. Fall Chinook juveniles limited to the mainstem and lower ends of tributaries may be forced to migrate downstream earlier than in a reference condition. Although trends of fall Chinook indicate that this is not a limiting factor an early migration may affect other aquatic or terrestrial species.

For areas where stream temperature data was not available, in order to determine the potential of stream warming that currently exists in the analysis area, current vegetation within 100 feet of stream channels was grouped by seral class. Geomorphic segments were integrated into this analysis since various landforms require different levels of vegetation to provide adequate shading potential. Table 25 displays the relationship between seral class and geomorphic segments that either results in a high or low potential for stream warming.

TABLE 25: SHADING POTENTIALS OF VARIOUS GEOMORPHIC SEGMENTS

Channel Type	Seral Stages with high potential for stream warming	Seral Stages with low potential for stream warming

1st and 2nd order confined headwater source channels	Grass-forb, which includes agricultural lands, or early seral (brush, seedlings, and small saplings)stages; both less than 10 years old that provide little shade.	All other seral stages including mature conifer, hardwoods, and older conifer managed stands that provide adequate shade in these narrow streams channels.
Confined, 3rd order or larger channels; mostly transport channels	Grass-forb, early seral, and conifer or conifer-deciduous mix pole stages (11-24 year-old managed stands) which cannot yet provide enough shade in these wider stream channels.	All other seral stages including mature conifer and hardwoods that are tall enough to provide shade in these wider channels.
Moderately confined channels; mostly 3rd-5th order or larger deposition channels	Grass-forb, early seral, conifer pole, older plantation stages (conifer and conifer deciduous mix 25-50 years old), and hardwoods with open canopies[1] that cannot provide adequate shade in these wide, more dynamic channels.	All other seral stages including mature conifer and hardwoods with canopies dense enough (>51% canopy closure) to provide shade in these deposition channels.
Unconfined, 3-4th order channels; Mostly depositional flats channels	Grass-forb, early seral, conifer pole, older plantation stages and hardwoods with open canopies[1] that cannot provide adequate shade in these wide, terraced valleys.	All other seral stages including mature conifer and hardwoods with canopies dense enough (>51% canopy closure) to provide shade along the terrace edges.
Unconfined, 4th order or larger channels; all depo-sitional flats chan-nels in wide valleys.	All seral stages except mature conifer.	Only mature and late-seral conifer stages can provide adequate shade in these wide stream channels.

[1] *For BLM managed subwatersheds vegetation data does not include canopy closure so all hardwoods are considered to provide adequate shading. This may underestimate high potential warming miles in Upper Lobster and Little Lobster subwatersheds.*

Based on this integration, Figure 15 depicts the number of stream miles by subwatershed which are considered to have a high potential for stream warming. Map 23 shows the spatial distribution of areas within the subwatersheds with a high potential for warming. Mainstem Five Rivers and Lobster Creek, comprised mostly of private lands, contain the largest number of miles with a high potential for stream warming. These reaches currently exhibit the highest

Figure 15. Miles of stream with high potential for warming from inadequate riparian shading.

stream temperatures although cumulative warming from tributaries are also a factor. Early seral stands comprise the majority of riparian acres (approximately 55%) potentially providing inadequate shade. Grass-forbs seral stages, largely agricultural lands, comprise nearly 20% of the acres and hardwoods another 20%.

The total number of riparian stream miles with a high potential for stream temperature increases, represents approximately 13% of the total stream miles in the watershed. Percentages of high potential warming miles by subwatershed ranged from 1% in Elk, one of the coolest streams, to 20-30% for the mainstem subwatersheds.

Since the majority of the watershed is in Federal ownership, it follows that most inadequately shaded stream miles occur on Federal lands. These streams are dominated by managed stands or alder stands. Potential warming from managed stands may be overestimated. Some of these channels are intermittent but because most provide flow through the early part of the warming season they were retained in the analysis. Only early seral managed stands were considered to

Map 23 ACurrent Condition Shade and ...@

have a high potential for stream warming along the small order source channels. More analysis and modeling should be performed in these channels to determine their contribution to stream warming in the watershed.

Riparian shade may be underestimated in Upper Lobster subwatershed. Due to the 1996 flood events riparian canopy in the Upper Lobster subwatershed has been severely degraded due to flooding and landsliding affects. This data is not representative in Table 25 or Map 23 as these impacts occurred within the last year. Hardwood riparian areas in larger order channels seem less effective at providing shade. In Five Rivers most hardwood stands are comprised of young-large alder 9-20 inches in diameter with only about half the stands providing adequate canopy closure. When mature timber is removed from adjacent hillslopes the remaining alder bottomlands do not provide adequate canopy closure. Some of these stream reaches may require over a century until trees are large enough to provide adequate shade.

Growth of juvenile salmon and trout, and their ultimate size before they smolt, is important to the overall survival during downstream migration and ocean survival. Figure 16 provides a relative indication of coho salmon growth loss due to elevated water temperature; for this analysis a Azero@ growth threshold of 20 ^{o}C from Table 22 was used. The number of rearing days above the 20 ^{o}C threshold may also represent a indication of disease susceptibility and mortality. For coho salmon, growth would be diminished and risk of disease would be high within the lower 10 miles of Lobster Creek in the Lower Middle Lobster and Lower Lobster subwatersheds and at least within the lower 14 miles of Five Rivers in the Lower and Middle Five subwatersheds. Similar conditions exist in the lower end of most major tributaries of Five Rivers: Buck Creek, Green River, Crab Creek, and Cascade Creek. Stream temperatures in lower Preacher Creek, a Lobster Creek tributary, also exceed the 20 ^{o}C threshold.

At elevated stream temperatures fish may try to find refuge in cold water areas in the stream channel such as at the mouth of cold water tributaries and springs or in deep pools. Lindsay *et al.* (1986) showed that available rearing areas decrease as water temperature increases and that fingerlings will migrate considerable distances to avoid the stress of elevated stream temperatures. The availability of cold water micro-sites within the mainstem channels is unknown. Fish sampling in the mainstems seems to indicate that juvenile salmonids aren=t simply redistributing to potentially cooler pools during warmer stream temperatures but are moving out of the system (OSU 1991, Siuslaw National Forest 1994).

Using the preceding impacts as a measure, it is quite possible that the fish associated with the lower mainstem channels are using the remaining cool water tributaries which directly flow into the lower river. These tributaries are recognized as having significance in terms of providing the remaining rearing habitat for the lower river zone. These conditions represent tributaries which are considered special areas of water quality management by the DEQ. *The intent of the cold-water refugia designation is to provide ecologically significant refuge that is of limited supply to stenotypic cold-water species not widely supported within the subbasin* (DEQ 1995). Loss of lower river rearing habitat from water temperature increases have resulted in reduction in life history diversity of many salmonid species over the period of development in many basins. This is caused by the loss of segments of the population having life histories that exploit lower river habitats during spawning and rearing (Rhodes et al., 1994).

Migration of fish from warm water mainstem habitats into cooler tributaries is critical to the survival of salmonids. Table 23 and Map 26 depict existing and potential cold water

Figure 16 (Part 1). Days of A0@ Growth for Coho. *The total number of days is also provided for the relative exposure during the rearing period. Lobster Creek RM 19.6 represents the impacts from a significant debris flow tributary. Note that immediate cooling by RM 19.5 is realized from a debris jam in this reach.*

Figure 16 (part 2). Days of A0@ Growth for Coho. *The total number of days is also provided for the relative exposure during the rearing period. Lobster Creek RM 19.6 represents the impacts from a significant debris flow tributary. Note that immediate cooling by RM 19.5 is realized from a debris jam in this reach.*

refugia areas. Protection of in-stream and riparian habitat is critical in these subwatersheds. Strict adherence to best management practices must be employed to reduce the risk temperature increases in these subwatersheds whenever management activities are employed. This adherence will help to maintain the quality of these areas. Migration from the mainstems to these cold water refuges is often blocked by culverts on the County roads paralleling Lobster Creek and Five Rivers. The trend of fish passage may be declining if examples like the recent replacement of the Phillips Creek culvert which worsened fish passage become commonplace. In addition, fish moving into other areas must compete with established fish populations for limited rearing space. Densities of fish in these areas are probably currently restricted by the lack of complex rearing pools critical for summer rearing and potentially low levels of winter rearing habitat.

In the future, maximum stream temperatures in watershed tributaries may slowly decrease towards reference conditions with long-term trends of vegetation recovery and restoration of Federal lands and private timber lands. Overall downward trends noted in riparian canopy closure on private lands during the early settlement period through the late 1950s have stabilized and improved during the last 30 - 40 years. These riparian zones have experienced re-growth and canopy closure. Recovery of mainstem stream temperatures will lag behind. Significant riparian openings still remain along the rural residential and agricultural mainstem Lobster Creek and Five Rivers channels.

LOW FLOW

Reduction in low flows can have an effect on stream temperature increases and competition stress from reduced habitat. Large wood removal by past management practices has reduced the ability of the associated riverine wetlands to store and release cold water during the summer low flow periods. This is a significant loss considering the fact that functioning floodplains in the current condition are now producing groundwater outflow in the 50-55F range. The lack of wood in the channel limits the local groundwater and surface water interaction in the riparian zone decreasing the rate of local groundwater recharge. Large wood provides a frictional element which slows the movement of water and sediment from the watershed, thus capturing material which aids in the storage of water along with the mechanism to recharge and cool it. A good example of this occurred as a result of the large debris flow above RM 19.6 on Lobster Creek which caused extreme channel change and exposure. As a result of this a significant debris jam accumulated downstream at RM 19.5. These drastic changes offered a chance to collect a reference condition following such a event. What is noteworthy is the extreme warming that occured in the debris track channels and the significant cooling whichoccured in the debris jam (Figure 14).

Summer low flow condition has progressively degraded from historic conditions to the present. Abandonment and entrenchment of floodplains in the lower portion of Lobster Creek (RM 0-3.5 & 7.5 - 10) and some of the mainstem of Five Rivers has reduced the depth and area of the local riparian water table promoting an overall reduction in the water available for low flow during the summer critical period for rearing habitat.

The lack of large wood throughout the system has exacerbated this problem. Water can be expected to leave the system more rapidly as access floodplains has diminished. Low flow condition is directly linked to the amount and quality of aquatic habitat. Comparison of base flow between gauge record at East Fork Lobster and Five Rivers at Fisher with the Alsea Basin Study watersheds provides a indication of reduction in low flow dependent on watershed condition. The base flow per square mile of watershed in the Acontrol@ watershed (Deer Creek) is .256 cfs/sq mi compared to .095 cfs/sq mi in East Fork Lobster. This reduction in base flow can be attributed to a number of causes including: species conversion, reduction in storage (local groundwater) and entrenchment.

The capability of the stream channel and riparian zones in the watershed to ameliorate stream temperature increases continues to be limited by the legacy of historical impacts and the lack of key component recovery. The lack of large wood in the channels, low future recruitment potential, and the dis-connection of stream channels from historic floodplains diminishes the current capability to promote the cooling effect from local groundwater sources.

ISSUE 4: PRODUCTION OF TIMBER IS AN IMPORTANT OBJECTIVE FOR THE AREA DESIGNATED AS MATRIX BY THE NW FOREST PLAN

Timber is one of several forest products which have been extracted from this area as a commodity. Several local residents have made their living in industries related to the extraction of forest products - from road building , timber harvest, reforestation and release to collection and sale of greenery, mushrooms and other forest products. This issue focuses solely on timber as a commodity as it relates to past, present and future trends.

Forest management objectives in the past were directed at multiple use management offorest lands which included timber, water, wildlife and recreation. The trajectory for timber rotation was approximately 80 years for a sustainable forest product output. As a result, about 12% of the federal landbase had been harvested per decade (Table 15) since the late 1950s, early 1960s. (Map 14). Harvested areas were seeded with grasses to enhance elk forage and recreational opportunities.

Based on the number of acres that have been harvested on federal and private land in the watershed (Table 15), approximately 46,000 acres or 61% of the land area has been harvested. Assuming that the average volume at age 100 is 65 MBF/ac, it is estimated that 2.4 BBF of timber has been extracted from this watershed. On the average, about 500 acres/year were harvested on federal land yielding approximately 29 MMBF/ year.

In the 1990s this rate of commercial timber harvest was drastically changed due to identification of the potential for loss of the Northern Spotted Owl resulting from habitat loss. Since 1991, little commercial harvest of timber has occurred in the watershed.

The NW Forest Plan was developed to provide a credible, large scale assessment of the habitat for threatened and endangered species as well as provide for socio economic considerations. As a result of the land use allocations developed in the NFP, 94% of the Lobster/Five Rivers watershed was identified as a reserve for both late-successional and aquatic species. The remaining 6% of the watershed is designated as Matrix and expected to provide for a sustainable level of commercial timber harvest.

There are a few areas within the Matrix allocation wherecritical connectivity functions for transfer of late-successional species has been highlighted by this and other analyses. Specifically, the Green River, Upper Buck Creek, and Crab Creek subwatersheds which currently are highly fragmented and not functioning as connectivity habitat are of concern. Their proximity to currently functioning habitat and their location between surrounding LSR networks render those subwatersheds as critical connectivity areas. Both the LSRA (Siuslaw 1996) and this analysis recommend that those areas be managed to provide for connectivity and dispersal of late-successional and aquatic dependent organisms. At a minimum, the preliminary boundaries of the Riparian Reserve network would need to be maintained and upland vegetation treatments should provide for dispersal habitat (i.e. 40% canopy cover).

In addition, there is an existing block of contiguous mature conifer in Lower Buck Creek that is currently providing sufficient interior habitat to be a functioning block. However, no T&E surveys have been conducted in that area to document use. The recommendation is to leave that block unharvested until harvested areas within the LSR boundary have matured enough to provide quality habitat.

Other subwatersheds where Matrix land use has been allocated are associated with landforms that have a moderate to low susceptibility to landslides. Following site specific evaluation, it may be appropriate to reduce the width of Riparian Reserves in those areas which would provide for a larger land base for sustainable commercial timber production. Aquatic Conservation Strategy objectives would dictate the ability to reduce Riparian Reserve boundaries. At this point, no attempt has been made to determine acreage that would be available for sustainable commercial timber harvest.

Identification of the function of the above mentioned areas will help to guide levels of appropriate harvest on Matrix lands. Matrix areas, as identified by the NFP are small blocks along the ridge systems (Map 24). The acres of each seral class is included for reference (Table 26). The range of appropriate treatments for these types of areas has not been determined at this time. In addition, due to the complexity of prescriptions that result following site specific evaluations, no further calculations of expected sustainable harvest from these areas was done in this analysis.

TABLE 26: SERAL STAGE OF VEGETATION IN MATRIX OUTSIDE OF RIPARIAN RESERVES

Seral Stage of Vegetation	Acres	Percent
Grass/Forb	2	0
Early Seral < 10 yrs.	550	14
Early Seral 11-24 yrs.	791	20
Early Seral 25-50 yrs.	856	22
Mid-aged conifer <80 yrs.	59	1
Mature conifer >80 yrs.	1213	30
Hardwood dominated	513	13

Map 24 ACurrent Vegetation in Matrix ....@

Map 25 – Mature conifer Patch Connect

Map 26 AAquatic Priority Areas@

ISSUE 5: ACCESS WITHIN AND THROUGH THIS WATERSHED IS IMPORTANT

Population in the watershed remains fairly constant with original homesteads being sold to new landowners or passed down through family members. Little subdivision of parcels has occurred. Population estimate is slightly less than 150 people living in the watershed. There are no towns, school or churches within the watershed.

Most people work outside of the watershed boundary. Locals used to have sufficient work on federal and/or private land to be within commuting distance of home doing work associated with timber harvest and for reforestation. Now locals travel as far away as Alaska to find seasonal work in such occupations as road construction. Reforestation contract crews are still employed locally with precommercial thinning activities although the quantity of work is reduced. Local logging companies are currently being employed on private lands. Employment for heavy equipment operators or loggers on federal lands is limited to stream or road restoration contractors. Prindell Creek Farms is a local employer with seasonal work crews coming from both inside and outside the watershed to help with tree seedling lifting and packing.

Access to this watershed was assessed at four levels. The first is access to and from private land holdings. The County and private road systems facilitate the majority of this access (Maps 28-30 - red roads). Some industrial forest lands, however, are accessed by federal road systems and a Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA) secures access to these lands.

The second critical level of access is that road system necessary to facilitate movement through this watershed to the surrounding areas. Maps 28-30 (green roads) shows those routes that are either consistently used by locals or visitors to the area or are necessary for administration of Federal lands. This road system provides access to the majority of dispersed recreation areas that are currently utilized in the watershed. Together these first two levels display the Access and Travel Management (SNF) or Travel Management Objectives (BLM) system that will be maintained as the open road system. BLM TMOs are not final and will be revised at a later date. The majority of these roads, especially the major travel corridors were in use, for the most part, prior to 1934.

Access within and through this area grew since the turn of the century with a boom in road construction in the late 1950s and early 1960s (Map 14, Table 27). Most of the roads in to the area were in place by the 1970s with only spur roads to facilitate timber harvest constructed in the 1980s and early 1990s. Many of the road systems in the Five Rivers area are blocked by wildlife gates to limit harassment of wildlife. Often these closure sites are used as dispersed camping sites during the hunting season and hunters access the closed area on foot.

The third level of road access brings in the ridgetop roads that need to be utilized for initiation and maintenance of project work within the watershed (Maps 28-30- blue roads). One option for continuation of forest management is to access all areas from the ridges with fewer (only ATM, TMO) roads coming off the ridge into the riparian areas. For example, with this option, Forest Road 3215 and 3220 and 3230 would be closed from the ridge down while Forest Road 3210, 37, and 3705 would provide access from the valley to the top of the watershed.

Due to the reduction in maintenance funds as a result of reduced timber harvest activities, the system of roads which covers the watershed cannot be adequately maintained. In order to minimize the effects on fisheries, the unmaintained road systems need to be hydrologically stabilized i. e. waterbarred, culverts removed or designed to allow passage of debris during storm flow events. Maps 28-30 (black roads) shows all the current spur roads that are priority for closure or obliteration following assessment of need to facilitate restoration and management of federal lands.

There are currently 313 miles of road on Federal land in the watershed. On the average, road density is 3.4 miles/ mi^2 with a range of 2.5 miles/mi^2 in Lower Lobster Creek subwatershed to 4.6 miles/mi^2 in Upper Lobster Creek subwatershed.

The ATM plan would result in 83 miles of road on Federal land in the watershed. In addition, key roads for administration of current and future projects would result in another 72 miles of road. These roads would be opened or closed depending on project access needs and timing. This would be a maximum of 155 miles of road in the watershed.

At some future date, assuming all identified spur roads are closed or obliterated, 158-230 miles of road would be closed. The larger number includes the roads identified for administrative use.

TABLE 27: TRENDS FOR ACCESS

Critical Element	Trend Reference ≥ Current	Major Causes	Ecological or Social Processes Affected	Possible Actions	Future Trend
Road Access	**Increase**	**Initially homesteading, expanded by timber harvest, utilized by recreationists**	**hydrologic processes, landslides, sediment routing, human use of area**	**maintain critical traffic flows through watershed for local, recreation, and administration use, maintain project roads until not needed, close spur roads**	**Decreased roads**

Recreation use of the watershed is light other than short periods of high use related to fall elk hunting and or fishing (two to three weeks in November). Deer and bear hunting is somewhat longer term (one to four months). Some recreation is centered around the mainstems of Lobster, Five Rivers and major tributary streams especially during the summer. Denzer Meadow gets a lot of use, sometimes long-term. The lack of garbage and toilet facilities in this concentrated use area is leading to problems.

Green River is also a dispersed recreation focus area. This includes the large meadow at the confluence with Five Rivers and several dispersed spots in the forest adjacent to Green River. This area, has been identified as part of the proposed Corvallis to the Sea Trail. Closure or obliteration of a portion of Forest Road 3231 (Green River Road) will not foreclose this option and will facilitate non-motorized access into the forest.

Both recreationists and small business people require access to harvest forest products i.e. greenery, mushrooms, transplants. Fewer areas will be easily accessed as more roads are closed, gated or unmaintained.

CONDITION OF ROADS

As a result of the storm in February 1996, several large landslides have blocked road access in the watershed. Roads associated with the ATM system will be reconstructed to allow access. Other road access will be assessed with project needs.

With reduced brushing and maintenance of roadside vegetation, and increased waterbarring, access within and through Federal lands will be slower and more hazardous.

Appendix H lists the current condition of roads within the watershed by roadnumber, based on surveys conducted during the summer of 1996 (after the flood).

CHAPTER VI: MANAGEMENT OPPORTUNITIES

Management opportunities and a prioritization of restoration areas are captured in this chapter. The analysis to this point, determined where and what type of ecological components, critical for various resources, are missing or reduced in quantity and/or quality. Information gained throughout the analysis helped to determine what types of management activities may be appropriate to restore particular ecological conditions or processes. The integration of what's missing, where, and what may be appropriate to restore that condition was used to guide recommendations for the general placement of activities on the landscape. The activities suggested on the subwatershed maps at the end of this chapter, are site specific when such site specific needs were known, but more generally, the recommendations refer to overall conditions and will require site specific analysis prior to implementation.

PRIORITIZATION OF RESTORATION AREAS

The first step in this phase of the watershed analysis process was to document, on a landscape scale, where the watershed was functioning from a terrestrial and aquatic standpoint. It is important to maintain this overall landscape perspective. The ability to see larger scale relationships can be lost when reducing recommendations to subwatershed levels. At times, management activities will focus on restoration of a single resource, in those instances, the areas highlighted on Maps 25 and 26 would be used to determine restoration priorities.

1. Terrestrial Landscape Assessment:

Several larger scale analysis efforts (LSR and Federal Lands Assessments) were referenced to determine how the Lobster-Five Rivers watershed was functioning with regards to terrestrial species of concern in the Coast Range. The location of known sites and existing habitat condition was analyzed at the watershed scale and related back to the larger scale to determine how the different areas of the watershed were functioning. Emphasis on maintaining large blocks of mature and interior forest habitat (refugia) and providing linkages within and to areas outside of the watershed is a priority for late-successional forest species. Map 25 depicts the remaining large blocks of mature conifer and corridors that are critical for protection and/or acceleration of the development of old-growth forest components.

This evaluation also identified areas of potential conflict and areas of opportunities within existing management direction. These included such things as:

- the identification of functioning blocks of mature forest habitat in areas designated as Matrix

- the opportunity to establish topographic boundaries instead of 0.5 mile radius circles for murrelet activity areas.

- identification of appropriate areas to evaluate for the reduction of riparian buffer widths

- opportunities for maintaining a mosaic of habitat types for other species (primarily elk) to minimize potential conflicts with private landowners

2. Aquatic Landscape Assessment:

Functioning and partially functioning cold water refuge areas were identified (Map 26). These too are important areas for protection and/or enhancement. In addition, subwatersheds where quality fish production is occurring were identified (Map 26). A watershed scale restoration plan for fisheries would focus on these quality areas first. Habitat restoration in the key watershed would take precedence over the other areas. The subwatershed data sheets and maps that follow also indicate potential cold water refuge areas and opportunities to restore stream temperatures.

3. Silvicultural Opportunities and Access

The plantations layer was then overlaid with the transportation system to look for integrated opportunities. This landscape assessment of a variety of emphasis areas enabled us to determine a number of things:

- Prioritized treatment areas
- Multiple entry opportunities - areas accessed by ridgetop or ATM roads
- Single entry areas - valley bottom or short spur access
- Areas to maintain or enhance species diversity (i. e. western hemlock, western redcedar and hardwood diversity areas)
- Areas to develop a shade-tolerant understory

When evaluating species mixes in the plantations and natural forests across the landscape, it was noted that the shade tolerant conifer species locations matched fairly well with known areas of *Phellinus werii* (laminated root rot) infestation. Shade tolerant species tend to be fairly resistant to *Phellinus* infection and should be encouraged in these landscape areas (Map 27).

To assist in the selection and arrangement of specific treatment units, road access by plantation age is displayed in Maps 28-30.

Map 27 AExisting species Diversity@

Map 28 AManaged Stand Access .... @

Map 29 ARoad Access -11 -24 years old@

Map 30 AManaged Stand Access (> 25 years ....@

4. Overall Landscape Prioritization

The team evaluated all five issues together at the subwatershed scale to facilitate implementation of restoration (Map 31). When all resources are considered, the combination of all five issues balances the prioritization of treatments. Single resource concerns should refer back to the appropriate landscape analysis.

The method utilized to establish prioritization of subwatersheds for future management activities is outlined in Appendix I.

APPROPRIATE MANAGEMENT ACTIVITIES

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. This is particularly important when determining the primary need for treatment within LSR or riparian reserves and to evaluate the future outcome of the stand: keeping all the pieces.

Although the majority of the watershed is in Reserve, forest management must still be pursued if long-term objectives are to be met and the attainment of those objectives accelerated to the degree possible. Justification for this assumption is described in the following section.

The LSRA (Siuslaw 1996) determined that given the high density and predominantmonoculture 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. These include:

_ thinning to control density and produce desirable characteristics
_ underplanting with shade tolerant species
_ selecting for both species and structural diversity
_ developing prescriptions that are ecologically based i.e. working within the successional pathways of different environments.
_ creation or maintenance of snags and CWD

For silvicultural prescriptions of CWD in managing plantations, a recommended Anumber@ 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 trajectory of the curves supplied by this analysis. The importance of managing for CWD in plantations is to provide continuity which is important for the succession of fungus and lichens. As with plant

Map 31 APriority sub-watersheds@

succession a much wider diversity of fungus and lichen species occur in mature and old-growth. However, many species of fungus and lichens appear to have much lower abilities to disperse and re-inhabit an environment after being absent.

The final objectives of stand characteristics should dictate the application of various silvicultural prescriptions. Care must be taken in applying silvicultural treatments that do not eliminate options to obtain key structural, functional or diversity components in the stand. The following analysis was done to determine a rough range of structural features and timber/fiber commodities that could be expected given certain silvicultural scenarios.

An average stand in the Lobster/Five Rivers watershed was modeled using ORGANON (Willamette Valley Version) to determine potential growth, mortality, and timber volumes. Stand examination 93101 located in the Green Riversubwatershed with a site index of 135 comprised mostly of 26 year old Douglas-fir with a small component of red alder was used as the average stand. The stand was grown for a period of 5 years to age 31 to reflect current conditions. The model indicated an average of 268 conifers per acre with a total of 275 trees per acre including the hardwood component. At 31 years of age the quadratic mean diameter is 11.5 inches at DBH, the mean diameter is 10.8 inches DBH. The height of the 40 largest trees is 86.3 feet. The stand density index is 343, relative density index is .659 and mean crown ratio is .369. At 31 years of age four different management scenarios were imposed on the stand for modeling purposes.

1. The stand was grown to 150 years of age with no treatment (beyond age 120, the model extrapolates).
2. The stand was commercially thinned by basal area to 40 residual trees per acre (TPA) and grown to 120 years.
3. The stand was commercially thinned by basal area to 100 TPA and grown to 120 years.
4. The stand was commercially thinned using a specified range of diameters (7@ to 14@ DBH) to 100 TPA and grown to 120 years.

The model was not modified to show potential natural regeneration or anyunderplanting; it is only growing the residual trees as directed by the particular management scenario. Table 28 and Figures 17-19 display the model results at 31, 51, 101, 121, and 151 years of age for the quadratic mean diameter, height, and the number of trees per acre for each of the four management scenarios. This data was used to assess:

- changes in diameter over time and to specifically look at what treatments would reach an average of 24@ DBH; important to both wildlife and fisheries management, in the shortest time possible
- the average number of live trees per acre over time as an indicator of habitat quality
- the rate of mortality, another indicator of structural characteristics

ORGANON model runs were used to evaluate the long-term development of plantations under various silvicultural treatments. The following charts outline the levels of residual live trees, cumulative levels of snags and logs (mortality) over time and the expected mean diameters of the stands under three treatments (No action as control):

TABLE 28. MANAGEMENT SCENARIOS AND TREE GROWTH TO 120 YEARS

	No Action			Basal Area Cut to 40 TPA			Basal Area Cut to 100 TPA			Diameter Cut to 100 TPA		
AGE	TPA	Q.M.D.	Height	TPA	Q.M.D.	Height	TPA	Q.M.D.	Height	TPA	Q.M.D.	Height
31	268	11.5	86.3	42.1	11.6	73.9	105.3	11.5	84	100.5	12.4	86.3
51	189	16.1	127.4	39	18.1	116.2	92.6	17.3	126.9	81.7	18.9	128.4
71	138	19.9	156.2	37.7	24.8	148.5	82.5	21.9	157.8	68.9	24.2	158.5
101	95	25	187.3	36.1	31.3	181.4	68.7	27.1	190.9	56.7	30	190.3
121	79	27.9	202.8	35.1	34.3	197.7	61.2	30	207.1	52.6	32.8	206.2
151	63.1	31.7	220.4				52.3	33.6	225.8			

Figure 17: Residual Live Trees Resulting From Various Silvicultural Treatments

Another important factor to habitat quality is the mortality within a stand over time. Standing dead and down trees contribute to ecological complexity which can increase habitat quality and consequently diversity of species across a landscape.

Figure 18: Cumulative Tree Mortality Resulting From Various Silvicultural Treatments

Figure 19: Stand Diameters Resulting From Various Silvicultural Treatments

Figures 17 - 19 display the results of some of the structural characteristics that could be expected (based on ORGANON Modeling) given different silvicultural prescriptions. This information will assist in the determination of the appropriate forest management treatment based on the desired outcome. For example, if the desire is to produce the largest diameter trees as quickly as possible, thinning to 40 TPA at age 31 may be an appropriate application. However, if there is also a desire to allow for natural senescence of trees and a standing or down wood structural component in the stand, then, perhaps, thinning to 100 TPA by basal area or through a diameter limit cut application is more appropriate. Leaving plantations alone results in many trees per acre which die off due to competition, creating small diameter snags and down wood. By age 121, all treatments result in less than 80 TPA overall.

Based on the above analysis and following guidelines developed in the LSRA (Siuslaw 1996), it was determined that within Reserve boundaries, a variety of silvicultural opportunities can be considered(including no treatment options). Table 29 indicates the potential volume in each subwatershed of the analysis area based on management scenarios 2 and 3 as described above. The resulting volumes were developed by multiplying the number of acres of managed stands 21 through 40 years of age by the cut volumes for management scenarios 2 and 3. This total volume was then divided by 19 to provide an annual volume amount. The annual volume was subsequently cut in half to reflect constraints to potential timber volumes when balanced against the Aquatic Conservation Strategy and late-successional reserve objectives. These amounts are what could be available over the next ten years. In ten years the plantations that are now between 11 and 20 years of age would then be potential candidates for commercial thinning volumes.

TABLE 29. POTENTIAL TIMBER VOLUMES BY SUBWATERSHED USING MANAGEMENT SCENARIOS 2 AND 3

ıbwatershed	Acres of 21-40 yr old plantations	Total Annual (BF) Vol. @ 31 Yrs.	(BF) Vol @ Resid. 40 TPA	(BF) Vol @ Resid. 100 TPA
r	401	225,162	130,821	082,131
ive	723	405,965	235,869	148,082
Five	709	398,104	231,302	145,214
'ive	1355	760,833	442,051	277,525
	109	061,204	035,560	022,325
cade	883	495,805	288,067	180,852
uck	996	559,254	324,932	203,997
Buck	803	450,885	261,968	164,467
o	1111	623,827	362,449	227,550
en	1913	1,074,150	624,091	391,813
obster	755	423,933	246,309	154,636
np	810	454,815	264,252	165,901
ıcher	971	545,217	316,776	198,876
. Lobster	594	333,531	193,785	121,661
WS/BLM	6758	4,806,515	1,396,315	876,625
ıual Vol. er Ten Years		**11,619,194**	**5,354,547**	**3,361,655**

The merchantable Douglas-fir volume within the stands ranged from a low of 8 MBF and 9 MBF in the two Cascade Creek Stands (Stand Exam #146 and #149) to a high of 19 MBF (SE #161) in Upper Buck and 20 MBF in Cascade Creek and Lower Five Rivers (SE #144, 148).

In addition to density management of vegetation in plantations there are a variety of other techniques that are appropriate to employ for restoration of this watershed. Table 30 synthesizes the techniques and relates it to the ecological component effected.

TABLE 30: RESTORATION OPPORTUNITIES FOR KEY ECOLOGICAL OR SOCIAL ELEMENTS

ey Element	Status	Restoration Activity
ırge Woody ebris	Decreased occurrence in stream channels	Protect existing mature source areas Allow delivery across roads Manage young vegetation to produce large trees Plant conifer in riparian areas
reambed ıbstrates	Decrease in Quality	Reduce road density Insure road maintenance i.e. Best Management Practices Restore LWD levels Stabilize Streambanks
ɔol Habitat	Decrease in quantity and quality	Restore LWD levels Plant conifer in riparian areas Limit sedimentation
ream emperature	Increasing	Maintain or enhance shade Plant riparian areas
lature Forest abitat in arge Patches	Decreased	Focus density management in plantations to priority areas
ardwoods	Increased	Convert or maintain for wildlife habitat, diversity, soil restoration (nitrogen)
rush / Grass	Increased	Maintain current meadows, Seed closed Roads
ıags and WD	Decrease in quantity	Insure prescriptions allow for recruitment and creation
ırge Old rees	Decrease	Maintain defect Thin to wide spacing
anopy Gaps		Prescribe random spacing in plantations Allow blowdown Allow endemic insect and disease outbreaks
lultiple anopy	Decreased	Prescribe random spacing in plantations Underplant with shade tolerant species
imber Supply	Decreased	Employ commercial thinning in Matrix Sell excess from density management in Reserves

y Element	Status	Restoration Activity
cess	Decreased in recent past	Follow ATM plan Convert Roads to Trails Stabilize closed roads Determine appropriate timing on project roads needs and closures

MANAGEMENT OPPORTUNITIES COMMON TO ALL FEDERAL OWNERSHIPS

A few overall guidelines for management activities were discussed and are included here:

_ Maintain untreated areas in both young and older plantations forAclumpiness@ and diversity

_ When closing roads, control the spread of noxious weeds, i.e., plant conifer. In matrix lands, if weeds are not a problem, keep in early seral for forage

_ Work with the three Counties on an agreement to retain LWD, for fish habitat structures, that slides or falls onto the county roads from Federal lands. A flood plan in which identification of wood storage and sediment waste areas and mobilization procedures should be adopted to respond to catastrophic events where wood can be lost from the system due to removal for firewood cutting and general maintenance.

_ Within priority restoration areas, put a high priority on the restoration of habitat around TE&S locations i.e. within provincial home ranges.

_ The large debris jam at RM 19.5 - 19.6 on Lobster Creek will most likely provide cooling to downstream main channel in the future. Without this structure during the 1996 period, downstream temperatures would have been above the growth threshold for at least the 2 miles directly downstream until the confluence with J line Creek. We recommend this structure not be removed and to continue monitoring the water quality contributions in and around this site. The exception is that logs that do not interact with flood flows may be removed and placed in other stream reaches near this area.

_ Consideration should be given to creating large debris jams rather than singular channel structures. These will have a greater effect on decreasing temperatures, storing sediment and groundwater and providinglong term quality habitat. These should be placed in zones of natural blockage (i.e. flowing from unconfined to confined reach and tributary confluences. These areas would require access for transportation. Potential sites are illustrated on the subwatershed maps. Consider using whole trees from upland sites on the riparian reserve fringe.

_ The next 303d review will likely add portions Lobster Creek and Five Rivers to the water quality limited list for the state. Due to the anadromous salmonid issues involved with this drainage it may become fairly high in priority to set TMDL=s for the watershed. This would involve further restrictions to management in and around channels. It is recommended that the watershed council formed to steward thesesystems, place a high priority in development of a water temperature management plan. This plan when approved by the DEQ will allow management to continue in the areas associate with least risk.

_ Water Temperature monitoring should continue throughout the watershed to monitor change and trend. This will also provide information to the watershed council for a future water temperature management plan. Interagency cooperation on site selection and funding will enhance long-term monitoring efforts.

_ The 1984-1985 disease surveys confirm that laminated root rot is wide spread in this portion of the Alsea Ranger District. A total of 145 units (approximately 3,484 acres) were surveyed. Laminated root rot is present throughout the Lobster-Five Rivers Watershed Analysis area. Goheen et al., (1985) recommended the following management techniques for areas infested with laminated root rot. These techniques were specifically formulated for areas that were to be managed for commercial timber production, but may apply to reserves, depending on the severity and extent of the infestation.

_ In 15 year old or older plantations that have already been thinned, manage those with severe or moderate laminated root rot ratings on shorter than normal rotations. Severely diseased plantations should be clear-cut when trees reach minimum merchantable size. Do not commercially thin such stands. After final harvest, treat sites by planting tree species that are immune to P. weirii. In lightly diseased stands during commercial thinning, harvest all Douglas-firs in and within 50 feet of any obvious laminated root rot centers. Replant with immune, resistant, or intermediately susceptible tree species that are adapted to the site. Hardwoods are immune, western redcedar is resistant, western hemlock is intermediately susceptible. If only immune species are planted on an infected site and grown 50 years or more, *P. weirii* will die out. If resistant species are used, there should be much the same result, although there may be a small amount of infection and retention of the pathogen. If intermediately susceptible species are grown for a rotation (50 years or more), they should suffer relatively little apparent damage. However, many may be infected, a few may die, and the disease will be maintained on the site. Planting with highly susceptible species such as Douglas-fir will result in an accelerated disease problem.

_ Control of Douglas-fir beetles is by promoting and maintaining a vigorous stand. Depending on overall area objectives, injured trees should be removed before beetles can attack, and windthrown trees should be salvaged either before they are infested or before the next generation of beetles emerges. Douglas-fir beetles are common in the area associated with laminated root rot. They are attracted to the root rot weakened and windthrown trees. Disease management strategies that move away from Douglas-fir in the infected areas will result in significant reductions in losses to Douglas-fir bark beetles. Remember that these organisms at endemic levels create valuable canopy gaps and structural diversity.

MANAGEMENT OPPORTUNITIES RELATING TO BLM ROADS

Findings: 1996 Flood Damage

The precipitation year starting in 1995 was particularly wet. In February, 1996, a 25 - 50 year runoff event occurred (the worst event since the 1964 flood). Significant run off occurred, triggering numerous landslide events, resulting road and culvert damage. An incomplete inventory of the transportation system in the Lobster / Five Rivers area reveals that immediate corrective action should be under taken to mitigate resource damage and salvage capital investments.

Recommendations:

High Priority

High priority projects have been identified and most were completed during the summer of 1996.

Further consideration should be given to relief culvert size and spacing as these provide an immediate benefit in storm proofing the watershed for future events. Data indicates these may be lacking in some areas.

With consideration given to current staffing and budgetary constraints, initiate and complete these identified project as soon as possible.

Findings: Road Inventory/Transportation Management Objectives

An interdisciplinary (ID) team of specialists reviewed data generated by a field reconnaissance inventory of all BLM-controlled roads in this watershed, and identified the road use restrictions and priority uses of each road. Using results from this ongoing process, the Salem District is currently establishing the Transportation Management Objectives (TMO) for the Lobster/Five Rivers Watershed.

A major information gap is lack of road and culvert data and information on private controlled roads within the watershed analysis area.

Recommendation

High Priority

Finish the TMO in order to enable the BLM to manage the transportation system more effectively

Findings: Transportation Management Plan

Once completed, the TMO process will result in the development of maintenance levels, determination of road closure status, and design of maintenance and/or improvement criteria.

Recommendation

High Priority

A watershed-wide "Transportation Management Plan" should be developed after the ID team has finalized all TMO's for the BLM-controlled roads. This plan should, at a minimum:

1) identify inspection and maintenance needs during and after storm events.
2) identify road operation and maintenance priorities with emphasis on correcting drainage problems that contribute to degrading riparian resources.
3) provide criteria for regulating traffic during wet periods to prevent damage to riparian resources.

Although the TMO process has not yet been completed, a partial list of project opportunities (for BLM roads only) has already been derived from the road inventory; specific project recommendations will be added to this document upon completion of this process.

The list of projects will generated based upon their having met one or more of the objectives which appear in the list which follows.

Potential Road and Culvert Project Objectives

Improve Stream Crossings on Unsurfaced Roads: This will reduce the risk of sediments entering stream courses, especially when vehicular or OHV use occurs during wet weather. Measures to reduce sedimentation at these areas include surfacing the crossing area, vegetating cut and fill slopes, controlling wet weather access and improving drainage.

Replace Severely Damaged or Deteriorated Culverts: To avoid culvert failure and the subsequent deposition of sediments into streams.

Monitor and Maintain Stream Diversion Potential Culverts: These culverts have the potential to divert water out of the natural stream channels and form alternate channels should the culverts become plugged or fail.

Monitor and Maintain or Replace Partially Blocked Culverts: Culverts blocked by debris, rocks, and or sediment can cause significant damage to the road and/or the stream.
Prioritize and Replace Potentially Undersized Culverts: These culverts may not be large enough to meet present standards for major flood events and should be considered for improvement or replacement. These culverts have been field identified by engineers but require a drainage analysis before replacement. The need for additional relief culverts should also be assessed.

Close or Decommission BLM Roads Posing a Threat to Wildlife, Fisheries or Other Resources: Closure may be accomplished with gates, earth berms, or other physical barriers. Decommissioned roads may include various types of road surface treatments (i. e., scarifying, waterbars), culvert or fill removal, and/or reducing the height of fills. Some roadbeds may be converted to recreational trails.

Repair Roadside Failures: Such failures may be due to slides, unraveling cut slopes, or eroded fill slopes.

Surface Dirt Roads: Roads having grades greater than eight percent would be surfaced with rock to reduce potential for surface erosion and runoff into streams.

Subwatershed Statistics, Unique Attributes, Limitations and Goals

Bear Creek Subwatershed

Total Acres: 1358 Percent SNF: 99 Percent BLM: 0 Percent Private: 1

PHYSICAL: **LTA: 3L**

Landslide Susceptibility Rating: High: 11% Moderate: 42% Low: 47 %

Road Density: 3.8 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ear Creek	R	PF	PF	N	PF	R	PF	R

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 37%
Mid-aged. 2%
Early 25-50 . . . . . . 24%
Early 11-24 . . . . . . 13%
Very Early <10 . . . 6%
Grass Forb 0%
Hardwood 17%

Interior Forest: 8%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: 2 occupied MAMU sites Relatively good T&E survey coverage.

Botanical: No known Poa sites

Other Wildlife Status: L-M Elk Rating. ODFW elk transplants in this drainage
Special Habitats: None

Other Species of Concern: None

Bear Creek Subwatershed

Subwatershed Unique Attributes :

- Contains a large patch of mature conifer that=s functioning for connectivity to the north. Is a critical linkage within >CORE= LSR area.
- Large percentage of road in watershed is closed to limit harassment of wildlife. Area has had elk transplants in the past.

Limiting Factors :

- High percentage of hardwoods within watershed, 70% within transport reaches. Limits area of late-successional habitat but allows winter forage and thermal cover for elk.
- Hardwood canopy not sufficient to allow for cooling of water.
- Source area for contribution of LWD low.
- Access from Five Rivers during summer low flow may be a problem

Purpose and Need for Management Action :

- Any activities in this watershed should further the attainment of late-successional characteristics and foster connectivity to the north.
- This is a potential cold water refuge for salmonids. All vegetation management must maintain or enhance shade to keep water temperatures low. Conversion of stream adjacent alder sites necessary to facilitate attainment of cold water areas.
- Road management objectives need to ensure control of fine sediments.

Cascade Creek Subwatershed

Total Acres: 3573 Percent SNF: 98 Percent BLM: 0 Percent Private: 2

PHYSICAL: **LTA: 3C1**

Landslide Susceptibility Rating: High: 4% Moderate: 52% Low: 44%

Road Density: 3.3 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ascade Creek	N	PF	R	N	PF	R	R	R
.Fork Cascade	N	PF	PF	N	R	N	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 28%
Mid-aged. 1%
Early 25-50 . . . . . . 18%
Early 11-24 . . . . . . 17%
Very Early <10 . . . 10%
Grass Forb 1%
Hardwood 24%

Interior Forest: 2%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: No owl surveys; inadequate murrelet survey coverage. Good botanical surveys in riparian.

Other Wildlife Status: High Elk Rating

Botanical: Buffered Poa populations.

Other Species of Concern: None

Special Habitats: Homestead meadows, wetlands and beaver ponds

Cascade Creek Subwatershed

Subwatershed Unique Attributes :

- Highly fragmented landscape. The mature forest component is low. Given the surrounding landscape, this area has a lower value for providing connectivity for late-successional species.
- Riparian areas are dominated by hardwood species or managed stands. Historic homesteading of this area has influenced riparian area composition. Lots of springs and groundwater emergence in this area due to underlying dip of sandstone. Species diversity is high .. The terrain and habitat condition is excellent for elk.
- This area is important for supplying a wild brood stock for Coho. There is a fish ladder at a natural falls where ODF&W traps wild brood stock for transplant. A lot of fish habitat improvement work has already occurred in this watershed, addition of LWD and riparian planting of conifer species has been completed.

Limiting Factors :

- The area has high stream temperatures. At this point in time, this is the only stream that DEQ has listed as water quality limited.
- Source areas for LWD are low and some of the roads in lower landscape positions are limiting delivery of LWD to the stream channels should a natural debris torrent occur.

Purpose and Need for ManagementAction :

- Target surveys prior to planning efforts to assess the use of the area by T&E species. Determine appropriate landscape boundaries for these allocations.
- Riparian reserves must be utilized to maintain shade especially on south slopes, and to provide for slope stability. ACS objectives must be met prior to any determination of reduced RR width..
- Road management objectives should limit roads within RR boundaries and consider access for project work from above.
- Encourage multiple commodity production from this watershed i.e. mushrooms, greenery, timber, elk, etc.

Camp Creek Subwatershed

Total Acres: 2812 Percent SNF: 92 Percent BLM: 0 Percent Private: 8

PHYSICAL: **LTA: 3C**

Landslide Susceptibility Rating: High: 12% Moderate: 53% Low: 35%

Road Density: 2.9 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
amp Creek	R	PF	R	R	PF	R	PF	R

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 33%
Mid-aged. 3%
Early 25-50 . . . . . . 25%
Early 11-24 . . . . . . 13%
Very Early <10 . . . 6%
Grass Forb 0%
Hardwood 21%

Interior Forest: 8%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: Active spotted owl pair site. Only N 1/2 of watershed has adequate T&E survey coverage

Other Wildlife Status: Moderate rating for elk. ODFW elk transplants in this drainage

Botanical: Non-native brush problems in meadows.

Other Species of Concern: None

Special Habitats: Beaver ponds and homestead meadows with old orchards. Priority drainage for wildlife habitat enhancement projects and partnerships.

Camp Creek Subwatershed

Subwatershed Unique Attributes :

- Two large central patches of mature conifer, extend into adjacent watersheds, some remnant old growth. Good owl site. Area important for connectivity of late-successional habitat. Area provides a potential source for LWD delivery to mainstem channel.
- Old homestead meadows provide landscape diversity.
- Conifer species diversity introduced into some plantations.

Limiting Factors :

- Fragmented mature conifer
- Lacking hemlock understory
- Water temperatures are at risk. Headwater areas cooler, warms toward lower end of subwatershed.
- Few deep complex pools, fine sediments are impairing spawning in some areas. LWD partially functional.

Purpose and Need for Management Action :

- This is a potential cold water refuge. All vegetation management must maintain or enhance shade to keep water temperatures low. Important to maintain or enhance aquatic habitat components, keep input of sediment low, maintain slope stability during all activities
- Key connectivity corridor, link to Preacher and Middle Five Rivers area. Maximize treatments that accelerate stand development between existing mature patched. Continue development of conifer species diversity.
- Phellinus wereii present, allow for natural processes to occur

Crab Creek Subwatershed

Total Acres: 4935 Percent SNF: 93 Percent BLM: 0 Percent Private: 7

PHYSICAL: **LTA: 3C1**

Landslide Susceptibility Rating: High: 6% Moderate: 48% Low: 46%

Road Density: 2.7 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
rab Creek	N	PF	R	N	PF	R	R	R
ougar Creek	PF	PF	R	N	PF	N	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 34%
Mid-aged. 1%
Early 25-50 . . . . . . 19%
Early 11-24 . . . . . . 18%
Very Early <10 . . . 8%
Grass Forb 2%
Hardwood 18%

Interior Forest: 7%

LSRA Priority: Core
Upper drainage in large block

WILDLIFE STATUS:

T&E Species Status: Several occupied MAMU sites. Resident single owl site.

Other Wildlife Status: High elk rating.

Botanical: Buffered Poa population in Cougar and lower Crab

Other Species of Concern: Two long-term neotrop monitoring sites (MAPS stations)

Special Habitats: Wetlands and old homesteads in Cougar and all along mainstem of Crab Cr.

Crab Creek Subwatershed

Subwatershed Unique Attributes :

- This subwatershed also includes Cougar Creek but they are not connected hydrologically. The existing condition and potentials of the two areas differ. Cougar is currently a cold water refuge. Fish production from both streams is currently low.
- High beaver activity in Crab Creek, especially in the upper basin, with complex deep pools. Cougar Creek had partially functional substrates with sedimentation occurring above meadow complex. LWD is low and pools are shallow and not complex.
- Area lacking stream buffers in old plantations. Hardwoods and grass/forb dominates riparian zone in Crab. One of best riparian conditions in the watershed occurs downstream of meadow complex in Cougar Creek.
- Important linkage function with areas NE and SW. Larger >100 acre patch of mature conifer existing

Limiting Factors :

- High stream temperatures in Crab Creek. Heating occurring in the many plantations and on old homestead pasture lands.
- Fines are occurring in pool habitat.
- Lower portion of Crab Creek in private ownership.
- Mature conifer LWD source areas are few. Delivery of LWD impaired by roads except in lower Crab Creek.
- Heavily fragmented, lots of plantations could limit timing of treatments
- Private lands may limit connectivity to the north

Purpose and Need for Management Action :

- Key connectivity corridor, link NE-SW. Maximize treatments that accelerate stand development between existing mature patched. Aggregate patches, work out from existing large patches. Maintain ability of species to disperse i.e. 40% canopy closure during all vegetation treatments. Highly fragmented area, will require a long time and a lot of work to restore conditions for both terrestrial and aquatic species.
- Encourage development of large trees in source areas. *Phellinus wereii* present, allow for natural processes to occur
- Stability and shade associated with riparian areas need to be protected during all activities. Riparian planting of conifer will aid recovery process.
- Not a high priority to put LWD in Crab Creek but would help routing of sediments above wetland complex in Cougar Creek. Wetland complex in Cougar Creek need to be protected and natural recovery allowed to occur.
- Ensure snags and CWD are an intregal component of activity prescriptions
- Consolidate MLSRs into manageable landscape units

Elk Creek Subwatershed

Total Acres: 809 **Percent SNF: 93** **Percent BLM: 0** **Percent Private: 7**

PHYSICAL: **LTA: 3L**

Landslide Susceptibility Rating: High: 16% Moderate: 59% Low: 25%

Road Density: 3.1 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
lk Creek	**PF**	**N**	**PF**	**N**	**PF**	**R**	**N**	**R**

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 24%
Mid-aged. 8%
Early 25-50 . . . . . . 14%
Early 11-24 . . . . . . 11%
Very Early <10 . . . 10%
Grass Forb 0%
Hardwood 34%

Interior Forest: 3%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: No known T&E locations.

Botanical: No buffered Poa populations

Other Wildlife Status: L-M elk rating

Other Species of Concern: None

Special Habitats: None

Elk Creek Subwatershed

Subwatershed Unique Attributes :

- Currently a cold water refuge
- Highest percent of riparian hardwood.
- The eastern (upper) 1/3 of watershed had important connectivity function to north
- High potential for steelhead spawning and rearing.

Limiting Factors :

- low quantity of interior habitat.
- moderate to high landslide susceptibility
- fine sediment in flats may be a problem
- stream gradients limit Coho use
- 5 foot falls on private property
- Lacking source areas for LWD in stream adjacent and tributary streams
- Access from Five Rivers during summer low flow may be a problem, determine other barriers to fish movement upstream

Purpose and Need for ManagementAction :

- Any activities in upper portion of this watershed should further the attainment of late-successional characteristics and foster connectivity to the north.
- This is a potential cold water refuge for salmonids. All vegetation management must maintain or enhance shade to keep water temperatures low. Conversion of stream adjacent alder sites necessary to facilitate attainment of cold water areas. For the short term, placement of LWD necessary. Restructure culvert crossings to allow passage of LWD
- Encourage multiple commodity production from this watershed i.e. mushrooms, greenery, timber, elk, etc.

East Fork Lobster Creek Subwatershed

Total Acres: 3743 Percent SNF: 0 Percent BLM: 88 Percent Private: 12

PHYSICAL: **LTA: 3F**

Landslide Susceptibility Rating: High: 26% Moderate: 46% Low: 28%

Road Density: 4.5 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ast Fork obster	PF	PF	PF	N	PF	R	R	R

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 14%
Mid-aged. 11%
Early 25-50 . . . . . . 31%
Early 11-24 . . . . . . 22%
Very Early <10 . . . 10%
Grass Forb 3%
Hardwood 8%

Interior Forest: 2%

LSRA Priority: Linkage to mature

WILDLIFE STATUS:

T&E Species Status: Owl pair site with very low habitat. Non-reproductive. No murrelet surveys.
Other Wildlife Status: Low elk rating

Botanical: Meadows along top of Prairie Peak are important botanical area.
Other Species of Concern: Old-growth species in remnant patches

Special Habitats: Remnant old growth areas and meadows on Prairie Peak are important habitats which should be protected.

East Fork Lobster Creek Subwatershed

Subwatershed Unique Attributes :

- highest percent of off-channel habitat in the watershed
- depositional areas have good complexity
- low amount of hardwood on slopes or in riparian areas, some in depositional areas have significant hardwood component
- cold water supply
- quality spawning gravels
- good aquatic habitat
- snag component increasing due to mortality in 100-120 year old stands
- Conversion of hardwoods in depositional areas is completed

Limiting Factors :

- Area highly susceptible to landslides
- limited depositional areas, most source and/or transport
- loss of pool habitat, due to fines or sediment routing problems
- structure is limiting
- loss of prime winter habitat
- depleted source areas for large wood, roads restricting imput of LWD
- highly fragmented

Purpose and Need for Management Action :

- Manage stands to maintain canopy closure and provide shade
- Allow complex debris jams to route sediments and cool water temperatures
- Road design should allow delivery of LWD to stream channels
- Assure attainment of stability to meet ACS during project design and implementation
- Manage plantations to accelerate attainment of late-successional characteristics
- Build up snag component in 30-60 year old stands
- Prioritize work out from existing mature patches

Green River Subwatershed

Total Acres: 6198 Percent SNF: 89 Percent BLM: 0 Percent Private: 11

PHYSICAL: **LTA: 3C, 3C1**

Landslide Susceptibility Rating: High: 26% Moderate: 46% Low: 28%

Road Density: 3.0 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
reen River	R	PF	R	N	PF	R	R	R
ast Fork Green		N	PF	R	PF	N	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 29%
Mid-aged. 0%
Early 25-50 . . . . . . 25%
Early 11-24 . . . . . . 15%
Very Early <10 . . . 6%
Grass Forb 0%
Hardwood 24%

Interior Forest: 8%

LSRA Priority: Core
Upper drainage in Mature Block

WILDLIFE STATUS:

T&E Species Status: Seven occupied murrelet sites. No known owl sites.

Other Wildlife Status: High elk rating

Special Habitats: Homestead meadows, beaver ponds.

Botanical: Buffered Poa populations along lower Green River

Other Species of Concern: None

Green River Subwatershed

Subwatershed Unique Attributes :

- Quality habitat diversity due to geomorphology and vegetation
- Fish production is high
- Potential for quality recreation experience,stream-side access, old growth remnants, connections to adjacent trail systems

Limiting Factors :

- Low levels of LWD in mainstem, tributaries partially functional
- Lacking deep complex pools
- Fine sediments found in substrates
- Recent flooding has removed streamside vegetation
- Stream temperatures are high due to quantity of early seral conditions
- Impaired fish passage on E.Fork
- Roads impair delivery of LWD
- Hardwood component of riparian areas (depositional and transport) way over reference condition
- Highly fragmented landscape
- low snag and CWD component

Purpose and Need for Management Action :

- Attain status as a cold water refuge, provide quality aquatic habitat components
- Maintain shade and stability during all vegetation management activities.
- Maximize treatments that accelerate stand development toward late-successional structural conditions
- Provide for snag and CWD in all treatment prescriptions
- Restore LWD to create complex pools and assist in sediment routing
- Road designs should allow passage of LWD to stream channels
- Important for connectivity of late-successional habitat, much of area not functioning for that, until surrounding area is functioning, need to provide for dispersal habitat (i.e. 40% canopy closure throughout subwatershed. Limit edge effects between RR and Matrix designations
- Provide for accumulation of snags and CWD in all prescriptions

Little Lobster Creek Subwatershed

Total Acres: 5117 Percent SNF: 1 Percent BLM: 61 Percent Private: 38

PHYSICAL: **LTA: 3L**

Landslide Susceptibility Rating: High: 15% Moderate: 37% Low: 57%

Road Density: 4.4 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ittle Lobster	R	PF	R	N	PF	?	N	R
riar Creek	R	PF	R	N	PF	?	?	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N)

VEGETATION:

Mature 38%
Mid-aged. 14%
Early 25-50 . . . . . . 6%
Early 11-24 . . . . . . 14%
Very Early <10 . . . 16%
Grass Forb 1%
Hardwood 12%

Interior Forest: 13%

LSRA Priority: Linkage to mature block

WILDLIFE STATUS:

T&E Species Status: New active owl pair site. No known murrelet sites.

Botanical: No surveys for sensitive plants.

Other Wildlife Status: Moderate elk rating

Other Species of Concern: None

Special Habitats: Natural fire-regenerated stands serve to reduce edge and enhance interior forest habitat rating for this watershed.

Little Lobster Creek Subwatershed

Subwatershed Unique Attributes :

- Fairly intact mature conifer providing quality habitat and important linkage to area to north. Part of quality ›CORE= habitat. Large patches of mature separated into 2 areas
- Natural decay processes building up snag and CWD component in mature stands
- Best owl habitat. Best interior habitat
- low % hardwood overall, outside range in depositional areas
- lots of 50-80 year old (fire regenerated) conifer
- topographic shading in bottom of drainage

Limiting Factors :

- high percentage of private property both residential and industrial forest blockiness limits ability to connect mature
- lacking stream survey information for entire area. High stream temperatures in mainstems, need to monitor tributaries
- LWD partially to non functional, lacking deep, complex pools, may be overload of fines (60%) non-functional
- high road densities
- area burned 2-3 times in last 140 years
- high percent early seral <20 years old

Purpose and Need for Management Action :

- This is the gateway to good aquatic habitat, currently at edge of degrading
- Potential Cold water refuge area. All activities should maintain or enhance shade component especially in plantations on south facing slopes
- Monitor attainment of snags and CWD and wildlife use of this component. Prescriptions should be designed to attain this component
- Protect integrity of existing mature conifer. Accelerate attainment of late successional conditions prioritize work in stands between existing mature patches to provide connectivity
- Utilize landscape patterns and shapes to accelerate late-successional stand characteristics in 50-80 year old stands, link with mature patches, no edge effects or further fragmentation of mature patches
- When possible through further analysis, insure roads allow passage of LWD, obliterate valley bottom and mid-slope roads

Lower Buck Creek Subwatershed

Total Acres: 4184 Percent SNF: 83 Percent BLM: 0 Percent Private: 17

PHYSICAL: **LTA: 3C**

Landslide Susceptibility Rating: High: 4% Moderate: 50% Low: 46%

Road Density: 3.4 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ıck Creek	**N**	**PF**	**?**	**N**	**?**	**?**	**?**	**R**
ʼilson Creek	**R**	**PF**	**R**	**N**	**PF**	**PF**	**PF**	**R**
ɛar Creek	**R**	**R**	**PF**	**N**	**PF**	**PF**	**PF**	**R**

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 32%
Mid-aged. 1%
Early 25-50 . . . . . . 16%
Early 11-24 . . . . . . 16%
Very Early <10 . . . 10%
Grass Forb 4%
Hardwood 21%

Interior Forest: 6%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: Limited surveys in N half of drainage. No known T&E locations

Other Wildlife Status: High elk rating

Special Habitats: Moderate beaver activity

Botanical: No known sensitive plant locations. Non-native spp control

Other Species of Concern: None

Lower Buck Creek Subwatershed

Subwatershed Unique Attributes :

- Large contiguous block of mature conifer providing habitat
- Beaver play an important role in creating pool habitat
- Bear Creek has quality non-impaired source areas for LWD
- Quality fish production in tributaries, receiving strays from Upper Buck

Limiting Factors :

- Low LWD, substrates partially functioning due to fines in lower basin, pools present but not deep or complex
- very low quantity of LWD source areas
- High stream temperatures (due to amount of private land in grass)
- Agricultural land contributing sediment

Purpose and Need for Management Action :

- Tributary streams will supply quality habitat, not the mainstem. Need to assess water temperatures and prescribe practices which maintain sufficient shade to retain cold water temperatures.
- Riparian planting completed in Wilson Creek
- Allow delivery of LWD in road crossing designs
- Maintain quality of mature block until sufficient portions of the rest of the landscape is functioning as late-successional ecosystem
- Provide for multiple commodities in designing landscape prescriptions i.e. timber, elk, greenery and mushrooms

Lower Five Rivers Subwatershed

Total Acres: 4374 Percent SNF: 73 Percent BLM: 0 Percent Private: 27

PHYSICAL: **LTA: 3C**

Landslide Susceptibility Rating: High: 6% Moderate: 44% Low: 50%

Road Density: 3.4 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ive Rivers	N	PF	?	N	?	?	?	R
vamp Creek	?	?	?	?	?	?	PF	
herry Creek	?	PF	R	N	PF	R	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 30%
Mid-aged. 4%
Early 25-50 . . . . . . 15%
Early 11-24 . . . . . . 6%
Very Early <10 . . . 15%
Grass Forb 4%
Hardwood 25%

Interior Forest: 6%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: Limited T&E surveys 3 occupied murrelet sites, no owl locations. Bald eagle sightings along river in winter
Other Wildlife Status: High elk rating

Botanical: No known sensitive plant locations. Noxious and non-native brush problems.
Other Species of Concern: None

Special Habitats: Unique wetland habitats. River oxbow identified as important wetland area by ODFW.

Lower Five Rivers Subwatershed

Subwatershed Unique Attributes :

_ provides connectivity N, NE-SW
_ Access opportunities to river, few public land access points in watershed
_ Dispersed camp sites established
_ Significant wetland habitat in Swamp Creek

Limiting Factors :

_ high percentage of hardwoods
_ Water temperature is limiting, substrates are dominated by bedrock, Five Rivers highly entrenched,summer rearing habitat is limited
_ percent interior habitat is low, very fragmented, low conifer species diversity
_ high percentage of private property, fragmented, mixed ownership
_ Dispersed campsites not maintained, getting trashed
_ High landslide susceptibility in lower portion of subwatershed
_ County Road maintenance, road impairs delivery of LWD to stream channel
_ Lacking aquatic habitat data necessary to develop restoration activities

Purpose and Need for Management Action :

_ enhance existing large patch in SE portion of area, maintain existing habitat, provides linkage opportunities to large patch of mature habitat to north outside of watershed and to Denzer Ridge area
_ Allow recreation opportunities while ensuring aquatic and riparian health
_ Maintain integrity of wetland for water storage, cooling, salmonid and waterfowl use
_ North of Cherry Creek mange for multiple commodity opportunities, i.e. mushrooms, timber, greenery. Maintain sufficient riparian reserves to assure attainment of ACS objectives

Lower Lobster Creek Subwatershed

Total Acres: 5009 Percent SNF: 85 Percent BLM: 0 Percent Private: 15

PHYSICAL: **LTA: 3C, 3L**

Landslide Susceptibility Rating: High: 6% Moderate: 37% Low: 57%

Road Density: 2.5 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
obster Creek	N	PF	R	N	PF	R	N	R
aylor Creek	?	?	?	?	?	?	?	?
cGlynn Creek	R	R	R	N	PF	R	R	
hillips Creek	R	N	PF	N	R	R	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 29%
Mid-aged. 4%
Early 25-50 . . . . . . 10%
Early 11-24 . . . . . . 16%
Very Early <10 . . . 12%
Grass Forb 3%
Hardwood 23%

Interior Forest: 7%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: One occupied murrelet site. No owl locations. Bald eagle sightings in the winter.

Other Wildlife Status: Mod-High elk rating

Botanical: Noxious and non-native brush problems in openings

Other Species of Concern: none

Special Habitats: Homestead meadows at Tailor Cr

Lower Lobster Creek Subwatershed

Subwatershed Unique Attributes :

- Blowdown supplying CWD to upland areas
- Beavers occur in Phillips and McGlynn Creeks important to fish habitat
- Integral part of "CORE" LSR south half of subwatershed
- Large mature conifer patch provides connectivity to south
- Fish passage work completed at McGlynn and Crooked Creeks
- riparian planting completed

Limiting Factors :

- Highest percentage of early seral of any subwatershed - limits late-successional opportunities, limits ability to provide shade and cool water temps.
- very fragmented mature conifer
- lots of private land
- mainstem not supporting fish
- some restricted fish passage to tributaries i.e. Phillips Creek
- few deep pool complexes, low levels of LWD
- stream temperatures are high
- limited ability to link late-successional habitat to north
- Lobster Creek really entrenched

Purpose and Need for Management Action :

- enhance existing large patch in S part of subwatershed to link with Camp, Middle Five and Lower Five Rivers prioritize connectivity between existing mature patches
- encourage multiple commodity production in north part
- Encourage closure of road systems
- Create deep pool complexes, mainstem and tributary, with addition of LWD, provide access to all habitat for the long term
- Potential cold water refuge in Phillips and McGlynn Creek, need to focus on water temperature decreases and LWD increases
- Prescribe treatments which facilitate development of snags and CWD
- Utilize Riparian Reserves to maintain shade and slope stability
- Monitor debris complexes to assess ability to reconnect floodplain in entrenched areas
- Crook Creek provides opportunities to provide commodities and evaluate RR reductions

Lower Middle Lobster Creek Subwatershed

Total Acres: 4147 Percent SNF: 57 Percent BLM: 15 Percent Private: 28

PHYSICAL: **LTA: 3C,3L**

Landslide Susceptibility Rating: High: 10% Moderate: 49% Low: 41%

Road Density: 2.7 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
obster Creek	N	PF	?	N	PF	N	?	R
lt Creek	PF	N	PF	N	PF	R	PF	
'ilkinson Creek	R	PF	R	R	PF	R	R	
hilcote Creek	?	PF	?	?	?	?	?	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 21%
Mid-aged. 2%
Early 25-50 . . . . . . 11%
Early 11-24 . . . . . . 20%
Very Early <10 . . . 8%
Grass Forb 8%
Hardwood 30%

Interior Forest: 3%

LSRA Priority: Core and linkage

WILDLIFE STATUS:

T&E Species Status: Limited surveys
Historic bald eagle nest site, now inactive
Regular eagle sightings in drainage
.
Other Wildlife Status: Moderate elk rating
Regular cougar sightings.
Special Habitats: Limited beaver dams.

Botanical: Noxious and non-native brush problems in openings.

Other Species of Concern: None

Lower Middle Lobster Creek Subwatershed

Subwatershed Unique Attributes :

_ high percentage of hardwoods riparian and upland
_ Equal proportions of seral habitat
_ Partially functional wood and complex pools in Wilkenson Creek
_ Historic and continued human use of area
_ Key watershed above Little Lobster confluence
_ Powerline to sub-station on the Alsea

Limiting Factors :

_ Lacking TES surveys
_ Low percent interior habitat
_ Sediment high in Wilkenson due to past harvest
_ small mature conifer patches
_ lower portions the beginning of water quality limiting stretch
_ lower portions not supporting fish
_ high stream temperatures, little federal land on mainstem to influence temperatures, cattle on private property keeping riparian vegetation in grass
_ Silt Creek not functioning for LWD
_ high landslide susceptibility in tribs.
_ Lobster Valley Rd blocking routing of LWD

Purpose and Need for Management Action :

_ provide link to Camp Creek mature conifer patch. East half important for connectivity within large LSR
_ Allow Phellinus and gap processes
_ Assess water temperatures in Wilkenson and Silt Creek potential cold water refuges. All activities need to enhance or maintain shade and cooling effect of vegetation
_ Allow recovery over time
_ Facilitate fish access to all habitat
_ Maintain ACS in Silt Creek when developing RR widths

Middle Five Rivers Subwatershed

Total Acres: 4238 Percent SNF: 77 Percent BLM: 0 Percent Private: 23

PHYSICAL: **LTA: 3C, 3C1**
Landslide Susceptibility Rating: High: 5% Moderate: 40% Low: 55%

Road Density: 3.0 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
iddle Five R.	N	PF	?	N	PF	R	N	R
lder Creek	?	N	N	R	PF	PF	R	
razy Creek	?	?	?	?	?	?	?	
endall Creek	R	N	N	N	PF	PF	PF	
edar Creek	R	R	R	R	PF	PF	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 35%
Mid-aged. 3%
Early 25-50 . . . . . . 14%
Early 11-24 . . . . . . 11%
Very Early <10 . . . 8%
Grass Forb 7%
Hardwood 22%

Interior Forest: 9%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: Resident single owl site One occupied murrelet site.

Other Wildlife Status: High elk rating

Botanical: Noxious and non-native brush problems in openings. No buffered Poa locations.

Other Species of Concern: Potential for bat habitat high

Special Habitats: Fisher covered bridge, millponds, meadows, orchards and wetlands provide habitat for bats, neotropical migratory birds and wetland species.

Middle Five Rivers Subwatershed

Subwatershed Unique Attributes :

_ Beaver activity creating pools
_ Important connectivity SW-NE

Limiting Factors :

_ large percentage of private in mainstem and tributaries, bisects watershed
_ LWD is low, pools shallow, lacking complexity, substrates impaired by fines
_ high water temperatures, occurring on private lands
_ entrenchment of Five Rivers is high, no stream terrace interaction
_ Wind in Denzer Ridge area a concern for treatment types

Purpose and Need for Management Action :

_ unfragmented forest linkage NE-SW, grow within and out from larger patches, connect with Camp and Lower Lobster patches
_ restoration of mainstem habitat would benefit fish distribution in watershed
_ potential cold water refuges in tributary streams, water temperatures unknown

Middle Lobster Creek Subwatershed

Total Acres: 7879 Percent SNF: 0 Percent BLM: 58 Percent Private: 41

PHYSICAL: **LTA: 3F, 3L**
Landslide Susceptibility Rating: High: 9% Moderate: 47% Low: 54%
Road Density: 3.9 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
obster Creek	R	PF	?	N	R	?	N	N
artha Creek	R	R	R	R	N	N	N	
eadow Creek	?	N	?	?	?	?	?	
oal Creek	?	?	?	?	?	?	?	
ear Creek	PF	PF	?	?	R	?	N	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 28%
Mid-aged. 13%
Early 25-50 . . . . . . 6%
Early 11-24 . . . . . . 56%
Very Early <10 . . . 16%
Grass Forb 7%
Hardwood 26%

Interior Forest: 9%

LSRA Priority: Connectivity, link to large mature blocks

WILDLIFE STATUS:

T&E Species Status: Owl pair site and several murrelet sites.

Other Wildlife Status: L-M elk rating

Botanical: Prairie Peak ecosystem is botanical focus. Large remnant old growth patch

Other Species of Concern: Old growth and high meadow spp.

Special Habitats: Several bridges and millponds, highest amount of remnant old growth patches in WA. Natural meadow habitats on Prairie Peak

Middle Lobster Creek Subwatershed

Subwatershed Unique Attributes :

- Upper 1/3 of subwatershed is good aquatic habitat
- Low entrenchment of mainstem
- some larger blocks of mature conifer
- Snag levels increasing due to mortality in 100-120 year old stands

Limiting Factors :

- Lots of private ownership, checkerboard patterns
- limited LWD for mainstem, lack of channel structure
- Stream temperatures at risk of being limiting
- highly fragmented mature conifer habitat
- lots of early (<20 year old plantations)

Purpose and Need for Management Action :

- These valley bottoms have the greatest potential for complex habitat and interaction with the floodplain
- Potential cold water refuge in Bear and Martha Creeks
- All activities employ techniques to facilitate shading or other mechanisms to lower water temperatures i.e. increase groundwater interaction
- Insure prescriptions result in adequate supply of CWD
- Accelerate the younger forest growth to build up patch size of mature forest

Preacher Creek Subwatershed

Total Acres: 4480 Percent SNF: 78 Percent BLM: 11 Percent Private: 11

PHYSICAL: **LTA: 3C, 3F, 3L**

Landslide Susceptibility Rating: High: 10% Moderate: 40% Low: 50%

Road Density: 4.0 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
reacher Creek	R	R	R	N	PF	R	R	N

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 28%
Mid-aged. 3%
Early 25-50 . . . . . . 23%
Early 11-24 . . . . . . 21%
Very Early <10 . . . 6%
Grass Forb 3%
Hardwood 18%

Interior Forest: 4%

LSRA Priority: Core, mixed seral

WILDLIFE STATUS:

T&E Species Status: Very limited survey coverage
No known T&E locations.

Other Wildlife Status: Moderate elk rating
Wetland habitats good
Special Habitats: Wetlands

Botanical: Noxious and non-native brush problems in openings.

Other Species of Concern: Good neotrop MAPS site

Preacher Creek Subwatershed

Subwatershed Unique Attributes :

_ two large blocks of mature conifer
_ Phellinus potential
_ Power Corridor up Creek and over to Summers Creek
_ Beaver habitat maintains pools
_ Historic and continued human use
_ Upper area is cold water refuge
_ Limited elk use of area
_ Quality neotropical bird habitat
_ Existing LWD structures (COPE Study)
_ Key watershed

Limiting Factors :

_ low percentage of interior habitat, highly fragmented into small mature conifer patches
_ LWD levels low, fine sediment a problem in riffle areas
_ limited source areas for LWD
_ lacking TES surveys
_ Livestock use in riparian areas, maintaining grass cover, streambank stability problems
_ lots of plantations, later ones planted with multiple species

Purpose and Need for Management Action :

_ Connectivity linkage to large mature conifer block in Camp Creek important. Maintain large mature conifer patch. Manage early seral to attain late successional characteristics, grow out from existing patch
_ Initiate restoration of temperatures at top of watershed and work down all activities need to enhance or maintain stream temperatures
_ Control cattle to enhance riparian resources
_ Facilitate development of multi conifer species

Upper Buck Creek Subwatershed

Total Acres: 3642 Percent SNF: 85 Percent BLM: 0 Percent Private: 15

PHYSICAL: **LTA: 3C1**

Landslide Susceptibility Rating: High: 1% Moderate: 45% Low: 54%

Road Density: 3.5 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
pper Buck Ck.	R	PF	PF	N	PF	R	R	R

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 39%
Mid-aged. 1%
Early 25-50 . . . . . . 21%
Early 11-24 . . . . . . 16%
Very Early <10 . . . 10%
Grass Forb 1%
Hardwood 13%

Interior Forest: 15%

LSRA Priority: Core, large patch habitat

WILDLIFE STATUS:

T&E Species Status: Resident single owl site; Several murrelet sites, large blocks of habitat

Botanical: No buffered Poa sites

Other Wildlife Status: High elk rating

Other Species of Concern: None

Special Habitats: Large locks of mature conifer. Important connectivity area.

Upper Buck Creek Subwatershed

Subwatershed Unique Attributes :

- large blocks of mature conifer connected to south and west
- good fish production, good habitat diversity, substrates good
- cold water refuge
- other mature blocks not as connected but important existing habitat
- Riparian hardwood close to reference conditions
- Phellinus potential

Limiting Factors :

- mature conifer areas thinned and/or salvage harvested in past, lacking snag and CWD components, less structural diversity
- low levels of LWD, pool moderate for quantity, no deep or complex pools, few quality source areas for contributing LWD, stream adjacent sources ok in upper basin but lacking in lower
- gradient too high for lots of beaver activity

Purpose and Need for Management Action :

- maximize treatment that accelerates stand development between existing mature patches, assure attainment of all late-successional components
- Recruit snags and large wood in commercially thinned and salvaged areas
- Develop understory of multiple conifer species
- Change MLSR circles to represent manageable landscape
- Maintain quality aquatic habitat, create deep complex pools, restore conifer in depositional areas to maintain low water temperatures
- Maintain full SAT Riparian reserves, critical for connectivity function, maintain dispersal habitat in uplands until adjacent landscape is functional
- Develop multi-conifer understory

Upper Five Rivers Subwatershed

Total Acres: 5730 Percent SNF: 93 Percent BLM: 0 Percent Private: 7

PHYSICAL: **LTA: 3C1**

Landslide Susceptibility Rating: High: 17% Moderate: 49% Low: 54%

Road Density: 2.7 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
ive Rivers	**R**	**R**	**PF**	**N**	**PF**	**N**	**N**	**R**
ummers Creek	**PF**	**R**	**R**	**N**	**PF**	**N**	**R**	
ord Creek	**?**	**R**	**?**	**?**	**?**	**?**	**?**	
rindle Creek	**R**	**PF**	**R**	**R**	**PF**	**PF**	**R**	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 34%
Mid-aged. 1%
Early 25-50 . . . . . . 18%
Early 11-24 . . . . . . 19%
Very Early <10 . . . 8%
Grass Forb 2%
Hardwood 18%

Interior Forest: 11%

LSRA Priority: Core - Mixed Seral

WILDLIFE STATUS:

T&E Species Status: Very limited surveys; High murrelet occupancy level in one site

Other Wildlife Status: High elk rating

Special Habitats:

Botanical: Noxious and non-native species in openings

Other Species of Concern: Unknown; data gap

Upper Five Rivers Subwatershed

Subwatershed Unique Attributes :

_ mature conifer and interior habitat highest in watershed
_ low hardwood component
_ low road density
_ highest concentration of T&E species
_ entrenchment of Five Rivers lessening
_ substrates are ok
_ lots of potential for LWD source
_ fish ladder and falls
_ Phellinus potential

Limiting Factors :

_ fragmented landscape
_ water temperatures starting to warm, heating in lower subwatershed in grass/for areas
_ pools lack complexity
_ lots of unstable land
_ some impairment of LWD routing i.e. roads and falls

Purpose and Need for Management Action :

_ provide for unfragmented late-successional habitat, maintain dispersal habitat in all activities, build out from existing patches, accelerate LS structural components in plantations. Limit number of entries.
_ provide quality TES sites adjacent to existing concentration
_ potential cold water refuge
_ Activities should enhance quality aquatic habitat, maintain or encourage shaded streams and provide structures to enhance lowered water temperatures through groundwater interaction
_ Allow channel migration and hydraulic function, design long term solution to road impinging on function
_ allow natural occurrence of Phellinus to create forest structural diversity
_ Restore multi-conifer component of forest

Upper Lobster Creek Subwatershed

Total Acres: 3044 Percent SNF: 0 Percent BLM: 87 Percent Private: 13

PHYSICAL: **LTA: 3F**

Landslide Susceptibility Rating: High: 26% Moderate: 50% Low: 24%

Road Density: 4.6 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
obster Creek	R	PF	PF	R	PF	R	R	
outh Fork Lob	R	PF	?	R	PF	R	R	

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 10%
Mid-aged. 27%
Early 25-50 . . . . . . 34%
Early 11-24 . . . . . . 13%
Very Early <10 . . . 7%
Grass Forb 0%
Hardwood 9%

Interior Forest: 1%

LSRA Priority: Core - Early Seral

WILDLIFE STATUS:

T&E Species Status: Limited surveys
Low viability due to limited habitat.

Botanical: Remnant old growth patches

Other Wildlife Status: L-M elk rating

Other Species of Concern: Unknown

Special Habitats:

Upper Lobster Creek Subwatershed

Subwatershed Unique Attributes :

_ depositional areas have good complexity
_ low amount of hardwood on slopes or in riparian areas, some in depositional areas have significant hardwood component
_ cold water supply
_ quality spawning gravels
_ good aquatic habitat
_ snag component increasing due to mortality in 100-120 year old stands

Limiting Factors :

_ Area highly susceptible to landslides
_ limited depositional areas, most source and/or transport
_ loss of pool habitat, due to fines or sediment routing problems
_ structure is limiting
_ loss of prime winter habitat
_ depleted source areas for large wood, roads restricting imput of LWD
_ highly fragmented

Purpose and Need for Management Action :

_ Manage stands to maintain canopy closure and provide shade
_ Allow complex debris jams to route sediments and cool water temperatures
_ Conversion of hardwoods in depositional areas is on going
_ When possible through further analysis, insure roads allow passage of LWD
_ Assure attainment of stability to meet ACS during project design and implementation
_ Manage plantations to accelerate attainment of late-successional characteristics
_ Build up snag component in 30-60 year old stands
_ Prioritize work out from existing mature patches

West Fork Lobster Creek Subwatershed

Total Acres: 1070 Percent SNF: 3 Percent BLM: 58 Percent Private: 38

PHYSICAL: **LTA: 3F**

Landslide Susceptibility Rating: High: 16% Moderate: 54% Low: 23%

Road Density: 4.2 miles/mi^2

AQUATIC:

Stream Name	H_2O Temp.	Barriers	Substrate	Large Wood	Pool Area	Pool Quality	Off-Channel	Channel Condition
·Line Creek	PF	PF	R	R	R	?	R	R

Aquatic Habitat Ratings: Properly Functioning (PF) At Risk (R) Not Properly Functioning (N) Unknown (?)

VEGETATION:

Mature 21%
Mid-aged. 3%
Early 25-50 . . . . . . 54%
Early 11-24 . . . . . . 10%
Very Early <10 . . . 6%
Grass Forb 0%
Hardwood 6%

Interior Forest: 6 %

LSRA Priority: Core - Early Seral

l

WILDLIFE STATUS:

T&E Species Status: No survey data

Botanical: Remnant old growth patches

Other Wildlife Status: L-M elk rating

Special Habitats: Unknown

Other Species of Concern: None

West Fork Lobster Creek Subwatershed

Subwatershed Unique Attributes :

_ depositional areas have good complexity, lots of wood
_ low amount of hardwood on slopes or in riparian areas
_ cold water supply
_ quality spawning gravels

Limiting Factors :

_ Area highly susceptible to landslides
_ limited depositional areas, most source and/or transport
_ loss of pool habitat, due to fines or sediment routing problems
_ structure is limiting
_ loss of prime winter habitat
_ depleted source areas for large wood, roads restricting imput of LWD
_ highly fragmented

Purpose and Need for Management Action :

_ Manage stands to maintain canopy closure and provide shade
_ Allow complex debris jams to route sediments and cool water temperatures
_ Conversion of hardwoods in depositional areas is completed
_ When possible through further analysis, insure roads allow passage of LWD
_ Assure attainment of stability to meet ACS during project design and implementation
_ Manage plantations to accelerate attainment of late-successional characteristics
_ Build up snag component in 30-60 year old stands
_ Prioritize work out from existing mature patches

LIST OF ACRONYMS

ACCI	Vine Maple, *Acer circinatum*
ALRU	Red Alder, *Alnus rubra*
ATM	Access and travel management
BBF	Billion board feet
BENE	Dwarf Oregon Grape, *Berberis nervosa*
BLM	Bureau of Land Management
CFS	Cubic feet per second
CWD	Coarse woody debris
DBH	Diameter at breast height
DEQ	Department of Environmental Quality
ESA	Endangered Species Act
FEMAT	Federal Ecosystem Management Assessment Team
FSEIS	Final Supplemental Environmental Impact Statement
GIS	Geographic Information Systems
LSR	Late-Successional Reserve
LSRA	Late-Successional Reserve Assessment
LB	Pound
LTA(s)	Land Type Association(s)
LWD	Large woody debris
MAMU	Marbled Murrelet
MBF	Thousand board feet
MLSR	Managed Late Successional Reserve
MMBF	Million board feet
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NFP	Northwest Forest Plan
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-Highway Vehicle
OPHO	Devil=s Club, *Oplopnax horridum*
OSU	Oregon State University
OXOR	Oregon Oxallis, *Oxalis oregana*
PAG(s)	Plant association group(s)
PF	Partially functional
POMU	Sword Fern, *Polystichum munitum*
PSME	Douglas-Fir, *Pseudotsuga menziesii*
PVT	Private ownership
REO	Regional Ecosystem Office
RHMA	Pacific Rhododendron, *Rhododendron macrophyllum*
RM	River Mile
RMP	Resource Management Plan
RUSP	Salmonberry, *Rubus spectabilis*
ROD	Record of Decision
SI	Site Index
SQ FT	Square Feet
SNF	Siuslaw National Forest
THPL	Western Red Cedar, *Thuja plicata*
TSHE	Western Hemlock, *Tsuga heterophylla*
T&E	Threatened and Endangered
TE&S	Threatened, Endangered and Sensitive
TMDL	Total Maximum Daily Load
TMO(s)	Travel management objective(s)
TPA	Trees per acre
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFWS	United States Fish and Wildlife Service

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Appendix A

Subwatershed Statistics

Appendix A: Lobster/Five Rivers Subwatershed Statistics

Subwatershed (Alphabetical)	Subbasin Size	% of Analysis Area	% SNF	% BLM	% PVT	Rd Density mi/sq mi	Streams mi/sq mi	% LSR	% Riparian Reserve	% Matrix
Bear Creek	1358 ac	1.8	99	0	1	3.8	6.7	84	7	8
Camp Creek	2812 ac	3.7	92	0	8	2.9	8.2	92	0	0
Cascade Creek	3573 ac	4.7	98	0	2	3.3	8.2	6	74	18
Crab Creek	4935 ac	6.5	93	0	7	2.7	8.8	40	45	8
Elk Creek	809 ac	1.1	93	0	7	3	7.3	29	43	21
East Fk Lobster	3743 ac	4.9	0	88	12	4.5	7.1	88	0	0
Green River	6198 ac	8.1	89	0	11	2.9	8.2	46	36	7
Little Lobster	5117 ac	6.7	1	61	38	4.4	6.2	62	0	0
Lower Buck Cr	4184 ac	5.5	83	0	17	3.4	8.1	11	57	15
Lower Five Rivers	4374 ac	5.7	73	0	27	3.4	6.3	45	18	10
Lower Lobster	5009 ac	6.6	85	0	15	2.5	7	33	38	14
L Middle Lobster	4147 ac	5.4	57	28	15	2.7	6	54	13	18
Middle Five R	4374 ac	5.7	77	0	23	3	7.3	73	3	1
Middle Lobster	7879 ac	10.3	0	58	41	3.9	7.5	58	0	1
Preacher Creek	4480 ac	5.9	78	11	11	4	6.3	89	2	0
Upper Buck Cr	3642 ac	4.8	85	0	15	3.5	7.3	65	16	4
Upper Five Rivers	5730 ac	7.5	93	0	7	2.7	8.6	93	0	0
Upper Lobster	3044 ac	4	0	87	13	4.6	7	87	0	0
West Fk Lobster	1070 ac	1.4	3	58	38	4.2	6.4	62	0	0

Appendix B

Public Comment

Name		Comment summary	How I would like to be involved				Attended Public Meeting
Last	**First**		**Restoration**	**Evaluate Current Condition**	**Develop Future Condition**	**Need Information**	
Cottam	Doug	Will actively participate in wildlife and fish habitat and population data					
Quinn	JoAnne		X				
Moniskige							
Zellweger	Leland	Part owner of Zellweger-Fosdick Timber Co of Lobster Valley					
Hall	Frank	Will coordinate 34/20 partnership			X		
Phillips	Neil			X			X
Dillon	Daniel	Would like to see more old-growth. Beavers are helping with fish habitat	X		X		X
Bye	Stewart						
Nielsen		Coordinatie restoration efforts on my private property	X				
Jones	Dekon	Interested in having fish habitat improvement work on McGlynn and Crooked Creeks; access issues on Crooked Creek; Meadow with riparian planting. Worried about Beavers and silt	X			on collection of gravels	X
Krueger	Daniel	Tourist traffic and road condition; firewood policy; waterbarring; trash; bikes; meadows on Green River; landslides/sediment; use locals to police area; waste of wood; other forest products (train local industry); helicopters - sawsand murrelets				thoughts on riparian zone enhancement	X

Public Involvement Outcomes

1. Notice of Watershed Analysis Process sent to every family serviced by the Alse and Tidewater post offices.

2. Follow up calls to people willing to share information

3. Public Meeting Oct.16, 1996 to share information, seek information on known restoration needs/

Name		Comment summary	How I would like to be involved				Attended Public Meeting
Last	**First**		**Restoration**	**Evaluate Current Condition**	**Develop Future Condition**	**Need Information**	
Gammon	Dave	lack of supplying timber products and firewood permits; work with A>C>E> Committee				Net gain from fish habitat imp	
Reininger	Bruce, Wendy	Habitat restoration is highest priority, use selective timber harvest; restrict vehicles	X		X		
Strong	Louis	Poor Logging practices on Wilkenson Cree; Benton Co. dump fill in creeks; over grazing	X	X	X		
Rounds	Mary		X	X	X		
Keltner	Alberta						
Anderson	James		X				
Fairchild	Jim		X	X	X		
Hutton	John					Am I in watershed?	
Linzy	Darrell			X	X		

Name		Comment summary	How I would like to be involved				Attended Public Meeting
Last	First		Restoration	Evaluate Current Condition	Develop Future Condition	Need Information	
Hendrix	Harry	All hatchery salmon in watershed, no natives, seals and over fishing in ocean result in population declines. Doing too much with coarse woody debris					X
Hendrix	Fred	Beavers not a part of the system in early 1900's					X
Hockema	Kelly	Wasting money on fish habitat improvement, watershed analysis, need to harvest					
Brown	Lisa	Road closure policy					X
Falkenhagen	Nick		X				
Wilson	Kieth						

Appendix C

Successional Pathways

Appendix C: Successional Pathways

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

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

1. DRY ENVIRONMENT Salal Types (TSHE/GASH):

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

In the **moist environments** (TSHE/POMU), four pathways were proposed. It is expected that two would be dominated by conifers throughout succession, two by a conifer/deciduous mixture, and that the two groups would occur with equal probability. In the stands that are conifer throughout succession, the first pathway begins with Douglas-fir in the Early Seral stage; the second pathway with a mix of Douglas-fir and western hemlock (PSME/TSHE). By the Mature Seral stage, both paths develop a mixture of PSME/TSHE. Stands that have a mixture of Conifer/Deciduous species represent the third pathway for the moist environment. These begin with a mixture of alder and Douglas-fir (ALRU/PSME) in the Early and Young Seral stages. In the Mature Seral stage, the major species would be Douglas-fir and western hemlock/ western red cedar (PSME/TSHE (THPL). A fourth pathway begins with alder (ALRU) in the Early through Young Seral stages, and develops into a TSHE stand in the Mature and Late Seral stages.

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

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

For the **wet environments** (TSHE/RUSP), six pathways were proposed. Regeneration of conifers is sparse. Alder has a larger role than conifers in early seral stages and remains a large component in young and mature stages. Understory development of conifer is slow due to high salmonberry competition There are often 1-2 seral stages present at any one time since wide spacing of conifers allows for understory development to begin early in succession. The rapid growth and tree shape of Douglas fir that results from wide spacing appears to accelerate old-growth structure earlier (at about year 120) than in the other PAGs.

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

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

Appendix D

Landslide Susceptibility Ratings by Subwatershed

Appendix D: Landslide Susceptibility Ratings by Subwatershed

Lobster-Five Rivers Analysis Area (AA)			Landslide Susceptibility								
			Low			Moderate			High		
watershed (WS)	WS acres	% of AA	acres	% sub-basin	% of WS	acres	% sub-basin	% of WS	acres	% sub-basin	% of WS
Bear	1358	1.8	642	47	0.8	566	42	0.7	148	11	0.2
Camp	2812	3.7	993	35	1.3	1491	53	2.0	324	12	0.4
Cascade	3573	4.7	1564	44	2.0	1868	52	2.4	138	4	0.2
Crab	4935	6.5	2266	46	3.0	2360	48	3.1	309	6	0.4
Elk	809	1.1	203	25	0.3	476	59	0.6	129	16	0.2
East Lobster	3743	4.9	1044	28	1.4	1735	46	2.3	965	26	1.3
Green	6198	8.1	2697	44	3.5	1901	37	2.5	333	5	0.4
Little Lobster	5117	6.7	2919	57	3.8	1901	37	2.5	298	16	0.4
Lower Buck	4184	5.5	1938	46	2.5	2095	50	2.7	151	4	0.2
Lower Five	4374	5.7	2189	50	2.9	1913	44	2.5	272	6	0.4
Lower Lobster	5009	6.6	2919	57	3.8	1901	37	2.5	298	6	0.4
L.Mid-Lobster	4147	5.4	1717	41	2.2	2014	49	2.6	416	10	0.5
Middle Five	4374	5.7	2189	50	2.9	1913	40	2.2	201	5	0.3
Mid-Lobster	7879	10.3	4259	54	5.6	2924	37	3.8	694	9	0.9
Preacher	4480	5.9	2225	50	2.9	1813	40	2.4	442	10	0.6
Upper Buck	3642	4.8	1958	54	2.6	1621	45	2.1	61	1	0.1
Upper Five	5730	7.5	1951	34	2.6	2833	49	3.7	946	17	1.2
U. Lobster	3044	40	723	24	0.9	1536	50	2.0	785	26	1.0
West Lobster	1070	1.4	242	23	0.3	579	54	0.8	269	16	0.4

Appendix E

Current Seral Stages by Subwatershed

Appendix E - Lobster/Five Rivers WA: Current Seral Stages of Vegetation by Subwatershed

Percentage of Federal Ownership in Seral Groupings

Subwatershed (Alphabetical)	Basin Size	% of Basin in Federal	Early Seral (<11 yrs)	Pole Stands (11-24 yrs)	Old Plantations (25-60 yrs)	Mid-Age Conifer (60-90 yrs)	Pure Hdwds	Mixed Hdwds	Mature Conifer (90-160yrs)	Multi-Layer and Climax (>160yrs)
Bear Creek	1358 ac	99	6	14	24	2	9	8	35	2
Camp Creek	2812 ac	92	4	14	25	3	17	1	23	13
Cascade Creek	3573 ac	98	11	17	19	1	21	3	25	4
Crab Creek	4935 ac	93	9	19	20	1	13	2	34	2
Elk Creek	809 ac	93	11	11	15	8	23	7	23	2
East Fk Lobster	3743 ac	88	14	14	35	12	2	8	1	15
Green River	6198 ac	89	5	17	25	0	19	1	31	2
Little Lobster	5117 ac	39	18	8	3	11	3	1	49	7
Lower Buck Cr	4184 ac	83	11	19	18	1	11	3	36	1
Lower Five Rivers	4374 ac	73	17	6	17	3	13	4	31	8
Lower Lobster	5009 ac	85	13	19	12	1	14	5	31	5
L Middle Lobster	4147 ac	85	9	24	14	1	20	3	25	4
Middle Five R	4374 ac	77	11	14	16	2	8	4	34	11
Middle Lobster	7879 ac	42	16	6	7	11	11	6	29	15
Preacher Creek	4480 ac	89	3	23	23	3	14	3	26	5
Upper Buck Cr	3642 ac	85	8	19	21	1	7	0	43	1
Upper Five Rivers	5730 ac	93	8	20	19	0	10	4	34	4
Upper Lobster	3044 ac	87	8	15	32	24	8	2	0	11
West Fk Lobster	1070 ac	62	6	5	39	5	1	9	12	22

This table combines grass/forb and seedling/sapling seral stages into one grouping called early seral.

Appendix E - Lobster/Five Rivers WA: Current Seral Stages of Vegetation by Subwatershed

Federal Ownership (BLM and SNF) - Acres

Subwatershed (Alphabetical)	Basin Size	% of Basin in Federal	Grass/ Forb	Seedling Sapling (<11 yrs)	Pole Stands (11-24 yrs)	Old Plantations (25-50 yrs)	Mid-Age Conifer (50-80 yrs)	Pure Hdwds	Mixed Hdwds	Mature Conifer (80-150yrs)	Multi-Layer and Climax (150+yrs)
Bear Creek	1358 ac	99	0	83	182	323	29	118	110	460	25
Camp Creek	2812 ac	92	0	110	360	638	74	447	25	601	325
Cascade Creek	3573 ac	98	7	364	591	636	43	721	93	845	135
Crab Creek	4935 ac	93	26	398	846	905	42	583	99	1568	86
Elk Creek	809 ac	93	0	82	86	109	61	173	54	174	12
East Fk Lobster	3743 ac	88	74	377	449	1136	401	51	251	38	503
Green River	6198 ac	89	0	283	924	1387	9	1033	67	1708	89
Little Lobster	5117 ac	39	13	563	252	106	361	102	17	1539	206
Lower Buck Cr	4184 ac	83	2	366	662	612	34	395	104	1249	28
Lower Five Rivers	4374 ac	73	12	537	191	553	98	422	113	990	265
Lower Lobster	5009 ac	85	13	528	790	498	49	578	224	1314	222
L Middle Lobster	4147 ac	85	6	254	712	409	38	595	79	732	114
Middle Five R	4374 ac	77	57	311	449	519	60	254	144	1096	341
Middle Lobster	7879 ac	42	57	692	267	304	519	521	259	1335	671
Preacher Creek	4480 ac	89	8	109	905	919	121	547	127	1012	209
Upper Buck Cr	3642 ac	85	7	251	575	647	25	225	5	1341	23
Upper Five Rivers	5730 ac	93	9	437	1076	994	20	543	204	1791	226
Upper Lobster	3044 ac	87	0	213	402	834	639	215	51	8	282
West Fk Lobster	1070 ac	62	0	39	35	260	33	9	59	76	148

Acreages were derived from the current GIS vegetation layer for typed lands.

Appendix E - Lobster/Five Rivers WA: Current Seral Stages of Vegetation by Subwatershed

Percentage of Private Ownership in Seral Groupings

Subwatershed (Alphabetical)	Basin Size	% of Basin in Private	Early Seral (<11 yrs)	Pole Stands (11-24 yrs)	Old Plantations (25-50 yrs)	Mid-Age Conifer (50-80 yrs)	Pure Hdwds	Mixed Hdwds	Mature Conifer (80-160yrs)	Multi-Layer and Climax (>160yrs)
Bear Creek	1358 ac	1	0	0	6	19	31	0	44	0
Camp Creek	2812 ac	8	26	0	33	0	37	3	0	0
Cascade Creek	3573 ac	2	49	14	0	1	23	7	6	1
Crab Creek	4935 ac	7	25	2	6	5	52	5	5	0
Elk Creek	809 ac	7	2	0	0	0	55	22	2	19
East Fk Lobster	3743 ac	12	10	87	2	0	0	0	1	0
Green River	6198 ac	11	25	0	27	1	45	1	1	0
Little Lobster	5117 ac	61	13	25	10	18	18	6	9	0
Lower Buck Cr	4184 ac	17	29	2	5	3	53	1	6	0
Lower Five Rivers	4374 ac	27	22	5	9	8	46	3	5	2
Lower Lobster	5009 ac	15	25	1	0	17	37	6	14	0
L Middle Lobster	4147 ac	15	32	11	3	6	36	11	1	0
Middle Five R	4374 ac	23	30	0	6	5	50	4	3	1
Middle Lobster	7879 ac	58	33	3	6	15	2	37	5	0
Preacher Creek	4480 ac	11	55	3	19	0	22	0	0	1
Upper Buck Cr	3642 ac	15	26	0	20	4	43	0	7	0
Upper Five Rivers	5730 ac	7	22	0	2	12	64	1	0	0
Upper Lobster	3044 ac	13	0	1	51	46	0	2	0	0
West Fk Lobster	1070 ac	38	5	17	76	0	0	0	0	2

This table combines grass/forb and seedling/sapling seral stages into one grouping called early seral.

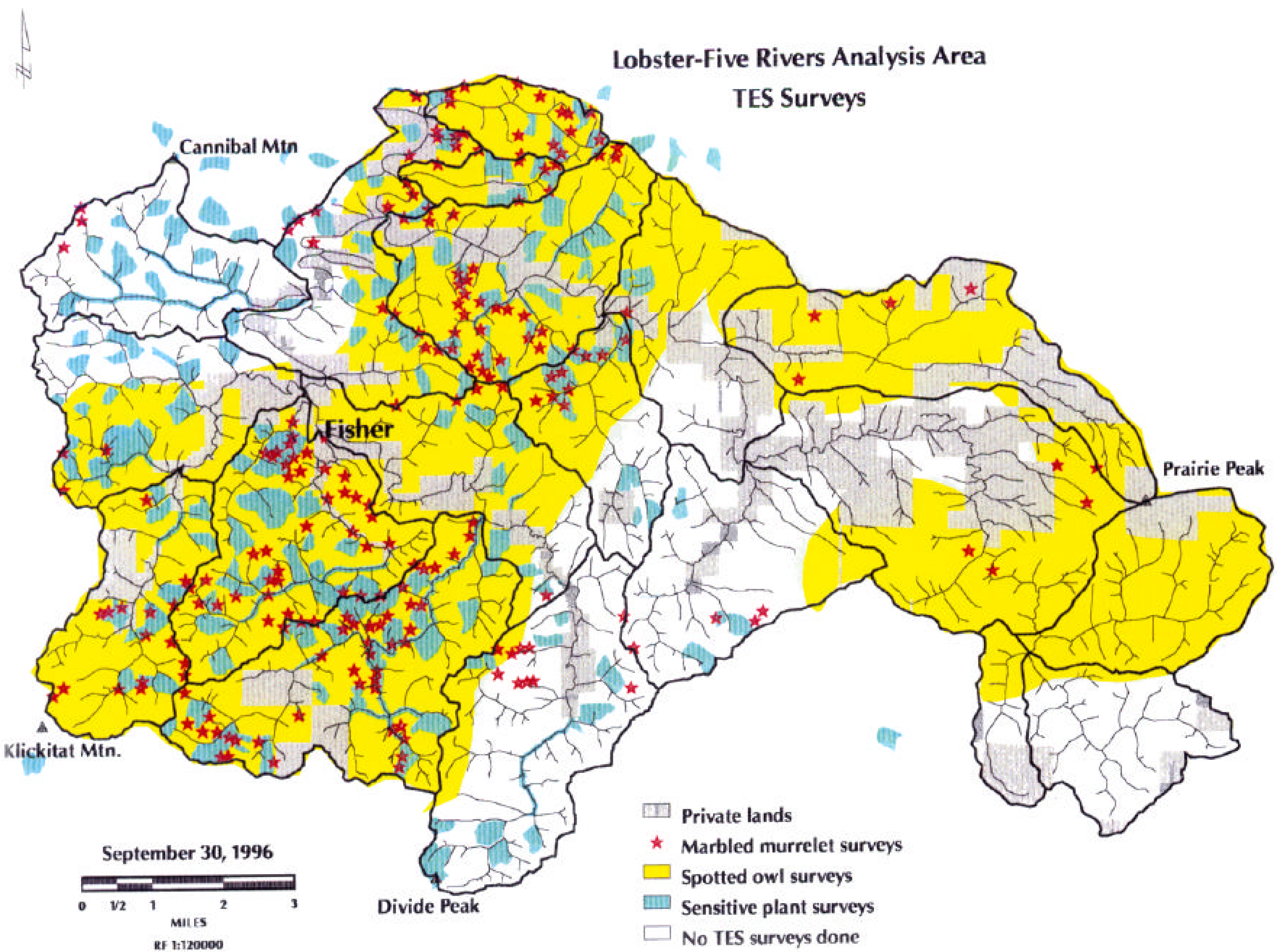
Appendix E - Lobster/Five Rivers WA: Current Seral Stages of Vegetation by Subwatershed

Private Ownership-Acres

Subwatershed (Alphabetical)	Basin Size	% of Basin in Private	Grass/ Forb	Seedling Sapling (<11 yrs)	Pole Stands (11-24 yrs)	Old Plantations (25-50 yrs)	Mid-Age Conifer (50-80 yrs)	Pure Hdwds	Mixed Hdwds	Mature Conifer (80-160yrs)	Multi-Layer and Climax (80-160yrs)
Bear Creek	1358 ac	1	0	0	0	1	3	5	0	7	0
Camp Creek	2812 ac	8	3	56	1	75	1	85	8	1	0
Cascade Creek	3573 ac	2	38	5	12	0	1	20	6	5	1
Crab Creek	4935 ac	7	72	7	6	19	17	165	16	16	1
Elk Creek	809 ac	7	0	1	0	0	0	32	13	1	11
East Fk Lobster	3743 ac	12	47	0	392	8	0	0	0	6	0
Green River	6198 ac	11	0	170	1	187	7	313	6	6	0
Little Lobster	5117 ac	61	21	232	492	201	349	352	118	176	9
Lower Buck Cr	4184 ac	17	146	56	15	34	22	368	7	45	0
Lower Five Rivers	4374 ac	27	142	119	59	110	94	532	37	53	18
Lower Lobster	5009 ac	15	145	43	5	0	133	283	45	110	2
L Middle Lobster	4147 ac	15	300	67	127	32	65	421	128	15	0
Middle Five R	4374 ac	23	245	38	4	55	49	484	42	31	11
Middle Lobster	7879 ac	58	491	566	92	191	476	62	1188	166	15
Preacher Creek	4480 ac	11	114	164	16	96	0	111	1	2	4
Upper Buck Cr	3642 ac	15	17	123	1	104	19	227	0	39	0
Upper Five Rivers	5730 ac	7	85	2	0	7	47	259	3	0	1
Upper Lobster	3044 ac	13	0	1	2	204	184	0	7	1	0
West Fk Lobster	1070 ac	38	0	20	72	327	0	0	0	2	7

Appendix F

Map of Threatened and Endangered Species Survey Status


Lobster-Five Rivers Analysis Area
TES Surveys
Cannibal Mtn
Fisher
Prairie Peak
Klickitat Mtn.
Divide Peak
September 30, 1996
0 1/2 1 2 3
MILES
RF 1:120000
Private lands
Marbled murrelet surveys
Spotted owl surveys
Sensitive plant surveys
No TES surveys done

Appendix G

Current Status of Known Spotted Owl Sites

Appendix G: History of Known Spotted Owl Sites In Lobster/Five Rivers

Site Information since 1990. Data prior to 1990 exists for several sites, but surveys may not have been to protocol at that time.

Mstr Site# (SNF #)	Own	Watershed	Ac Habitat in 1.5 mi circle	Site History	Survey Status	Comments
1765 [20]	SNF	Camp Cr	1688 ac	Reproductive Pair Site 90-Nest, no yng 91-Non-nesting 92-Non-nesting 93-Nest, young 94-Non-nesting 95-Non-nesting 96-Nest, young	Monitored annually by PNW. In density study area	Strong pair site.
2432 [21]	SNF	Lord Cr	1488 ac	Reproductive Pair Site 90-Nest, young 91-Non-nesting 92-Male only 93-Male only 94-No Response 95-No Response 96-No Response	Monitored annually by PNW. In density study area	Activity at this site has been declining. Female may have been lost.
3138 [80]	SNF	Alder Cr	1640 ac	Resident Single Site 90-Male. Bird moved to Waldport 91-New Male at site 92-No Response 93-No Response 94-Not surveyed 95-No Response 96-No Response	Monitored by PNW as time permits	Site was used by resident singles. May not be active any more.
3142 [91]	SNF	Upper Buck	2484 ac	Resident Single Site 91-Female only 92-No Response 93-Male. Nest unknown 94-Not Surveyd 95-Male only 96-Currently being surveyed	Monitored by PNW or FS as time permits	Site appears to be active, but nesting status unknown. A young radio-collared female used the site for two seasons, but died last winter.
3358 [90]	SNF	Crab Cr/ Upper Green	1533 ac	Resident Single Site 90-No Response 91-Male. Nest unknown 92-No Response 93-Male. Nest unknown 94-No Response 95-No Response 96-No Response	Monitored by PNW or FS as time permits	Site is used by resident single birds.

Continuation of Owl Site Histories: Site Information for the Lobster Creek Drainage

Mstr Site# (SNF #)	Own	Watershed	Ac Habitat in 1.5 mi circle	Site History	Survey Status	Comments
188	BLM	Prairie Pk	1360 ac	Reproductive Pair 90-Pair, Non-nesting 91-Pair, nest failed 92-Pair, nest failed 93-Male only 94-Male only 95-Pair, non-nesting 96-Still being surveyed	Monitored by BLM and PNW personnel.	Site has been active since 1975. Birds are nesting in remnant old growth 1989 was the last year that this site produced young.
183	BLM	E Fk Lobster	641 ac	Pair Site 90-Male only 91-Pair, non-nesting 92-Pair, non-nesting 93-Male only 94-Pair, non-nesting 95-Male only 96-Still being surveyed	Monitored by BLM and PNW personnel.	Site has been monitored since 1975. Only 1 young confirmed since then.
3975	BLM	Briar Cr/ Little Lobster	1175 ac	New Pair Site First documented in 1994 94-Nest, young 95-Male only 96 Still being surveyed	Monitored by BLM and PNW personnel.	New site found in 1994. Male from Eugene district, female from Alsea. A subadult radioed female has set up residence west of this site (Wilkinson/Phillips Cr) and has been there 2 yrs.

Summary of Owl Sites:

Of the 8 activity areas, 5 are pair sites and 3 are used by resident singles on a sporadic basis.
Of the 5 nest sites, 4 are long-term sites with very low reproductive success in the past 6-7 years and one site looks like it may have been vacated.

Given the low reproductive status of the owl sites in this watershed, it is likely that the sites either do not have sufficient habitat or prey base to support reproduction or that the long-term sites are in the process of fading out and being replaced by new sites elsewhere in the watershed.
Habitat limitation may also explain why seemingly good sites, like Upper Buck Cr, are not reproductive sites.

The active pair site and possible new site (female only), are located in drainages with relatively high levels of mature and interior forest habitat.

Appendix H

Road Condition Assessment

Status of Roads within 200' of Streams

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Outlet Ht	Failing Fill	Volume
3200	15/9/27	6.1(5RIV)	Y	N	Concrete	20X20 FT.	300	4	Clear	OK	0		0
3200	15/9/28	6.5	N	N	BIT	24	30	4	Clear	OK	4		0
3200	15/9/28	6.55	N	N	BIT	24	100	4	Clear	OK	3		0
3200	15/9/28	6.74	N	N	BIT	24	30	2	Partly Plugged	OK	5		0
3200	15/9/33	1.1	N	N	BIT	18	10	2	Partly Plugged	OK	5		0
3200	15/9/33	1.15	N	N	BIT	24	10	8	Partly Plugged	OK	4		0
3200	15/9/33	1.35	Y	N	BIT	48	150	6	Partly Plugged	OK	0		0
3200	15/9/33	1.4	N	N	BIT	24	30	5	Clear	OK	5		0
3200	15/9/33	1.55	N	N	BIT	24	30	8	Clear	OK	2		0
3200	15/9/33	1.65	N	N	BIT	36	90	8	Clear	OK	2		0
3200	15/9/33	1.77	N	N	BIT	36	50	10	Clear	Slide	0		0
3200	15/9/33	2.45	N	N	BIT	18	50	5	Clear	OK			0
3200	15/9/32	2.85	N	N	Multi	60	60	30	Clear	OK	0		0
3310	14/9/26	0.6	N	N									0
3205	14/9/20	1.45		N									0
3215	14/10/26	1.1	N	N	CMP	18	20	5	Clear	OK	1		0
3215	14/10/26	1.15	Y	N	CMP	144	200	6	Clear	OK	2		0
3215	14/10/26	1.35	N	N	Steel	15	25	8	Clear	Eroding	2.5		0
3215	14/10/26	1.4	N	N	CMP	18	20	6	Clear	OK	0		0
3215	14/10/26	1.45	N	N	Steel	15	30	15	Clear	Eroding	3		0
3220	14/10/33	4.85	N	N									0
3220	14/10/33	4.75	N	N	CMP	18	35	10	Partly Plugged	OK	0.5		0
3705	15/10/3	2.5	N	N	CMP	18	20	2	Plugged	OK	2		0
3705	15/10/3	3.05	N	N	CMP	18	30	4	Partly Plugged	Eroding	2		0
3230	15/9/8	0.25	Y	N	CMP	24	40	7	Partly Plugged	Eroding	5		0
3230	15/9/17	0.35	Y	N	CMP	24	45	7	Clear	Eroding	3		0
3230	15/9/17	1	N	N	CMP	18	60	4	Plugged	Slide	5		0
3230	15/9/17	1.1	N	N	CMP	18	45	?	Plugged	Slide	1	Y	148
3305	14/9/28	0.3	Y	N	BIT	72	50	9	Clear	OK	1		0
3305	14/9/28	0.5	N	N	BIT	18	30	11	Clear	Eroding	3		0
3500	15/8/12	0.55	N	N	CMP	18	24	5	Clear	OK	0		0
3505	15/8/12	0.2	Y	N								Y	3655

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Outlet Ht	Failing Fill	Volume
3505	15/8/12	1.1	Y	N								Y	3889
3505	15/8/12	1.3	Y	N								Y	2797
3505	15/9/2	2.6	Y	N								Y	2428
3505	15/9/2	2.8	Y	N								Y	3079
3505	15/9/11	3.2	Y	N								Y	10711
3505	15/9/15	6.8	N	N	BIT	36	30	4	Clear	OK	0		0
3506	15/8/12	0.2	N	N	BIT	24	27	3.5	Clear	OK	2		0
3505	15/8/12	0	Y	N	BIT	30	15	3.5	Clear	OK	3		0
3506	15/8/13	1.1	N	N	BIT	18	15	2	Clear	OK	0		0
3506	15/9/14	1.35	Y	N	BIT	60	35	2	Clear	OK	2		0
3506	15/9/14	1.85	N	N	CMP	18	40	2	Partly Plugged	Eroding	3		0
3506	15/9/23	2.15	N	N	CMP	18	10	2	Clear	Eroding	2	Y	610
3500	15/8/12	0.25	N	N	CMP&CONC	18	20	3	Clear	Eroding	2		0
3500	15/8/12	2.25	N	N	BIT	18	24	5	Clear	OK	0.5		0
3500	15/8/12	0.31	Y	N								Y	1852
3200	15/9/33	2.8		N									0
3250112	15/10/25	2.1	N	N	AL	15	8	2	Clear	Eroding	5		0
3250112	15/9/25	2.35	N	N	BIT	16	12	3	Clear	Eroding	3		0
3250112	15/9/30	2.4	N	N	BIT	16	12	2	Clear	Eroding	7		0
3250112	15/9/30	2.5	N	N	BIT	18	15	3	Clear	Eroding	2		0
3250112	15/9/30	2.65	N	N	BIT		24		Plugged	Eroding			0
3250112	15/9/30	2.8	Y	N	CMP	60	60	3	Clear	OK	3		0
3200115	14/9/9	0.35	Y	N									0
3230113	15/9/8	0.15	Y	N								Y	65
3231	15/9/17	0.05	Y	N	CMP	24	30	4	Clear	Eroding	2		0
3231	15/9/17		N	N	CMP	18	10	2	Clear	OK	1		0
3231	15/9/17	0.5	N	N	CMP	24	20	5	Clear	OK	1		0
3231	15/9/17	0.65	N	N	CMP	24	25	4	Clear	OK	0		0
3231	15/9/17	0.85	N	N	CMP	18	12	2	Clear	Eroding	1		0
3231	15/9/17	0.9	N	N	AL	18	18	2	Plugged	Eroding	2		0
3231	15/9/17	1	N	N	CMP	18	15	3	Clear	Eroding	0		0
3231	15/9/17	1.05	Y	N	CMP	18	15	4	Clear	Eroding	0		0
3231	15/9/17	1.18	N	N	AL	18	10	3	Clear	OK	0		0
3231	15/9/20	1.85	N	N	AL	18	15	2	Clear	Eroding	3	Y	224
3231	15/9/19	2.3	N	N	CMP	16	24	6	Clear	OK	0		0
3231	15/9/19	2.65	N	N	CMP	18	10	3	Clear	OK	0		0

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Outlet Ht	Failing Fill	Volume
3231	15/9/19	2.75	Y	N	CMP	36	30	4	Partly Plugged	OK	1		0
3231	15/9/19	3.1	N	N	CMP	15	10	2	Clear	Eroding	1		0
3231	15/9/19	3.15	N	N	CMP	24	25	2	Clear	Eroding	4		0
3231	15/10/24	3.35	N	N	CMP	18	12	1	Clear	Eroding	0		0
3231	15/10/24	3.5	N	N	CMP	18	15	2	Clear	Eroding	6		0
3231	15/10/24	3.6	N	N	CMP	24	20	2	Clear	Eroding	4		0
3231	15/10/24	3.7	N	N	CMP	18	10	2	Plugged	Eroding	0		0
3231	15/10/24	3.9	N	N	CMP	18	15	2	Clear	Eroding	0		0
3250112	15/9/19	3.95	Y	N	CMP	99	75	3	Clear	OK	0		0
3250112	15/9/19	3.6	N	N	CMP	18	18	4	Clear	Eroding	5		0
3250112	15/9/30	3.55	N	N	CMP	18	10	2	Clear	OK	4		0
3250112	15/9/30	3.5	N	N	CMP	18	10	2	Partly Plugged	Eroding	2		0
3250112	15/9/30	3.3	N	N	CMP	18	30	3	Partly Plugged	Eroding	8		0
3250112	15/9/30	3.1	N	N	CMP	18	15	2	Clear	OK	3	Y	173
3250112	15/9/30	3.05	N	N	CMP	18	10	1	Partly Plugged	Eroding	0		0
3250112	15/9/30	2.95	Y	N	CMP	48	30	4	Partly Plugged	OK	1		0
3700147	15/10/28	0.7	Y	N	CMP	99	50	3	Plugged	OK	0		0

Status of Roads > 200' of Streams

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Failing Fill	Volume
3200	15/9/32	2.65	N	N	BIT	36	30	5	Partly Plugged	OK		0
3200	15/9/32	3.75	N	N	BIT	18	40	10	Clear	OK		0
3200	15/9/32	3.85	N	N	BIT	18	30	3	Partly Plugged	OK		0
3200	16/9/5	3.9	N	N	BIT	18	15	5	Partly Plugged	OK		0
3200	16/9/5	4.05	N	N	BIT	18	75	25	Clear	OK		0
3240	15/9/28	0.04	N	N	BIT	18	60	5	Partly Plugged	OK		0
3240	15/9/28	0.1	N	N	AL	24	45	8	Clear	OK		0
3235	15/9/16	0.25	N	N	Steel	15	15	15	Clear	OK		0
3235	15/9/16	0.5	N	N	Steel	18	20	3	Plugged	OK		0
3235	15/9/21	1.1	N	N	Steel	18	60	8	Clear	OK		0
3235	15/9/21	1.3	N	N	Steel	18	100	6	Plugged	OK		0
3417114	14/9/9	0.55	N	N								0
3417114	14/9/9	1.2	N	N	BIT	18	8	5	Clear	Eroding		0
3412113	14/9/16	0.1	N	N	CMP	18	45	25	Partly Plugged	Eroding		0
3412	14/9/16	5.25	N	N	CMP	18	40	16	Partly Plugged	Eroding		0
3412	14/9/17	5.7	N	N	CMP	18	25	30	Clear	OK		0
3412112	14/9/17	0.2	N	N	CMP	24	15	8	Partly Plugged	OK		0
3412	14/9/17	6.85	N	N	Concrete	16	25	4	Partly Plugged	Eroding		0
3412	14/9/17	6.86	N	N	Concrete	16	25	8	Clear	Eroding		0
3412	14/9/17	7.2	N	N	Concrete	16	120	28	Clear	Eroding		0
3412	14/9/17	7.3	N	N	Concrete	16	24	7	Partly Plugged	Eroding		0
3412	14/9/17	7.5	N	N	CMP	36	50	13	Clear	OK		0
3310120SPUR#	14/8/24	0.15	N	Y	CMP	30	40	20	Partly Plugged	Eroding		0
3210	14/10/24	0.6	N	N	CMP	24	20	19	Clear	Eroding		0
3215	14/10/26	0.5	N	N	CMP	18	30	10	Clear	OK		0
3215	14/10/26	0.55	N	N	CMP	18	18	5	Clear	Eroding		0
3215	14/10/26	0.6	N	N	CMP	18	12	3	Clear	OK		0
3215	14/10/26	0.65	N	N	Steel	15	15	8	Clear	OK		0
3215	14/10/26	0.85	Y	N	CMP	36	50	12	Clear	OK		0

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Failing Fill	Volume
3225112	15/9/5	0.05	N	N	BIT	24	22	11	Clear	Eroding		0
3225112	15/9/5	0.08	N	N	BIT	24	20	4.5	Clear	Eroding		0
3306	14/9/32	0.65		N	BIT	18		2	Partly Plugged	Slide	Y	376
3230SPUR#3	15/9/17	0.2	N	Y	CMP	?	40	8	Plugged	Eroding		0
3230	15/9/17	0.8	N	N	CMP	24	75	17	Clear	Slide		0
3230	15/9/17	1.2	N	N	CMP	18	30	6	Clear	Eroding		0
3230	15/9/17	1.3		N								0
3305112	14/9/28	0.05	Y	N	1/2 PIPE	72	50	9	Partly Plugged	OK		0
3305111	14/9/33	0.2	N	N	BIT	24	25	10	Clear	Eroding		0
3305111	14/9/33	0.35	N	N	BIT	36	30	15	Clear	Eroding		0
3305111	14/9/33	0.45	Y	N	BIT	36	50	11	Clear	OK		0
3305	14/9/28	0.55	N	N	BIT	18	25	11	Clear	Eroding		0
3305	14/9/33	0.8	N	N	CMP	18	30	10	Clear	Eroding		0
3305	14/9/32	0.85	N	N	BIT	18	27	7	Clear	Eroding		0
3305	14/9/32	0.95	N	N	BIT	36	35	16	Clear	Eroding		0
3305	14/9/32	1	N	N	BIT	24	20	5	Clear	Eroding		0
3305	14/9/33	1.55	N	N	CMP	18	20	8	Partly Plugged	OK?		0
3305	14/9/33	1.7	N	N	?	?	25	?	Plugged	?	Y	292
3305	14/9/33	1.75	N	N	BIT	18	15	4	Clear	Eroding		0
3305	14/9/33	1.95	N	N	CMP	18	15	20	Clear	Eroding		0
3305	14/9/33	2.1	N	N	BIT	24	20	14	Clear	Eroding		0
3305	14/9/32	2.4	N	N	CMP	24	33	9	Clear	Eroding		0
3305113	14/9/32	0.05		N								0
3309	14/9/33	0.35		N								0
3507	15/9/2	0.35		N								0
3507	15/9/2	0.55		N								0
3505	15/9/14	4.9	N	N	CMP	18	30	12	Clear	Eroding		0
3505	15/9/11	3.6	N	N							Y	E+04
3505	15/9/11	3.8	N	N							Y	1960
3505	15/9/11	4	N	N							Y	1732
3505	15/9/11	4.75	N	N							Y	429
3505	15/9/15	5.9	N	N							Y	962

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Failing Fill	Volume
3505	15/9/15	6.05	N	N							Y	4444
3509	15/9/15	6.05		N								0
3505	15/9/15	6.15		N							Y	1430
3505	15/9/15	6.3		N							Y	1704
3505	15/9/15	6.35	N	N	BIT	18	30	4	Clear	Eroding		0
3505	15/9/15	6.4	N	N	BIT	18	30	4	Clear	OK		0
3505	15/9/15	6.9	N	N	CMP	36	20	5	Partly Plugged	OK		0
3506	15/8/12	0.57	Y	N	BIT	96	40	2	Clear	OK		0
3506	15/8/13	0.9	N	N	CMP	18	20	3	Partly Plugged	OK		0
3506	15/9/14	1.65		N								0
3506	15/9/14	2	N	N	CMP	18	18	2	Clear	OK		0
3500	15/8/12	0.3	Y	N	CMP	60	60	11	Partly Plugged	OK		0
3500	15/8/18	1.6	Y	N	CMP	36	30	12	Clear	Eroding		0
3500112	15/8/18	0.1	N	N	AL	36	15	2	Clear	OK		0
3500	15/8/18	1.8	N	N	CMP	18	30	12	Clear	OK		0
3500	15/8/18	2	N	N	CMP	18	15	12	Partly Plugged	Eroding		0
3500	15/8/18	2.15	N	N	Steel	15	22	6	Clear	Eroding		0
3500	15/8/19	2.55	N	N	CMP	18	15	3	Clear	OK		0
3500	15/8/19	2.6	N	N	BIT	18	15	6	Clear	OK		0
3500	15/8/7	1.1	Y	N							Y	3973
3500	15/8/19	2.75	Y	N							Y	1556
6300130	15/8/18	0.55	N	N	CMP	18	15	3.5	Clear	OK		0
6300124	15/8/18	0.7	Y	N	AL	48	30	6	Clear	Eroding		0
6300	15/8/18	0.1		N							Y	635
3500211	15/8/24	0.05		N								0
3509112	15/9/22	0.05		N								0
3509	15/9/22	1		N								0
3200	15/9/33	3.4		N							Y	E+04
3200	16/9/8	5.45		N							Y	1986
3200	15/9/33	2.2		N								0
3250	15/9/31	0.7		N							Y	1321
3250	15/9/31	0.8		N							Y	898

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Failing Fill	Volume
3250	15/10/36	2.95		N							Y	389
3250112	15/10/25	0.8	N	N	CMP	18	25	4	Clear	Eroding		0
3250112	15/10/25	1.05	N	N	CMP	18	10	1.5	Clear	Eroding		0
3250112	15/10/25	2	N	N	CMP	24	15	4	Clear	Eroding		0
3250112	15/9/25	2.2	Y	N	CMP	72	60	3	Clear	OK		0
3700111	15/10/1	0.1	N	N	CMP	24	25	5	Clear	OK		0
3700	15/10/1	0.5	N	N	CMP	24	30	10	Clear	OK		0
3700	15/10/1	0.6	N	N	CMP	24	15	15	Clear	Eroding		0
3700	15/10/1	0.7	N	N	CMP	24	25	10	Clear	Eroding		0
3700	15/10/2	1.2	N	N							Y	2165
3700	15/10/11	2.6	N	N							Y	500
3700	15/10/15	4.55	N	N							Y	1092
3700	15/10/27	6	N	N							Y	6347
3700	15/10/28	8.25	N	N							Y	693
3700141	15/10/15	0.05	N	N							Y	2564
3230	15/9/18	1.6	N	N	BIT	18	20	7	Clear	OK		0
3230	15/9/18	1.4	N	N	BIT	18	18	2	Clear	Eroding		0
3230	15/10/24	3.7	N	N							Y	1778
3230	15/9/18	1.5	N	N							Y	2333
3307	14/9/29	1.34		N							Y	9769
3231	15/9/17	1.15	N	N	CMP	24	20	5	Clear	Eroding		0
3231	15/9/17	1.4	N	N	AL	36	30	6	Clear	OK		0
3231	15/9/20	1.47	N	N	BIT	18	15	2	Clear	Eroding		0
3231	15/9/20	1.6	N	N	AL	24	24	5	Clear	OK		0
5800	15/10/29	20.9	Y	N	BIT	72	24	5	Clear	OK		0
5800530	15/10/29	0.1	N	N	BIT	24	30	8	Clear	OK		0
5800530	15/10/29	0.3		N							Y	E+04
5800	15/10/29	19.9		N							Y	2598
5800	15/10/29	19.6		N							Y	1667
5800	15/10/30	18.9		N							Y	1600
5800	15/10/29	18.4		N							Y	1667
5800	15/10/29	18.5	N	N	CMP	18	15	4	Clear	Eroding		0

Road #	Legal (T/R/S)	MP	Anad	Oper Spur	Culvert Type	Dia	Chan Wdth	Fill Ht	Inlet	Outlet	Failing Fill	Volume
5800	15/10/29	18.2	N	N	CMP	24	20	5	Clear	OK		0
5828	15/10/29	0.2	N	N	BIT	18	24	4	Clear	OK		0
BLM#1	15/8/18	1.45	N	Y	Steel	24	20	2	Partly Plugged	OK		0

Appendix I

Overall Priority Rating - Assessment Technique

The following analysis method was utilized to prioitize the Lobster Five Rivers subwatersheds for future management activities. This method incorporated all five of the issues that were being considered in the analysis. For terrestrial and aquatic resource specific issues, refer to Chapter IV in the watershed analysis document.

1. There were two factors that went into rating of each issue:

- potential of the subwatershed to provide the conditions highlighted by the issue based on either inherent qualities or existing condition.

- ability to affect changes in the current condition through management activities based on limitations of the area or the land use allocation from the NFP

This rating was interpreted slightly differently depending on the issue:
For Timber:
Potential was interpreted as H=Matrix, M=Mixed Allocation, L=LSR

For Access:
Potential was interpreted as meaning "value to the public", while limitation was a measure of management need for the road.

For Temperature:
Potential related to existing condition: H= existing cold water refuge, M= potential refuge i.e. partially functional now, and L= currently temperature limited areas.

The two ratings were then combined into one based on the following :

HIGH

HH	MH
HM	

MODERATE

LH
MM
HL

LOW

	LM
ML	LL

Each of the above conditions were rated high, medium or low. Appendix I displays the rating system for each subwatershed. Each rating of high was given a value of 10, each medium rating was valued 5 and each low rating received no value. Then the value for each of the five issues was tallied to determine the overall priority for that subwatershed.

A total value of 40 or more was rated Priority 1
A total value of 30 or more was rated Priority 2
A total value of 20 or more was rated Priority 3
A total value of less than 20 was rated Priority 4

ISSUE	CASCADE			LOWER 5			ELK			BEAR			UPPER LOBSTER		
	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total
WILDLIFE	H	H	**H**	M	M	**M**	L	L	**L**	H	H	**H**	L	L	**L**
FISH HAB	M	M	**M**	M	L	**L**	M	M	**M**	M	L	**L**	H	H	**H**
TEMPERATURE	L	M	**L**	L	L	**L**	H	M	**H**	M	M	**M**	M	M	**M**
TIMBER	H	M	**H**	M	M	**M**	M	M	**M**	M	M	**M**	L	L	**L**
ACCESS	M	H	**H**	L	M	**L**	L	H	**M**	L	H	**M**	M	H	**H**
TOTAL SCORE			**35**			**10**			**25**			**25**			**25**
PRIORITY			**2**			**4**			**3**			**3**			**3**

ISSUE	WF LOBSTER			EF LOBSTER			UP MID LOBSTER			LITTLE LOBSTER			PREACHER		
	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total
WILDLIFE	L	L	**L**	M	L	**L**	M	M	**M**	H	M	**H**	M	H	**H**
FISH HAB	M	M	**M**	H	H	**H**	H	M	**H**	M	M	**M**	M	L	**L**
TEMPERATURE	H	H	**H**	H	H	**H**	M	L	**L**	M	M	**M**	M	L	**L**
TIMBER	L	L	**L**	L	L	**L**	L	M	**L**	L	H	**M**	L	M	**L**
ACCESS	L	M	**L**	L	M	**L**	L	M	**L**	L	M	**L**	H	H	**H**
TOTAL SCORE			**15**			**20**			**15**			**25**			**20**
PRIORITY			**4**			**3**			**4**			**3**			**3**

ISSUE	LOW MID LOBSTER			LOWER LOBSTER			GREEN			UPPER 5			UPPER BUCK		
	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total
WILDLIFE	M	H	**H**	L	H	**M**	H	H	**H**	H	H	**H**	H	H	**H**
FISH HAB	M	L	**L**	M	M	**M**	H	H	**H**	H	M	**H**	H	M	**H**
TEMPERATURE	L	L	**L**	M	M	**M**	M	M	**M**	H	M	**H**	H	L	**M**
TIMBER	M	M	**M**	M	M	**M**	M	M	**M**	M	M	**M**	M	M	**M**
ACCESS	L	M	**L**	H	M	**H**	M	M	**M**	H	H	**H**	H	H	**H**
TOTAL SCORE			**15**			**30**			**35**			**45**			**40**
PRIORITY			**4**			**2**			**2**			**1**			**1**

ISSUE	LOWER BUCK			CRAB			COUGAR			MIDDLE 5			CAMP		
	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total	Potential	Limit	Total
WILDLIFE	M	M	**M**	H	H	**H**	H	H	**H**	H	M	**H**	H	M	**H**
FISH HAB	H	L	**M**	L	L	**L**	M	H	**H**	M	L	**L**	H	M	**H**
TEMPERATURE	M	L	**L**	L	L	**L**	L	H	**M**	L	L	**L**	M	M	**M**
TIMBER	H	M	**M**	M	M	**M**	L	M	**L**	L	M	**L**	L	M	**L**
ACCESS	H	H	**H**	H	H	**H**	L	H	**M**	L	M	**L**	H	H	**H**
TOTAL SCORE			**25**			**25**			**30**			**10**			**35**
PRIORITY			**3**			**3**			**2**			**4**			**2**