

BEAVER CREEK

WATERSHED ANALYSIS

October 2001

SIUSLAW NATIONAL FOREST WALDPORT RANGER DISTRICT



BEAVER CREEK WATERSHED ANALYSIS

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CHAPTER ONE:

WATERSHED OVERVIEW

Introduction

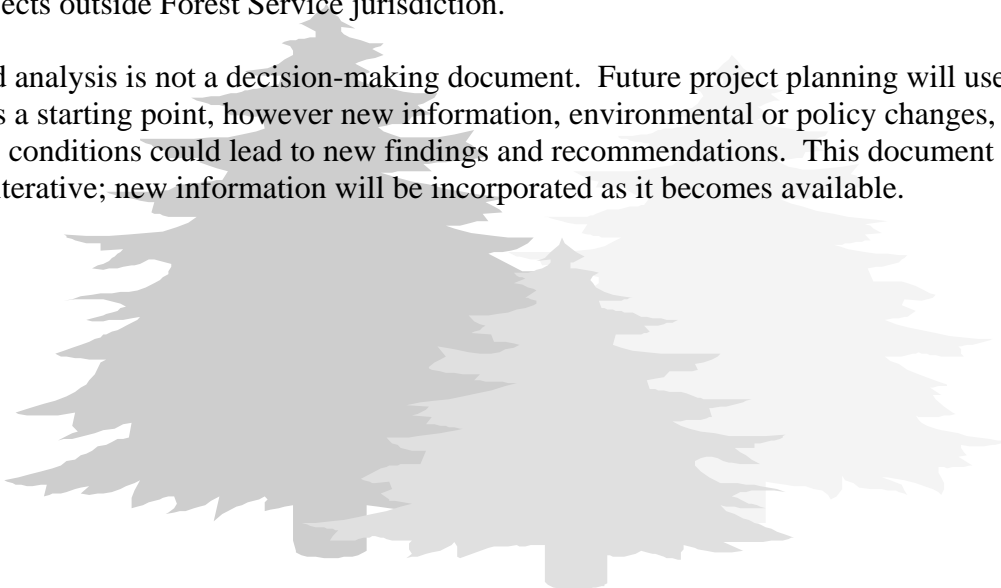
The Siuslaw National Forest has prepared this Beaver Creek Watershed Analysis as required within the Northwest Forest Plan (NFP – USDA/USDI 1994). The Northwest Forest Plan was developed to maintain and restore the ecology of federal lands within the range of the northern spotted owl, focusing on older forests (Late Successional Reserves) and watershed health (Aquatic Conservation Strategy – ACS). Watershed analysis is intended to:

- Provide site-specific information to meet ACS objectives in future project planning
- Provide the basis for restoration and monitoring programs for terrestrial and aquatic species,
- Provide the foundation from which Riparian Reserves (streamside zones) can be delineated.

This watershed analysis discusses the ecological processes at work in the Beaver Creek watershed, focusing on two resources: older forests and coho salmon. The analysis compares pre-settlement and current conditions, identifies important natural processes, and evaluates human impacts within the watershed.

This watershed analysis generally follows the outline described in the updated Federal Guide for Watershed Analysis - Ecosystem Analysis at the Watershed Scale (Federal Guide - Version 2.2, August 1995). Recommendations for maintaining/restoring natural processes on National Forest lands are included to help guide future project planning. Opportunities for restoration on private land are also discussed; private landowners and other organizations can use this information to support projects outside Forest Service jurisdiction.

A watershed analysis is not a decision-making document. Future project planning will use this document as a starting point, however new information, environmental or policy changes, and/or site-specific conditions could lead to new findings and recommendations. This document should be considered iterative; new information will be incorporated as it becomes available.



The Late-Successional Forest



Late-successional forest habitat within the Beaver Creek watershed is recovering from 100 years of agriculture, residential development and logging. Late-successional forests currently occupy about 31 percent of the watershed. A very low 1 percent of the watershed provides interior (unfragmented) forest habitat.¹

A Coho Stronghold

Coho salmon, a species recently listed as threatened under the Endangered Species Act², is the single most important resource in the Beaver Creek watershed. Beaver Creek has many special characteristics that make it one of the last strongholds on the Oregon Coast for coho:



The stream has a high proportion of low-gradient, slow flowing reaches and estuarine areas that are preferred coho rearing habitat.



The watershed is relatively intact, with little urban development, low recreational use and moderate amounts of logging.



Beaver Creek has not been heavily fished, and has not had releases of hatchery coho to supplement or sustain the fishery.

These characteristics increase the Beaver Creek watershed's potential as a refuge that can provide stock for native coho recovery in local streams. Federal lands in the North Fork of Beaver Creek are designated as a Key Watershed in the Northwest Forest Plan, making it a high priority for maintenance and restoration of aquatic habitat and species. Lower reaches of the Beaver Creek Watershed are also designated as Critical Habitat for coho.

Location And Size

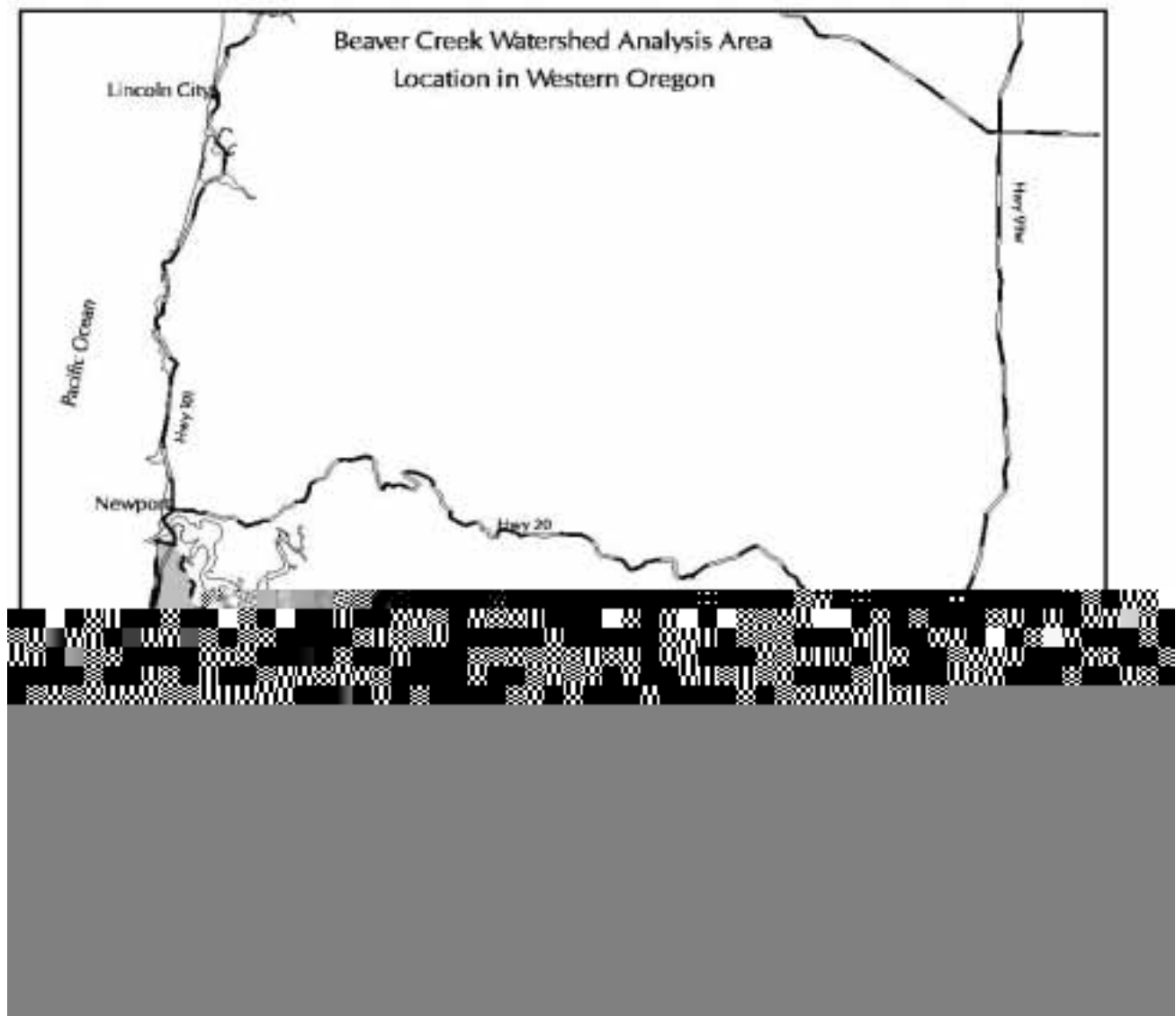
Beaver Creek is a 32,500-acre, 5th field watershed that lies between Yaquina Bay to the north, and Alsea Bay to the south (see Map 1: Vicinity). The mainstem of Beaver Creek reaches the ocean at Ona Beach.

The Beaver Creek watershed analysis area is divided into seven subwatersheds; three of these drain directly into the Pacific Ocean, and are not connected to Beaver Creek.

¹ Late-successional forest is a generic term that includes mature conifer forests and old growth. It is used interchangeably with the terms "older forests" or "mature forests".

² Endangered Species Act listing is uncertain following recent litigation.

Map 1: Vicinity



Named streams that are part of the Beaver Creek stream system include: Peterson, Lewis, Bowers, Tracy, Simpson, Pumphouse, Bunnel, South and North Forks of Beaver, South and North Forks and mainstem Elkhorn, Graves, Worth and Oliver Creeks. Named creeks within the analysis area that flow directly to the Pacific Ocean include: Thursday, Friday, Collins, Buckley, Fox, Squaw, Hill, Deer, Lost, Thie, Grant and Henderson Creeks. Named creeks are shown on Map 5: Geomorphic Stream Segments.

Land Ownership

Table 1: Land Ownership

	BLM	USFS	Total Federal	State and Local Gov't	Private Industrial Forest	Other Private	Total Private	Grand Total
Acres	330	11,313	11,643	908	8,500	11,469	19,969	32,500
% of Federal	3	97	--	--	--	--	--	--
% of Private	--	--	--	--	43	57	--	--
% of Total Landbase	1	35	36	3	26	35	61	100

Land Ownership is shown on Map 2.

Federal Land Use Allocations

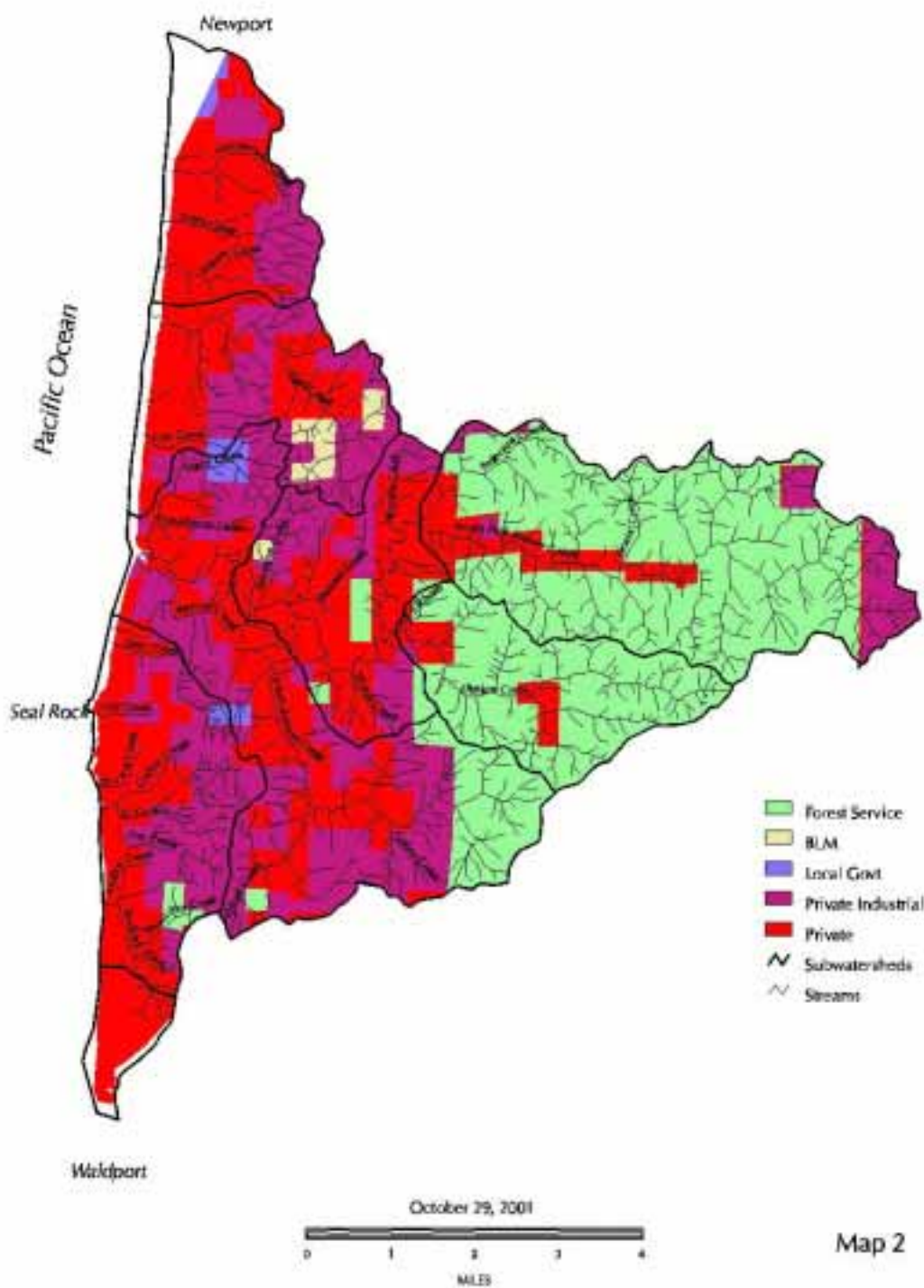
Key Watersheds

The North Fork of Beaver Creek is designated as a Key Watershed by the NWP, because of its relatively intact landscape and high quality coho habitat. Key Watersheds are prioritized for restoration and maintenance and are associated with specific standards and guidelines.

Late-Successional Reserves

Approximately 97 percent of the federally managed lands in the watershed are allocated to Late-Successional Reserve (LSR) based on the Northwest Forest Plan (see Table 2). The objective of this land use allocation is to protect and enhance conditions of late- successional and old growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. Occupied marbled murrelet sites are also included in this land use allocation. These areas protect all existing and recruitment habitat (i.e. stands capable of becoming marbled murrelet habitat within 25 years) within a 0.5-mile radius of documented occupation areas.

Beaver Creek Watershed Analysis Area Land Ownership



Riparian Reserves

Riparian Reserves were established in the Northwest Forest Plan to protect streams, rivers and other water bodies, and to ensure dispersal habitat for species dependent on aquatic and late-successional forest conditions. Eighty percent of the federal lands within Beaver Creek watershed are estimated to be within Riparian Reserves.

Matrix

Isolated portions of Siuslaw National Forest were allocated to Matrix in the Northwest Forest Plan, however much of this area is also within Riparian Reserves and managed accordingly. The upland acreage within Matrix and outside Riparian Reserves (less than 1 percent of the watershed) is small, scattered and not considered manageable for timber.

Table 2: Land Use Allocation

LAND USE ALLOCATION	BLM Acres (Percent)	USFS Acres (Percent)
LSR/Riparian Reserve	100%	97%
Riparian Reserve outside LSR	80%	3%
Matrix	0%	<1%

The Lower Reaches

The most valuable coho habitat in the watershed is within the privately owned, low-gradient stream reaches lower in the system. Agricultural use has led to stream channelization and straightening; draining of wetlands; removal of riparian vegetation and large wood; and other actions that degraded the coho habitat. Restoration of these low gradient reaches would increase the value and production of coho salmon in Beaver Creek.

Many groups and individuals are involved in watershed restoration on the low-gradient reaches. The following section summarizes existing projects within the area. Additional recommendations from groups working on the private lands are in Chapter Two, and Chapter Four lists a number of programs to assist the restoration effort.

Wetlands Conservancy

Some restoration and protection actions have already occurred or are currently proposed on private land. The Wetlands Conservancy established the 77-acre Estella Matilda Happ Memorial Wetland³ in the lower portions of main Beaver Creek (depicted on Map 5). The wetland contains ponds, marshes, sloughs, and tidewater areas where salt and fresh water mix. An unusual grove of dead, flooded spruce stands within this parcel. The Wetlands Conservancy is interested in acquiring more property on Beaver Creek and its tributaries (Zeke, Hollowell and Keady Properties on Beaver Creek and Simpson Creek – maps on file at the Siuslaw NF). The Wetlands Conservancy has also proposed some restoration projects on South Fork Beaver Creek in Section 33 (see restoration recommendations on private land in Chapter Two).

The Wetlands Conservancy was also instrumental in developing a pre-settlement vegetation map (see Map 3 in this document), which will be useful in planning and prioritizing future watershed restoration projects. For more information about the historic map or the Wetlands Conservancy, contact: Esther Lev, Wetlands Conservancy 503-239-4065, estherlev@wetlandsconservancy.org.

Mid Coast Watersheds Council

The **Mid-Coast Watersheds Council 6th Field Watershed Assessment** was completed in July 2001 (hereafter referred to as: 6th Field Assessment). The report is available by contacting Wayne Hoffman, 541-265-9195 and is viewable and downloadable from the council's website at www.midcoastwatershedcouncil.org.

The document assesses watershed conditions at the 6th field scale for numerous watersheds along the Oregon coast, including Beaver Creek watershed. Based on rankings of current conditions and future potential, the report prioritizes watersheds for restoration actions. Three stream reaches within Beaver and South Beaver Creeks are identified as having high priority for large woody material placement and other restoration measures.

Floodplain restoration opportunities are also identified in the 6th Field Assessment. Beaver Creek contains more miles of potential floodplain restoration than any other mid-coast watershed assessed. High potential areas are low-lying with wet soils, have stream segments longer than 500 meters, and are currently zoned for land uses compatible with floodplain restoration.

Oregon Watershed Enhancement Board

A database maintained by the Oregon Watershed Enhancement Board (OWEB) contains information on three different projects implemented in the Beaver Creek watershed since 1997. Contact Bobbi Riggers at OWEB, 541-757-4263 x235, for more information about how to access the database. In addition, an application was submitted and conservation plan written for a private parcel located upstream of and adjacent to the Happ Wetland on Beaver Creek. The plan was ranked as a low priority for program funds (and was not implemented) because summer grazing was to continue on the property. The three projects are described on page 8.

³ Also known as “Zeke’s Marsh”

A. North Beaver Creek, SW ¼ section 22, downstream of Elkhorn confluence

A riparian planting project began in 1995 along 1100 feet of North Beaver Creek was designed to determine the effectiveness of different widths of riparian tree buffers on providing shade to the channel. No direct temperature data was collected due to the short length of channel treated, however, the project has been closely monitored and results are planned for publication in the near future.

Preliminary data indicates very good survival of alder, hybrid poplar, and cedar plantings where adequate protection from grazing and weed control was provided. In 2000, the trees averaged 21 feet tall, with some as tall as 31 feet. A buffer width of six trees on the south side of the stream shaded 94 percent of the channel. A buffer of one tree effectively shaded 73 percent of the channel. In the summer of 2001, the plantings were thinned from their initial spacing of 5' to a spacing of 10-12'. Contact Bill Rogers, OSU Extension Service, 541-574-6534, for more information about this project.

B. North Beaver Cr ¼ mile, both sides of creek

A riparian area was fenced in 1995 to reduce livestock trampling and increase vegetation along the creek. No planting was done. Casual monitoring indicates the bank condition and the vegetative cover have improved. Contact: Lance Gatchell, Lincoln Soil and Water Conservation District, 541-265-2631, for more information about this project.

C. Alder Creek tributary to South Beaver, section 3

A project involving riparian planting and addition of large woody debris was implemented on private land in 1999 as mitigation for wetland fill and channel relocation caused by a Lincoln County road widening project. The riparian planting was monitored in summer 2001. The best success seemed to be with large (2-3") diameter willow cuttings of short length. This finding will be applied to future riparian planting projects.

Contact: Lance Gatchell, Lincoln Soil and Water District, 541-265-2631, for more information.

Beaver Creek Concerned Citizens

The "Concerned Citizens for the North Fork Beaver Creek Forest Preserve" have submitted a petition including 53 signatures of residents of Seal Rock and other nearby communities. The proposed Forest Preserve contains about 125 isolated acres of Siuslaw National Forest. The property lies about one quarter mile west of the confluence of Elkhorn and North Beaver Creeks. The residents request that the land be protected in perpetuity from logging, hunting, trapping, and never to be sold or traded. The group is pursuing purchase of the 160 acres of the Kingset property on Elkhorn Creek and proposes trading it with the Forest Service so that they could acquire the "North Fork Preserve." Maps of these properties are in on file at the Siuslaw National Forest Headquarters and Waldport Ranger District office.

CHAPTER TWO:

WATERSHED ISSUES, FINDINGS AND RECOMMENDATIONS

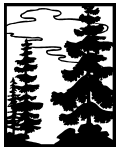
The Process

The Federal Guide (USDA 1995a) lays out the six step Watershed Analysis process. The process includes identification of key issues and questions to help focus the analysis. In the Beaver Creek watershed, two significant resource issues drove the analysis: coho salmon and older forests. Core questions within the Federal Guide were also considered.

Issue: Older Forests

Older forests currently occupy about 45 percent of federal lands, 23 percent of the private lands, and 31 percent overall of the Beaver Creek watershed. However, *interior* older forests, those that are not affected by fragmentation, occupy 1 percent of the watershed, all on federal lands. Logging, along with residential and agricultural development within the last 100 years removed many stands of older forest, especially within the lower reaches of the watershed.

Key Questions for Older Forests



What is the priority for restoring older forests within the Beaver Watershed Analysis Area as compared to other Siuslaw watersheds?



Where are the best opportunities to restore late-successional forests within the watershed?
What stands are reaching a size where they would benefit from thinning?



What other restoration treatments are recommended for the terrestrial environment?

Issue: Coho Salmon

The most significant resource in the Beaver Creek watershed is coho salmon. Coho populations in this small watershed are considered among the strongest on the central coast of Oregon. Coho salmon production would likely increase following restoration of low gradient, unconfined stream habitat (primarily on non-federal lands).

Key Questions for Coho Salmon



What are the presettlement and current habitat conditions and population trends for coho salmon?



What factors are limiting coho production?



How does the upper watershed affect the lower?



Which streams or reaches within the watershed contain intact, functioning systems and/or serve as critical habitat for anadromous fish?



Does the Key Watershed designation in the North Fork Beaver Creek provide high quality habitat and refuge for anadromous salmonids?

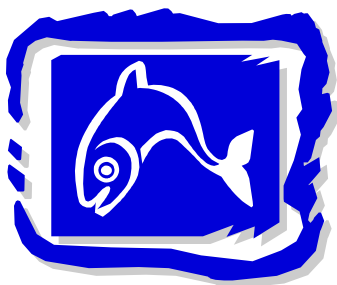


What restoration techniques might be appropriate?



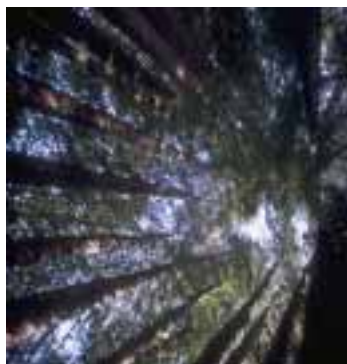
What role does the Forest Service have on the private land?

Key Findings



Beaver Creek can provide a solid refuge that can serve as a core coho salmon population for recovery efforts in nearby watersheds. The Key Watershed designation on federal lands provides for long-term recovery. About 68 percent of anadromous fish bearing stream miles are on private land. High quality anadromous fish habitat exists on federal land along North Fork Beaver Creek.

Beaver Creek is a dynamic system; upland conditions affect downstream habitat because sediment, nutrients, food, and wood move from the headwaters to the low gradient reaches downstream. Logging in the headwaters, along with land and stream clearing in the lower reaches, has reduced the amount of large wood important to coho salmon. Within the watershed, the most significant impacts from land use to fish and wildlife has been loss/degradation of tidal-influenced wetlands. Beaver Creek contains more miles of potential floodplain restoration than any other mid coast watershed.



Older forest restoration within Beaver Creek has less priority for this decade than some other Siuslaw watersheds. About three percent of federal lands within the watershed are currently functioning as interior forest habitat (the watershed as a whole is highly fragmented, with one percent of the acreage functioning as interior habitat). Additionally, the watershed is isolated from larger blocks of forest that are higher priority for immediate treatment. The North Fork of Beaver Creek was identified as an area that currently provides better late-successional habitat than elsewhere in the Coast Range Province (USDA 1995b).

About 2,000 acres of federal lands within the watershed are reaching a size where commercial thinning is possible.



Grizzly bear, Pacific fisher, and gray wolf were last reported in the Coast Range around 1860, 1913, and 1934, respectively. Other species that were once more widespread although uncommon were extirpated by mid 1980, (e.g. wolverine - 1972 and lynx - 1984). Still other species that were once common are uncommon to rare today (e.g. peregrine falcon, bald eagle, etc.). Many early seral associated species, as well as non-native species (plant and animal) and species which have expanded their ranges westward with settlement (i.e. opossums, barred owls, cowbirds), were uncommon or absent from the watershed prior to the mid-1800's.

Recommendations

Table 3 summarizes Interdisciplinary Team recommendations and considerations related to management of the Beaver Creek Watershed.

Table 3: Management Recommendations

What	Why	Comments
<i>Aquatic Projects on National Forest</i>		
Place in-stream structures	Enhance diversity and complexity of low gradient, anadromous fish habitat in North Fork Beaver Creek.	Limited road access.
Encourage beaver activity		
Fall trees into stream		Only if sufficient cover is present to provide for riparian species
Plant conifers in riparian areas		Cedar and spruce preferred species
<i>Terrestrial Projects on National Forest</i>		
Thin upland stands to a minimum 40 percent crown cover (hemlock and mixed conifer stand may carry a higher density). Vary spacing.	Enhance forest diversity and complexity. Ease edge-effect, increase connectivity between older forest stands. Increase wind-firmness.	Prioritize critical habitat for PETS ¹ species and younger stands along roads that connect existing older forest. Highest priority adjacent to Drift Creek. Consider risk of blowdown, especially adjacent to large openings.
Plant trees and encourage natural regeneration.	Restore diversity and complexity, especially in riparian areas.	Consider role of red alder vs. conifers within riparian areas.
Avoid unnecessary increases in dead or down woody material in areas susceptible to DF beetle.	Reduce mortality from Douglas-fir beetle.	DF beetles may infest live standing trees in stands that have 3 or more dead trees per greater than 12 inches diameter per acre (Hosteetler, 1996).
Manual release and brushing.	Control unwanted vegetation.	Aggressive brush invades disturbed areas or areas where conifers are widely spaced.
Avoid thinning on potential infection sites or thin wide and underplant western hemlock and western red cedar. Vary spacing.	Reduce impacts and risk of spreading Swiss needle cast.	Need to stay abreast of emerging information on dealing with this disease. Prioritize stream influence zones.
Plant and protect western red cedar. Fall trees around root rot pockets.	Reduce spread of <i>Phellinus</i> in susceptible species.	Would also create large woody material.

¹ Proposed, Endangered, Threatened and Sensitive Species

What	Why	Comments
Consider potential for noxious weed spread from management activities.	Reduce spread of noxious weeds.	Evaluate road work such as daylighting and waste disposal, firewood cutting and timber operations.
Hand removal of noxious weeds. Identify cooperative projects with other landowners.	Reduce spread of noxious weeds.	Help secure funding for cooperative projects on and off National Forest.
<i>Road Projects on National Forest</i>		
Place rolling dips above culverts and size culverts appropriately.	Reduce road failure potential.	--
Monitor culverts with potential to plug regularly.	Reduce risk of road failure.	1995 Road Survey indicated problem culverts (see Table 11 and Map 13)
Time road closures to allow access for restoration projects	Reduce cost /increase likelihood of implementing restoration projects.	500 Road already decommissioned. Most roads on federal land in good condition.
<i>Other Projects</i>		
Post directional/informational signs leading to Drift Creek Wilderness Area trailheads	Improve recreation experience.	Avoid signing main junction at Highway 101.
<i>Monitoring Opportunities</i>		
Formal stand exams on dense plantations before and after treatment.	Information to determine stand-level treatment needs. Increase understanding of the dynamics of mixed Douglas-fir and western hemlock stands. Monitor snags densities and growth response.	--
Riparian Zone Vegetation Development	Determine where conifers are most likely to be successful.	--
Wood recruitment zones, blowdown areas.	Observe how wood moves through the system; gap dynamics; insect and disease and vegetation response.	Low elevation flights may be helpful.

Table 3A lists recommendations related to non-federal lands in the watershed. Further information about site-specific proposals is available by contacting the referenced groups.

Table 3A: Potential Projects off the National Forest

What	Why	Comments
<i>Potential Projects off the National Forest</i>		
Maintain current condition and function of Zeke Marsh (Happ Wetland). Add interpretive signs.	Encourage natural wetland processes; improve coho production; environmental education.	Wetland Conservancy interested in acquiring adjacent and other properties in the watershed. Potential private/public partnership for additional interpretation and signing. Contact Esther Lev, 503-239-4065.
Property Acquisition	Resolve land use conflicts areas of high ecological value.	The Central Coast Land Conservancy has applied for a North American Wetlands Conservation Act (NWCA) grant to fund conservation related purchases in the Beaver Creek and other coastal watersheds. Contact: Fran Recht, Central Coast Land Conservancy, 541-765-2234
Consider acquiring Elkhorn (Kingset) inholding.	Improve anadromous fish habitat effectiveness and connectivity within National Forest.	Potential 3 rd party arrangement with Beaver Creek residents to trade for SNF property outside the National Forest boundary.
Plug ditches with large woody material, redirect water onto the floodplain, plant willows.	Enhance channel sinuosity and attract beaver.	South Beaver Creek, NW ¼ of section 33. A grant application has been submitted to OWEB. Implementation is scheduled to begin in 2002. Contacts: Tony Stein, ODFW 541-867-0300 x253 and Wayne Hoffman, Mid-Coast Watersheds Council, 541-265-9195
Plant willow and spruce along channelized stream segment.	Restore native vegetation.	South Beaver Creek, S. ½ of section 33, approximately ¼ mile above the county road bridge. This project is in the “talking stage” between the watershed council and the landowner. Additional areas in Section 33 have been identified for restoration by the Wetlands Conservancy.
Add large woody material to areas identified in the 6 th Field Assessment	Improve anadromous fish habitat, restore channel complexity.	Specific locations identified in 6 th field assessment include the mainstem of Beaver Creek (from the confluence with Elkhorn Creek upstream to a tributary junction near the eastern boundary of section 14) and South Beaver Creek (between Graves and Oliver Creeks).
Graze or otherwise remove canary grass.	Reduce canary grass competition with native grasses.	Control of canary grass and other noxious weeds on and off forest requires cooperative efforts.

What	Why	Comments
Breach dikes, divert flows back to original channels, Remove obstructions to tidal influence. Design stream crossings to meet fish migration and flood needs.	Restore channel sinuosity and hydrologic function.	Requires high level of expertise and cooperation with potential adverse effects on agriculture. Develop priorities in cooperation with Wetlands Conservancy, Mid-coast Watershed Council, and others.
Planting, thinning, fencing, or eliminating unwanted vegetation.	Restore native riparian vegetation.	FS to provide technical expertise and help secure funding in cooperation with the Midcoast Watershed Council and private landowners under the State of Oregon's Plan for Salmon and Watersheds and other initiatives (see Chapter Four).

CHAPTER THREE:

WATERSHED ANALYSIS

Introduction

This chapter summarizes the existing and pre-settlement condition of the watershed. It addresses the elements and processes influencing the Beaver Creek watershed.

The Physical Environment

Streams and Hydrology

The Beaver Creek watershed has an unusually high proportion of low-gradient streams flowing through broad, unconfined valleys. The western, or lower portion of the watershed contains extensive wetlands and potential wetlands. Map 3 is a pre-settlement vegetation map prepared by the Oregon Natural Heritage Program in 2001. The map was developed using Government Land Office (GLO) Survey notes taken from the 1867 to 1882. Areas mapped as W, WMU and WSM depict wetland vegetation noted by the GLO surveyors. More information about the map and how it was created is in the analysis files.

The wetlands are underlain by the Nestucca Formation, the Alsea Formation, the Yaquina Formation, and Quaternary terrace deposits (see Map 4: Lithology and Landslides). These formations and deposits are made up of erosive sedimentary rocks. The topography in the western part of the watershed is gentle, with wide, flat valleys allow for wetland development.

The eastern part of the watershed is underlain by the Tyee Formation: siltstones and sandstones that are more resistant to erosion than the rocks to the west. Thus, ridges are higher, slopes steeper, streams are more confined, and valleys are more incised.

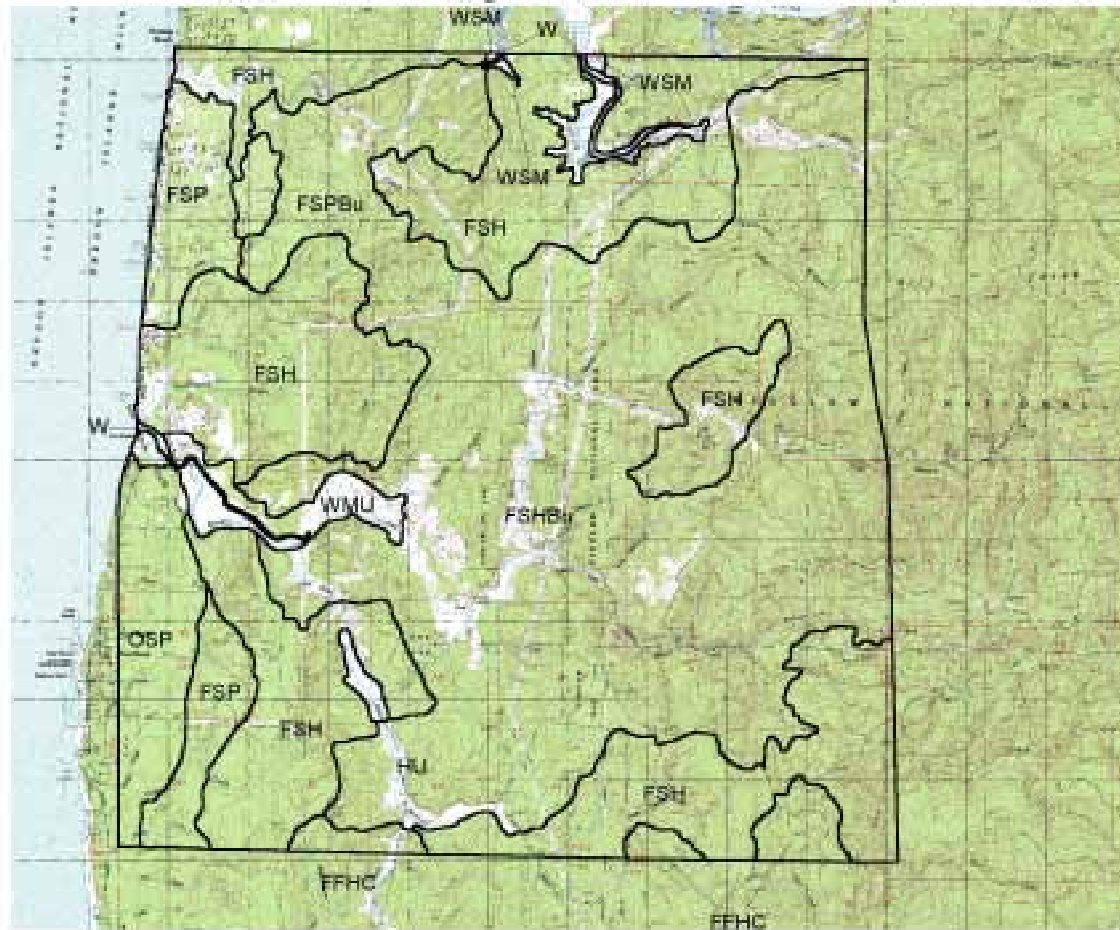
Streams in the Beaver Creek watershed were stratified into functional segments based on how steep and confined they are (see Map 5: Geomorphic Stream Segments – following Montgomery and Buffington’s 1993 methodology). Level of confinement is based on a depth to width ratio.

Source reaches are those with a gradient steeper than eight percent that are at least moderately confined. These reaches may flow intermittently, but respond quickly to storm events and are subject to periodic scour by debris torrents. These segments are important sources of cool water and pulses of sediment and wood to the rest of the stream system.

Transport reaches range between four and eight percent grade and are confined. They generally flow year round. Storage of sediment and wood in these reaches is temporary – high intensity storms will move material to stream segments lower in the system. These reaches are relatively resistant to long term geomorphic change caused by wood and sediment inputs because of the transitory nature of this material.

Map 3

Presettlement Vegetation - Township 12 South Range 11 West



Presettlement Vegetation Codes

FFHC - Mixed forest (mostly fir, etc.) forest with mostly deciduous understorey. Various combinations of Douglas fir, western hemlock, red cedar, grand fir, with lesser amounts of silver maple, dogwood, white oak, red alder.

FSH - Sitka spruce-Douglas fir-western hemlock forest, with patches of red alder. Sitka spruce often present. "Dense" understorey of vine maple, salmonberry and huckleberry.

FSPBu - As above, burned, often with scattered trees surviving fire.

FSP - Sitka spruce - shore pine - Douglas fir - hemlock forest.

FSPBu - As above, burned, often with scattered trees surviving fire.

HU - Brush, composition unknown. Includes "stickies" if so species or other descriptors are given.

OSP - Sitka spruce - Shore Pine woodland.

W - Water bodies - 1/2 inch across. Includes rivers, sloughs, ponds, beaver ponds, lakes, "marshy lakes" and "bogs".

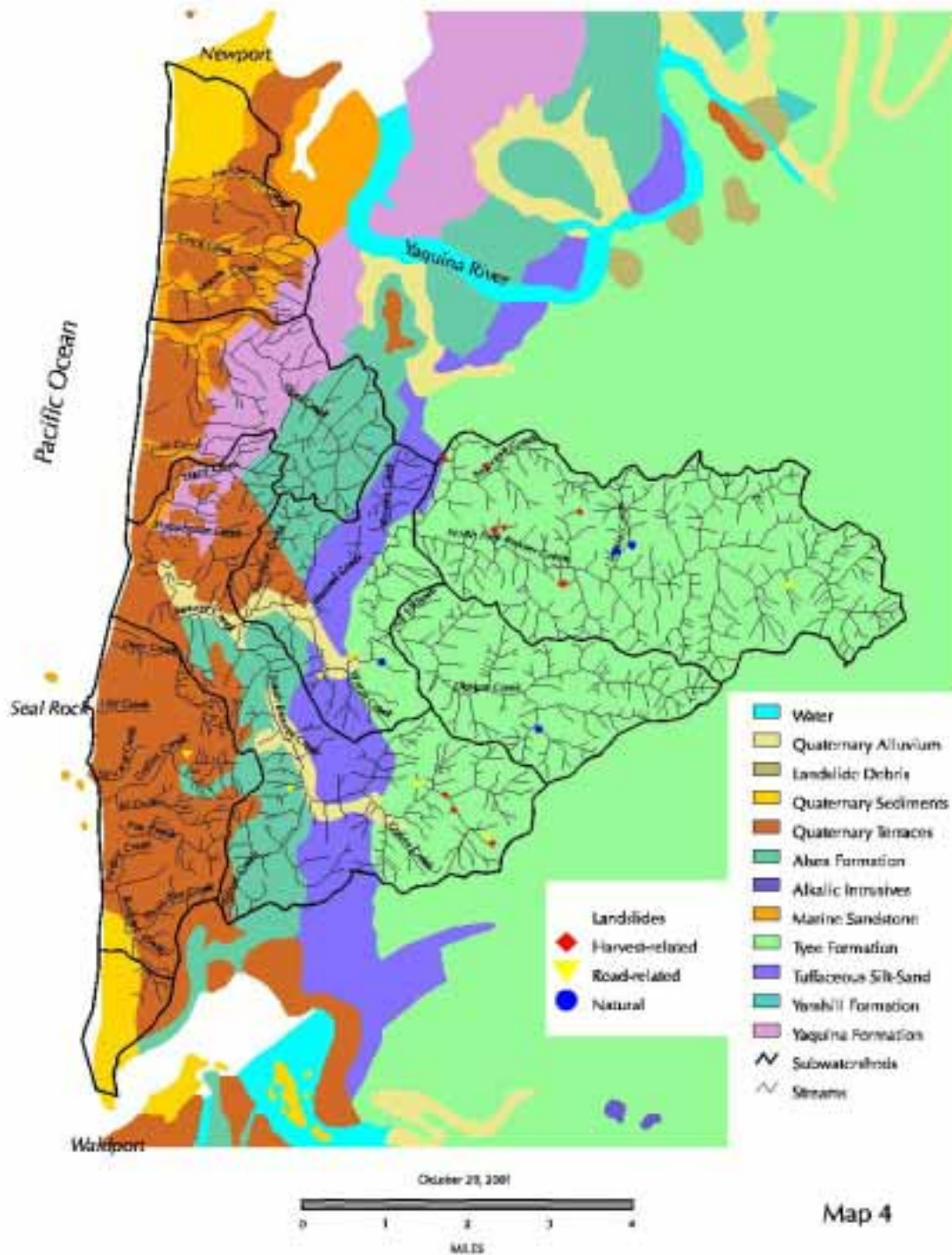
WMU - Marsh, composition unknown. Includes "wet meadow".

WSh - Salix marsh.

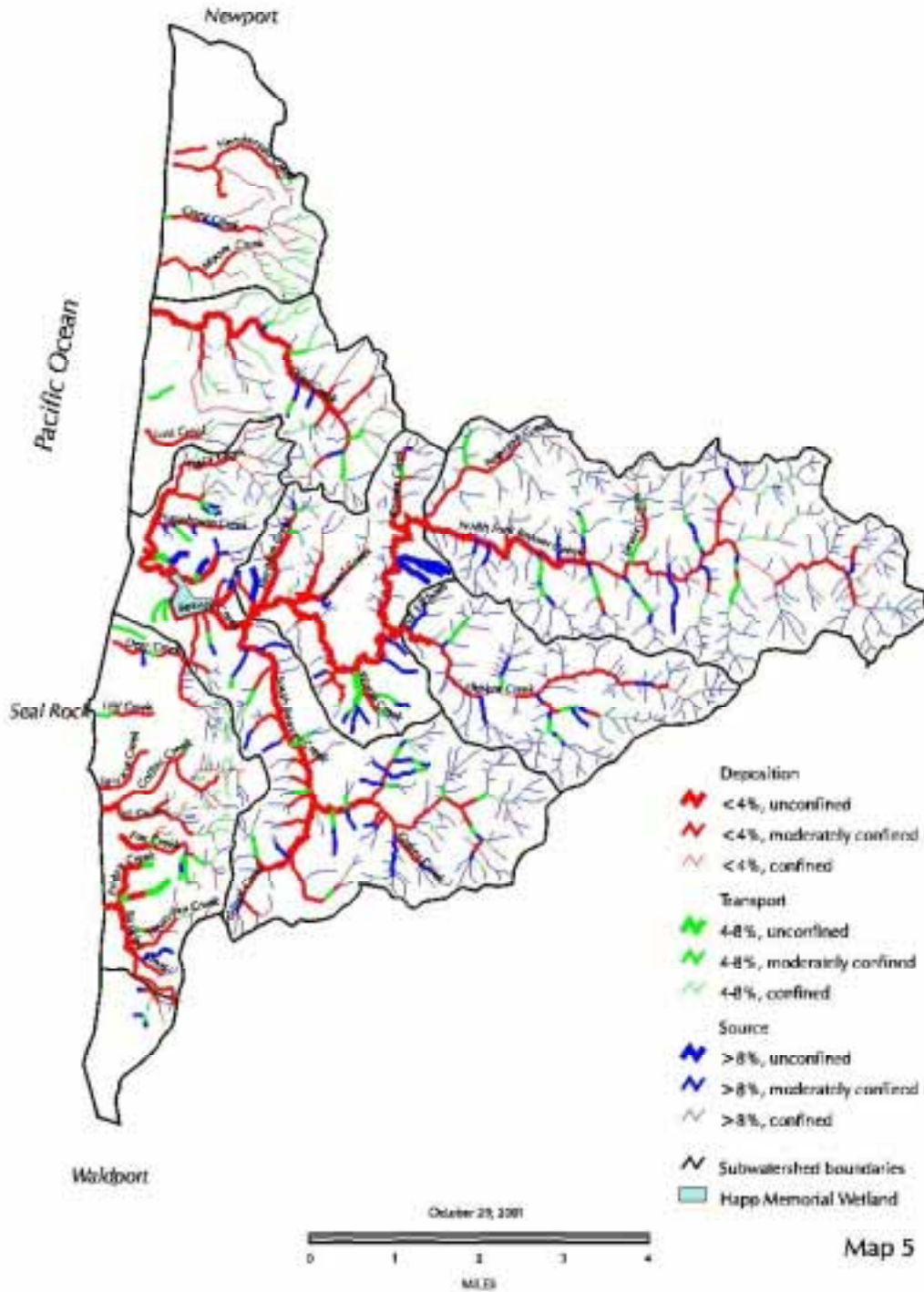


Oregon Natural Heritage Program
October 2001

Beaver Creek Watershed Analysis Area Lithology and Landslides



Beaver Creek Watershed Analysis Area Geomorphic Stream Segments



Depositional reaches have gradients less than four percent and are moderately confined or unconfined (unconfined depositional). Depositional reaches flow year round are strongly influenced by material that comes from the source and transport reaches. Healthy depositional reaches that are moderately confined provide long-term storage areas for substrates and wood. Unconfined depositional reaches meander across their wide valley bottoms and are associated with the extensive wetland system. Tidal flow contributes to wetland maintenance.

As the Beaver Creek watershed was developed for agriculture, some of these wetland areas were drained, ditched and diked. Modifications occurred along both forks of Beaver Creek, but not the main stream. During summer, the ditches efficiently carry Beaver Creek streamflow. During the wet months, flows routinely spill out onto the floodplains. The typically clear discharge of Beaver Creek into the ocean, even during floods, indicates that the watershed is still functioning well and efficient at holding and slowly releasing sediment and nutrients (Bob Buckman, personal communication, 1999).

Storms and Floods

In the Coast Range, stream flow reflects precipitation events with an annual cycle of high, flashy flows during the winter and low base flows during the summer months when most of the flow from channels is derived from emerging groundwater. Probability of flooding where waters exceed the channel is once every two years, with large floods occurring less frequently. Notable flood years in the Coast Range include 1861, 1890, 1909, 1927, 1953, 1955, 1964, 1974, 1982, 1983 and 1996. Floods in 1941, 1948 and 1949 were blamed on high tides and sand deposits that blocked the mouth of the creek.

Several newspaper articles from local newspapers during the 1940's and 1950's that were compiled by Ranger D. Bayer describe frequent flooding in the lower Beaver Creek and at the mouth¹. This 1948 article from the Waldport Record describes the conditions at the mouth of the creek:

During the freak storm of two weeks ago, high waves did so much damage at Beaver Creek that the normal channel became clogged with debris and sand. The creek could not empty into the ocean as usual with the result that its waters backed up inland.

The road was soon covered with water and the mill-pond of the C and H Lumber Company over flowed.

The mill was forced to shut down and the cars of people living up the Creek had to be towed in and out by the company trucks. Finally road conditions got so bad that not even these could get through.

Dynamiting to open the channel was the only solution and this the company proceeded to do. A few hours later, the creek had found its bed nearly 3 feet below the level of the sand deposited by the high water.

Everyone in the vicinity is grateful to the lumber company and the State and County workers who spared neither time nor energy in this emergency.

¹ Flooding at Beaver Creek was noted in articles dated February 25, 1926; March 4, 1926; December 25, 1941; November 18, 1948; November 17, 1949; and November 6, 1952.

A December 8, 1949 article from the Lincoln County Times reported on a hearing for Beaver Creek flood control. It describes the cause of frequent flooding this way:

Conditions at the mouth of Beaver creek have been such that ocean swells and tides have prevented the natural flow of the stream. This has resulted in the annual flooding of many acres of good farm land; as well as the formation of a permanent swamp. Beneath this swamp lies about a thousand acres of peat soil which can be surpassed no where as far as fertility and productiveness is concerned.

In 1999, the Corps of Engineers had no record of flood control projects being implemented at Beaver Creek.

A large storm in February, 1996 resulted in debris torrents in the headwaters of the North Fork of Beaver Creek, the headwaters of Elkhorn Creek, Lewis Creek and Peterson Creek. Most of the landslides from this event occurred on the Tyee Formation, with the exception of one road-related slide that occurred on the Alsea Formation (see Map 4: Lithology and Landslides).

Water Temperature

Water temperature has been monitored in the North Fork of Beaver Creek, Elkhorn Creek, and Peterson Creek from 1994 to 1996. State water temperature standards stipulate that a 7-day moving average of the daily maximum temperature shall not exceed 64 degrees Fahrenheit. Exceptions are made for periods of unusually warm weather, or if naturally occurring conditions prevent the stream from remaining below 64 degrees F.

Water temperatures were measured at 6 locations along the mainstem of the North Fork. Above Peterson Creek, two sites met state water quality standards. Site #28, which is 2 miles upstream of Peterson Creek, reached a 7-day average maximum temperature of 68 degrees F in 1994, although it was only 63 degrees F in 1995.

Peterson Creek had one year of data that was collected at the mouth. The 7-day average maximum temperature reached 62 degrees F, which complies with state standards.

Elkhorn Creek was monitored one mile upstream of the mouth for one year, 1994. The 7-day average maximum temperature reached 60 degrees F, which complies with state standards.

Two sites were monitored in the North Fork of Beaver Creek downstream of Elkhorn Creek. Both sites were above state water quality standards for all years they were monitored. The lowest site in Beaver creek, which is just upstream from Simpson Creek, was usually cooler than the site farther upstream and just below Elkhorn Creek.

The North Fork Beaver Creek above Peterson Creek, and Elkhorn Creek are east-west trending streams with a fairly high level of shading. The mainstem of Beaver Creek below Elkhorn Creek, in contrast, runs through pasture land in a wide valley that has minimal to non-existent shading. The slightly lower temperatures at the lowest site on Beaver Creek may be due to higher groundwater inputs, and/or the proximity to the ocean and the fog zone cooling.

Table 4 summarizes the temperature data.

Table 4: Stream temperature data from the Beaver Creek Watershed

Site Name	GIS Station Number	1994 Max. 7-day ave. high	1994 #days above DEQ standard	1994 Max. Instantaneous High	1995 Max. 7-day ave. high	1995 #days above DEQ standard	1995 Max. Instantaneous High	1996 Max. 7-day ave. high	1996 #days above DEQ standard	1996 Max. Instantaneous High
NF Beaver Cr, 1 mile upstream Lewis Cr	20	62F	0	63F	61F	0	61F	no data	no data	no data
Elkhorn Cr, 1 mi upstream of mouth	22	60F	0	62F	no data	no data	no data	no data	no data	no data
Peterson Cr at mouth	23	62F	0	68F	no data	no data	no data	no data	no data	no data
NF Beaver Cr 2 mi upstream	28	68F	8	70F	63F	0	65F	no data	no data	no data
Beaver Cr, upstream Peterson Cr	145	no data	no data	no data	64F	0	65F	no data	no data	no data
Beaver Cr, upstream Simpson Cr	187	66F	42	67F	65F	19	67F	no data	no data	no data
Beaver Cr upstream Elkhorn Cr	196	68F	42	70F	66F	27	68F	68F	55	70F

The Biological Environment: Aquatic

Source, transport and depositional streams all provide habitat for aquatic species. Within source reaches, aquatic habitat is limited due to the steep, episodic nature of disturbance events in these stream segments. Cutthroat trout and steelhead use lower portions for spawning, and cutthroat trout may remain as residents in some of these reaches. Cutthroat and steelhead use transport reaches, and as long as logjams exist to trap gravel and provide cover, coho will spawn and rear there as well. Gravels accumulated in moderately confined, depositional areas provide excellent spawning and rearing habitat for coho and steelhead. Low-gradient, unconfined reaches, oxbows and braided channels serve as excellent coho and steelhead rearing and cover. The lower reaches of Beaver Creek remain closely connected with their floodplains, providing refugia where young fish can feed and escape the strong currents of the floodwaters.

Habitat for aquatic organisms (notably anadromous salmonids) seems to have held up better over the years in Beaver Creek than in other nearby streams. Young coho salmon and cutthroat trout produced during the summer in numerous gravel beds and rearing pools found on National Forest lands in the headwaters move downstream for additional rearing in vast low-gradient stream reaches, wetlands, and estuarine areas on private land. The habitat areas complement each other, functioning like the lake systems on the Oregon Coast (Devils, Siltcoos, Tahkenitch) that are also strongholds for coho salmon in the state. The high coho production is likely related to the refugia provided by the lake and/or wetland system.

Instream Habitat Components

Stream survey data (USFS 1984 and 1988; ODFW 1998) indicate that Beaver Creek is a dynamic system, with sediment, nutrients, food, and wood moving down the channel during high flow events and becoming deposited downstream, where they contribute to critical fish habitat. Settlement activities such as logging, stream cleanout, agriculture, and building valley bottom roads along depositional reaches have affected the functioning and quality of the fish habitat.

Diking, channelization, and large wood removal has encouraged some downcutting of the channel so that depositional reaches may function like transport reaches, moving wood and substrate out of the system and into the open estuary. Rapid run-off leads to peak flows that are frequent, longer lasting and higher.

All reaches in the basin except for the extreme headwaters of Elkhorn Creek are short of both large woody material (LWM) and resultant deep pools (Figures 1 and 2).

Removing roughness elements (logs and boulders) from the channel increases velocity of the water and causes additional scour. Additional impacts include reduced subsurface flow and increased water temperatures, and occasional widening of streams due to lateral scour of streambanks when the channel reaches bedrock. Occasionally, there are entrenched channels, and fewer side channels and backwater alcoves (very important for coho salmon rearing).

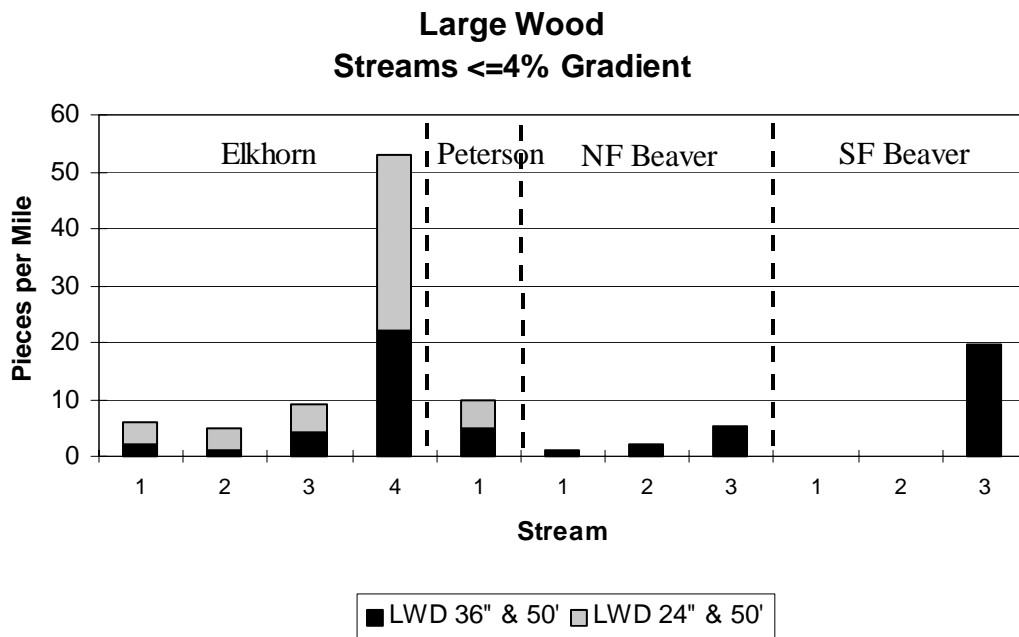


Figure 1: Large Wood Values for Selected Reaches

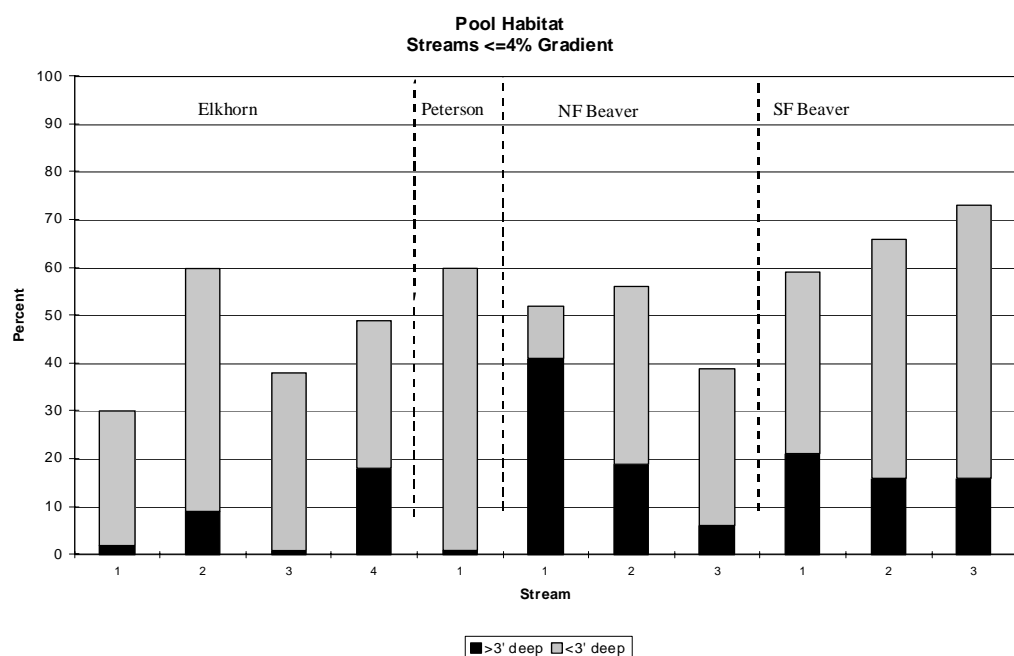


Figure 2: Pool Habitat Values for Selected Reaches

Stream Functional Ratings

Quantitative measures of components of fish habitat within four Beaver Creek subwatersheds were taken from existing Level-II stream survey data gathered by the Forest Service (Elkhorn, Peterson, and Lewis creeks and smaller tributaries), and similar information from ODFW (mainstems of North and South Beaver). These measures of various habitat components were rated according to the Matrix of Factors and Indicators for the Oregon Coast Province developed for consulting with the National Marine Fisheries Service (NMFS) on effects of activities on the threatened coho salmon. Key stream reaches are rated as functioning, not functioning, or at risk based on whether certain water quality, habitat and disturbance factors are within certain ranges².

Table 5 shows the ratings for each factor on the matrix, along with an overall rating. Map 6: Fish Habitat Ratings displays the overall ratings for each low-gradient stream reach that had completed surveys. Reaches within the privately owned main Beaver Creek downstream from the mouth of the North Fork were not rated.

Habitat conditions over the entire area are good, but below their potential. Only one of the surveyed reaches met properly functioning criteria for LWM; others mainly met criteria for temperature, various aspects of pools, and access. No quantitative measures of estuarine habitats were available, but Highway 101 and Ona Beach State Park may have modified the mouth of Beaver Creek to the degree that it is not functioning properly.

² Value ranges for functional classifications associated with the Matrix of Factors and Indicators are in the analysis files.

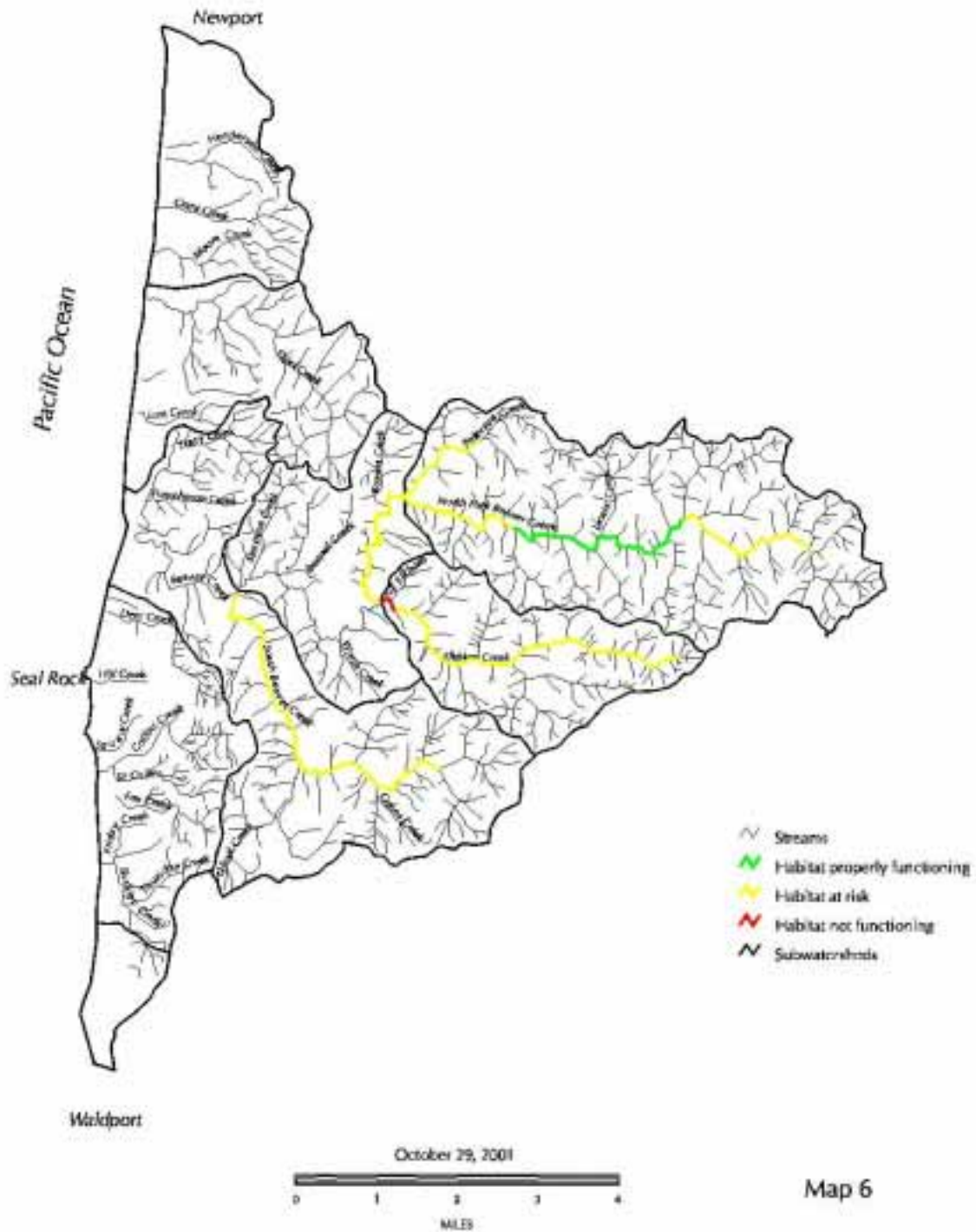
Table 5: Matrix of Factors and Indicators for Key Stream Reaches

	Stream Name and Survey Reach										
	Peterson Creek	North Fork Beaver Creek			South Fork Beaver Creek			Elkhorn Creek			
	1	1	2	3	1	2	3	1	2	3	4
<i>Water Quality Factors</i>											
Temperature	R	R							R		
Turbidity											
Chemistry											
<i>Habitat Access</i>											
Physical Barriers	P	P	P	P	P	P	P	P	P	P	P
<i>Habitat Elements</i>											
Substrate	R	N	P	P	R	N	R	N	R	R	R
LWM	N							N	N	N	R
Pool Area %	P	P	P	R	P	P	P	N	P	R	R
Pool Quality	N	P	P	R	R	P	R	N	P	R	R
Pool Frequency	P	R	N	R	N	R	R	R	P	P	R
Off-channel	N							N	N	N	P
<i>Channel Condition</i>											
Streambank											
Floodplain											
<i>Watershed Condition</i>											
Road Density	R	N	R	R	N	N	N	N	N	N	N
Disturbance History											
Riparian Areas											
Refugia											
OVERALL	R	R	P	R	R	R	R	N	R	R	R

P = Properly Functioning R = At Risk N = Not Properly Functioning

Blank cells indicate data gaps.

Beaver Creek Watershed Analysis Area Fish Habitat Ratings



The lower reach of Elkhorn Creek, rated as non-functioning, appears to be one of the poorer areas for salmonid rearing. Other reaches, particularly Reach 2 of North Beaver Creek, appear to be functioning reasonably well, although data are somewhat sketchy. Any such functional reaches should be considerable fish producers, with potential for fairly quick gains from restoration. Most portions of Beaver Creek, being slow and meandering, have a very high proportion of fines (sand and silt) in the substrate yet are good habitat for young coho salmon.

Riparian Vegetation and the Aquatic Environment

In the early 1900s, timber harvest and road construction began to remove riparian vegetation from steeper streams. The result of these activities has been to locally reduce the amount of large conifers available to provide shade, nutrients and a source of future LWM. For the most part, natural succession has been allowed to proceed resulting in small and medium conifers and alders established in most riparian areas. However, it may be several more decades before the riparian vegetation is large and begins to be recruited into the streams. Conifers are expected to be a more dominant component of riparian stands within the next few decades.

Riparian areas in Beaver subwatershed (including the lower portion of the North Fork and mainstem Beaver Creek downstream to the mouth of the South Fork) contain grass/forb pastureland and hardwood-dominated tree stands. Vegetation along transition reaches is a mix of deciduous trees and conifers in the understory and clumps of conifers coming near the stream along toeslopes.

Moving upstream, conifer stands increase and are most prevalent (15-20 percent) in the federal portions of Elkhorn and North Fork. Narrow, relatively pure bands of conifers are common in the upper (source reaches) of streams where slope failures have not occurred, while alder dominates the recent failure sites of several headwater streams.

Figures 3 and 4 display vegetation composition within 200 feet of streams. Figure 3 displays vegetation along steeper gradient creeks (greater than 8 percent); Figure 4 shows vegetation along streams less steep than 8 percent.

Water Temperature and Fish

Water temperature is a determining factor in the species composition and productivity of the aquatic ecosystem. Water temperatures can control the fish and other aquatic organism distribution within a watershed. Warm water species such as dace can out-compete cold water species (salmonids) when temperatures rise. Tributaries that are able to maintain cooler temperatures are critical to maintain as refugia.

Increases in water temperature directly affect salmonid stress levels. When under stress, salmonid populations may have reduced fitness, greater susceptibility to disease, decreased growth, and changes in time of migration or reproduction. Higher water temperatures reduce water oxygen capacity, which leads to greater stress. Optimum temperatures for survival and growth are at or below 58 degrees F. Above 64 degrees F, the fish become stressed; survivability and growth decrease as the temperature rises. Sustained temperatures above 70 degrees F will result in mortality for anadromous salmonids. Availability of cold water refuges, such as cooler stratified layers in deep pools, or under-gravel seeps can partially compensate for such effects.

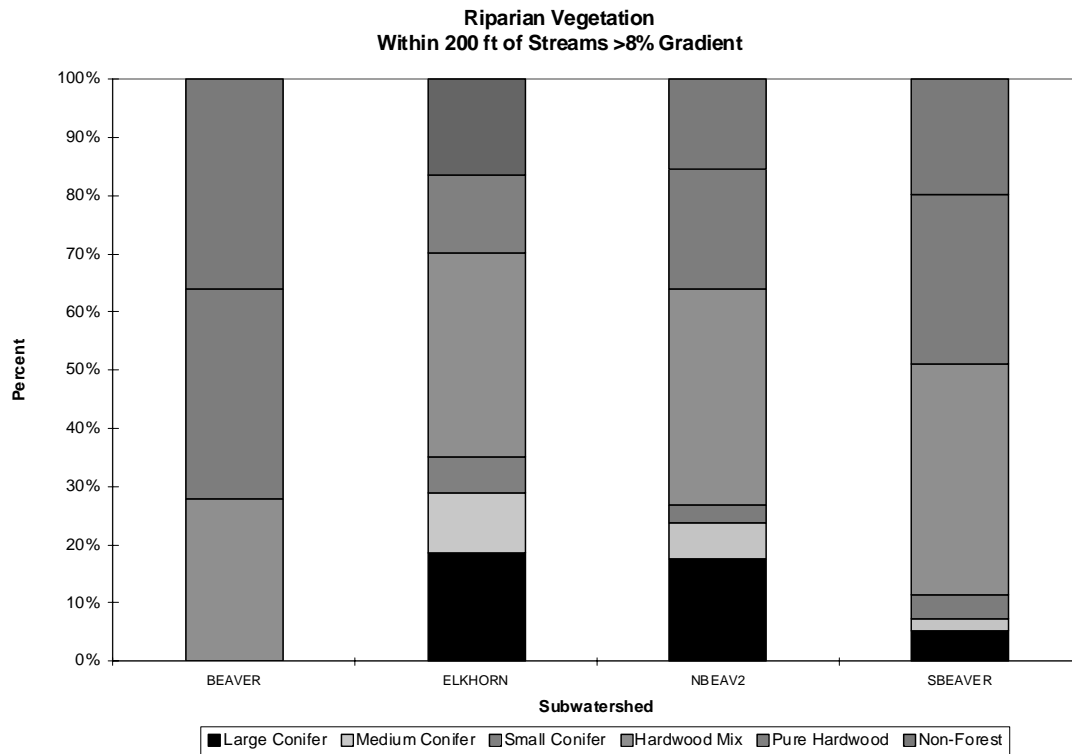


Figure 3: Riparian Vegetation Along Steeper Creeks

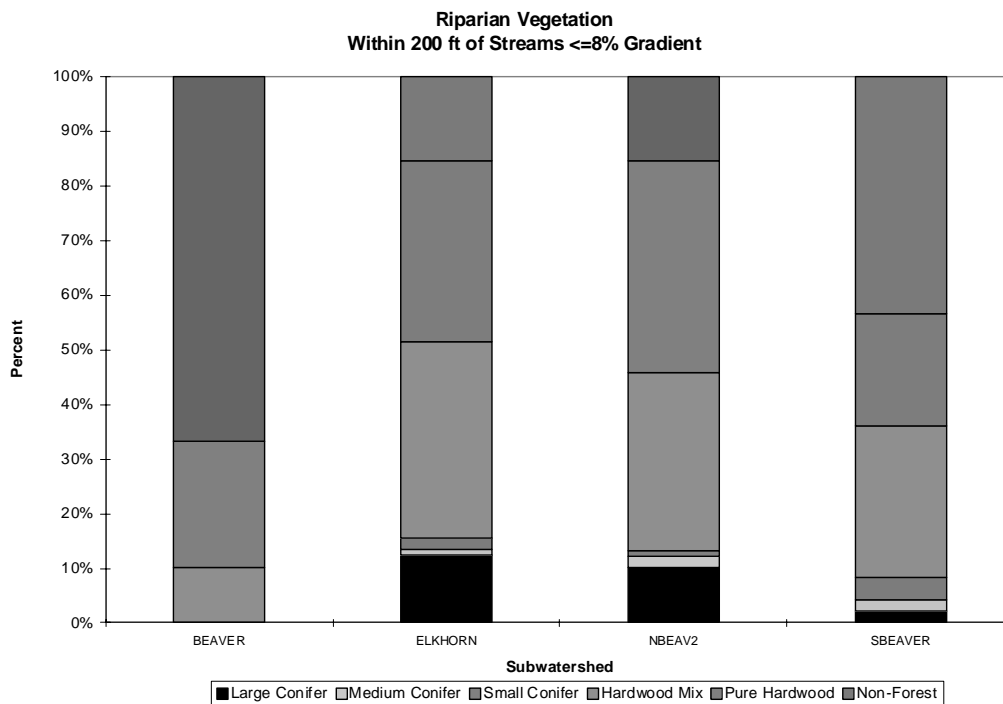


Figure 4: Riparian Vegetation Along Flatter Creeks

State water temperature standards stipulate that a 7-day moving average of the daily maximum temperature shall not exceed 64 degrees F. Exceptions are made for periods of unusually warm weather, or if the naturally occurring conditions prevent the stream from remaining below 64 degrees F.

Fish Populations And Distribution

Anadromous salmonids have access to most of the basin, and many young fish rear in estuarine areas of Beaver Creek (see Map 7: Fish Distribution). Still, fish habitat quality rates as moderate or "at risk" throughout the basin. Steelhead, which prefer faster moving water than coho salmon, range widely, but are not particularly abundant. A few chinook salmon show up occasionally in Beaver Creek, but there is no evidence that the population is self-sustaining (Tony Stein and Bob Buckman, ODFW, personal communication). Beaver Creek is well-known as an excellent sea-run cutthroat stream, although no data on population numbers is available.

On August 3, 1998, the National Marine Fisheries Service listed the Oregon Coast coho salmon as "threatened" under the Endangered Species Act, and has included Beaver Creek in proposed Critical Habitat for this species.³

Salmonid spawning and rearing habitats have declined over time due to wetlands development; agriculture; logging and roads; commercial and recreational fishing; ocean conditions; release of hatchery fish; and floods, fire and landslides. In this and other coastal watersheds, wild anadromous runs declined throughout the first half of the century with coho populations plummeting in the 1970s.

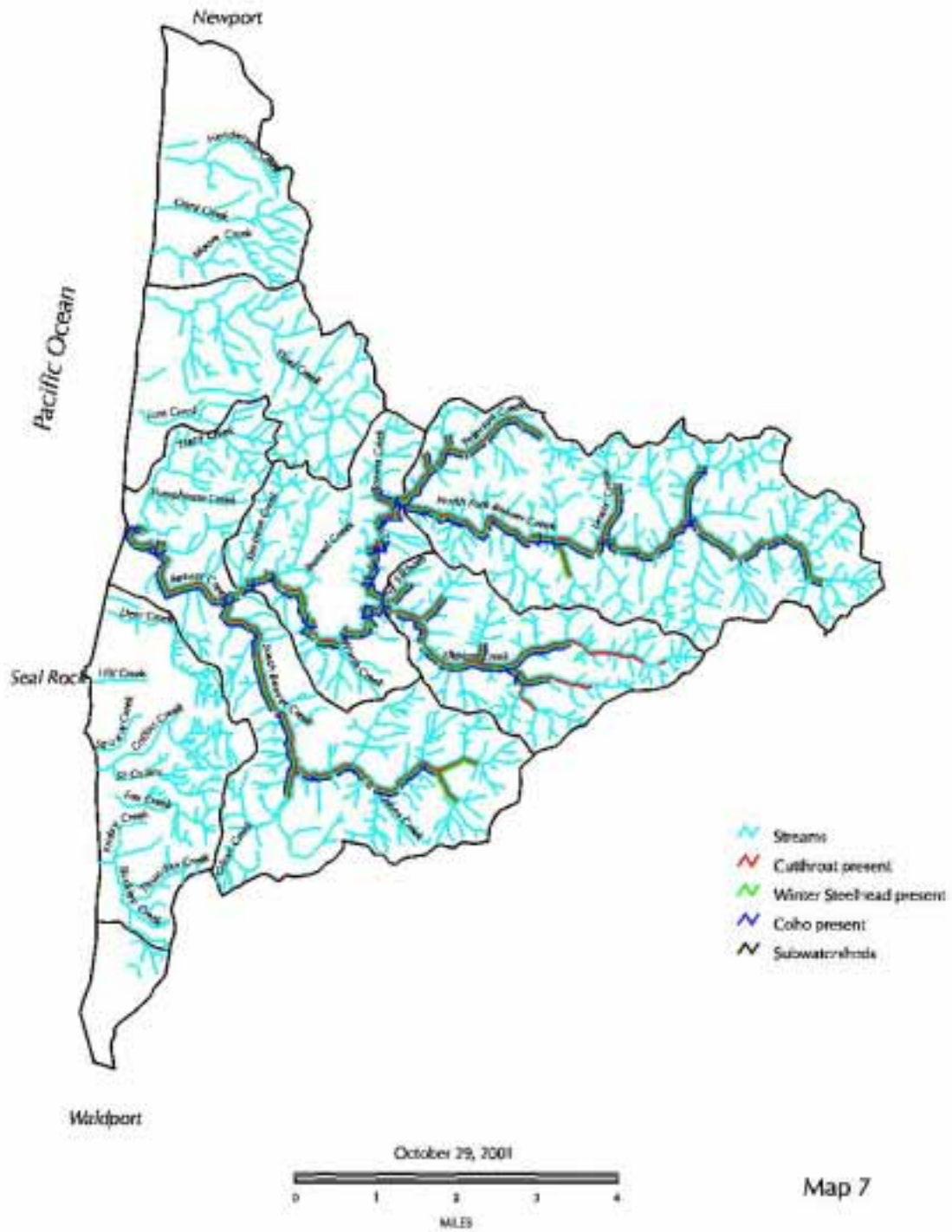
Hatchery fish have not been stocked in Beaver Creek. In recent years, a large number of coho salmon from aquaculture operations in nearby Yaquina Bay have strayed into the system, with clear potential to compromise the genetics of wild Beaver Creek coho (Bob Buckman, ODFW). Numbers of wild adults counted by ODFW while spawning in the North Fork, however, suggests the size of the wild run there has persisted in recent years while populations have crashed elsewhere on the Coast. Furthermore, the arrival of the peak wild North Beaver run in December-January suggests there has been minimal direct influence from interbreeding with fin-clipped, adult hatchery coho, which spawn in November (ibid).

Coho runs in the South Fork Beaver Creek have improved in recent years. In the past, some people have speculated that coho runs may not be viable there because of steep conditions on National Forest limit available spawning habitat. Viability of coho seems possible in the South Fork, given recent population information.

Peak adult coho spawner counts on North Fork Beaver Creek between 1950 and 1998 range from about 10 to over 80.

³ ESA listing uncertain following litigation.

Beaver Creek Watershed Analysis Area Fish Distribution



The Biological Environment: Terrestrial Vegetation

Climate/ Soil/ Vegetation Zones

About 75 percent of the analysis area is within the Coastal Fog Zone (within about 4 miles of the ocean and up major valleys) associated with spruce forest types. The remaining 25 percent is within the Central Interior Zone (towards the east and on higher elevation ridges near the coast) and supports hemlock forest types. Each zone represents a unique combination of landforms, climate and dominant disturbance regimes (see Map 8: Plant Series).

In the Coastal Fog zone, air masses moving directly from the ocean strongly influence the vegetation. During summer the air masses are often saturated, cool, and very stable (fog), which reduces maximum seasonal and daily transpirational demand on the vegetation. Douglas-fir is virtually absent along the immediate coast, and occurs abundantly only on warm, dry sites within this zone. Plant associations appear less distinctive as indicators of the environment. Vegetation is likely influenced by the moderating effect of frequent fog and in part by the influence of wind blowing down trees, overturning the soil, and accumulating large masses of downed logs which affects soil moisture and species composition.

In the Central Interior Zone, fog is mostly absent and Douglas-fir is the dominant conifer. In the Beaver Watershed a higher component of western hemlock is mixed in with the Douglas-fir in the Central Interior Zone as compared with similar watersheds such as the Yachats Watershed.

Overall, spruce dominates stands closest to the ocean; western hemlock is less tolerant of fog and tends to be up on the ridges; Douglas-fir dominates the eastern portion of the watershed; and red alder dominates riparian stringers and scattered small upland patches

The Spruce and Hemlock zones are relatively distinct in terms of site productivity, successional patterns and stand structure. Spruce plant association forests tend to have more open crown covers, with more multi-layered canopies and more conifer in the understory, in the hemlock associations the Douglas-fir stands tend to have more closed canopy covers, fewer layers in the canopy and less understory.

Table 6 emphasizes the relative idealized differences between the two zones; the transition between the two types on the ground is gradual.

Beaver Creek Watershed Analysis Area Plant Series

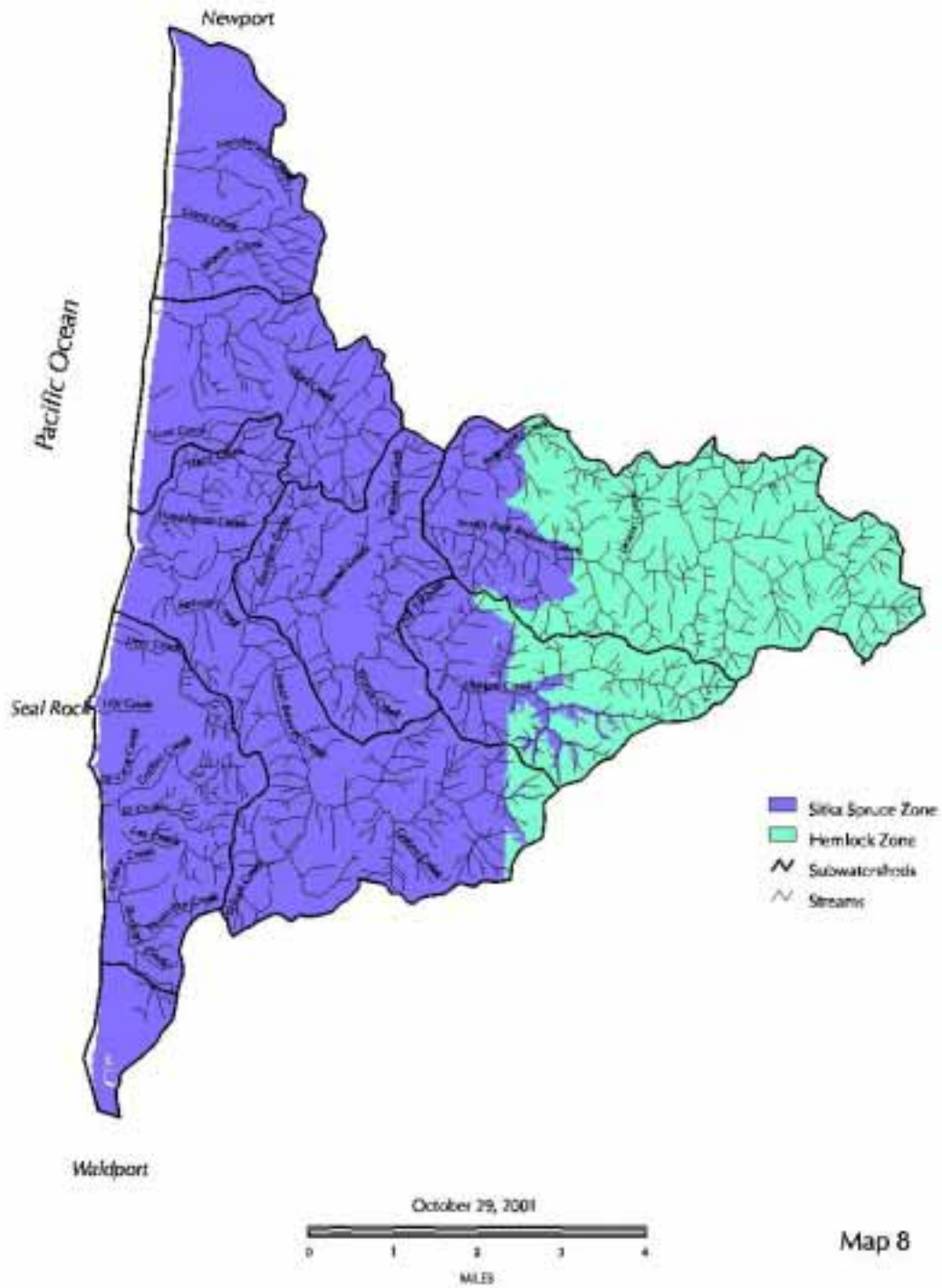


Table 6. Summary of Climate and Vegetation Influences between the Coastal Fog Zone and the Central Interior.

Plant series (Franklin and Dyrness, 1976)	Coastal Fog Zone Sitka Spruce Series	Central Interior Coast Range Western Hemlock Series
Climate	Uniformly wet and mild. Fog and low clouds during relatively drier summer months ensure minimal moisture stresses	Wet and mild, under considerable Maritime influences but experiences moisture stress in summer months.
Fire regime	Infrequent (500+yr), stand replacement	Infrequent (300-500 yr), stand replacement
Wind disturbance	Chronic wind disturbance. Mortality 2.8 percent per year of live biomass (Green, et al. 1992).	Little wind disturbance. Mortality rate 0.5 percent per year
Productivity	Very high (Franklin and Dyrness, 1973).	High.
Succession	<p><u>Pioneer species</u>: Sitka spruce. Salt tolerant spruce and salal.</p> <p><u>Climax tree species</u>: Western hemlock with a mix of spruce and cedar on wet sites. Spruce considered a “subclimax” (Franklin and Dyrness, 1973).</p>	<p><u>Pioneer species</u>: Douglas-fir.</p> <p><u>Climax tree species</u>: Western hemlock.</p> <p>Shrubs not as dense as in Sitka spruce series (Franklin and Dyrness, 1973)</p>
Stand Structure	<p>Tree species diversity: More species present</p> <p>Canopy layers: More layering</p> <p>Canopy Closure: higher percent of <u>open</u> canopy; lower tree density</p>	<p>Tree species diversity: fewer species present</p> <p>Canopy layers: Fewer layers</p> <p>Canopy Closure: higher percent of <u>closed</u> to mod. closed canopy; higher tree density</p>

Hardwoods

The amount and distribution of hardwoods has been influenced by human activities. Alder aggressively occupies sites where road building and logging have disturbed or compacted soil. Red alder has been reduced or eliminated through vegetation management in plantations. Many alder sites have been converted to conifers or cut for firewood.

Seral Stage Distribution, Species Composition and Structure

This watershed contains a wide distribution of seral stage vegetation types, as shown on Map 9: Current Vegetation and reported in Table 7⁴. Compared to historic conditions, vegetation patch sizes have decreased, mature conifer has been reduced and early seral, young conifer and conifer-mix have increased. Mature conifer and mix currently occupies about 30 percent of the watershed vegetation (about 45 percent on USFS, 35 percent on BLM, 25 percent on private industrial and 21 percent on other private, state and city).

Mature forests are prevalent on National Forest. These forests are characterized by Douglas-fir, western hemlock and western redcedar with diameters greater than 30 inches and scattered shade tolerant understories. Some of these stands are typed as old growth, but may lack some structural characteristics. Beaver Creek natural stands have a much higher proportion of western hemlock than most areas of the Siuslaw National Forest. Mature habitat on other ownerships consists of mostly conifer/hardwood mixes.

The current condition of the landscape is a result of the intensive timber management and agriculture that has occurred here. These have become the human agents of change, in addition to the natural agents of fire and wind. Clearcutting has been the predominant regeneration system and the shade intolerant Douglas-fir was selected for reforestation.

Private Industrial Forest Land: Intense timber harvesting (clearcutting) has occurred throughout the 20th century with many plantations established following large scale harvesting around 1980. Herbicides still used to control brush competition and road density is high.

National Forest: Logging was done in a pattern of dispersed patches of about 40 to 80 acres, producing "edges" and fragmentation of the natural forest. Site preparation, genetically-improved seedlings, and use of herbicides contributed to rapid reforestation. The plantation records show during the 1960's and 1970's a very high frequency of herbicide use, up to 6 - 8 visits (though usually just portions of a unit were sprayed each time). This heavy herbicide use corresponds with the reputation of this area as the most brush prone on the Siuslaw Forest. Herbicide use was curtailed in the mid-1980's. In the 1970's a more shade intolerant species (western hemlock, western redcedar and grand fir) were planted in replants or in brush prone areas. Within 3 miles or so of the ocean, the planting of Sitka spruce and western hemlock was emphasized, particularly from the early 1980's on. Shade-tolerant species were also expected to seed in naturally.

Precommercial thinning of very young stands in the 1960's and 1970's favored the faster growing Douglas-fir as crop trees and was done to mostly 14 or 13 foot spacing (a few at 12 feet). Plantations contain denser, more evenly spaced stands of trees than natural stands. Dense planting was intended to ensure survival of conifers to a given stocking level and to support later intermediate thinning entries.

⁴ Based on field corrected satellite imagery.

Beaver Creek Watershed Analysis Area Current Vegetation

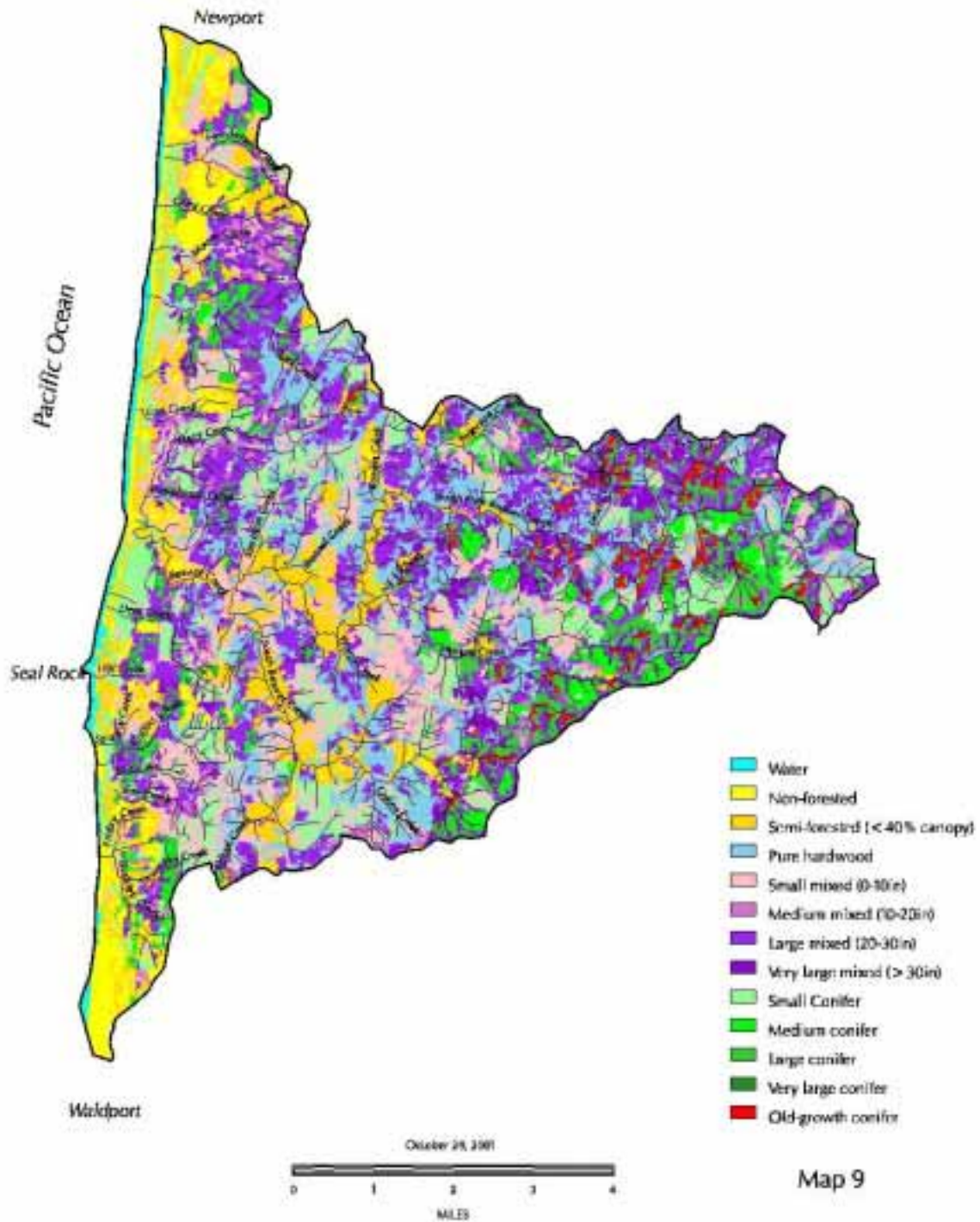


Table 7. Seral Classes by Land Ownership

Seral Class	USFS	BLM	Private Industrial Forests	Other Private	State & City	Percent Of Watershed
Open	5	0	178	976	120	4%
Semi-closed	235	3	696	2944	53	12%
Broadleaf (all sizes)	1572	79	1534	2102	5	16%
Small conifer & deciduous mix (<10" dbh)	1191	63	1966	1491	62	15%
Medium conifer & deciduous mix (11"-20")	1338	1	565	254	36	7%
Large conifer & deciduous mix (21"-30")	1910	65	1880	1994	41	18%
Very Large Mix (>30")	1213	17	123	345	1	5%
Small Conifer (<10")	938	67	1284	679	468	11%
Medium Conifer (11"--20")	938	3	156	365	111	5%
Large Conifer (21"--30")	1533	21	113	255	12	6%
Old-growth⁵	455	11	4	12	0	1%
Water	0	0	1	52	0	.2%
Total By Owner	11,328	330	8,500	11,469	908	32,535 100%

Fire History

The Coast Range tends to experience large (10,000 - 100,000 acre), severe fires with long intervals (300 - 500+ years). These fires are expected to be stand-replacing with most of the surviving conifers in riparian areas. The result is that large blocks of single seral stage conifer dominate the landscape over time. A study of fire events over the past few centuries has been undertaken by Teensma. The study resulted in maps which display approximate boundaries of fire events and seral stages that occurred in the Coast Range. This typing shows a historic series of overlapping fires, beginning with the major Yaquina fire in 1850; this watershed then had a large fire in 1890, much of which was reburned in 1920 (Table 8 and Map 10). Map 3 depicts areas where wildfire was evident to GLO surveyors in the late 1800's (landtype FSH Bu).

⁵ Old growth estimate may be high – field verification indicated that these stands lack some structural characteristics distinguishing old growth.

Beaver Creek Watershed Analysis Area Fire History

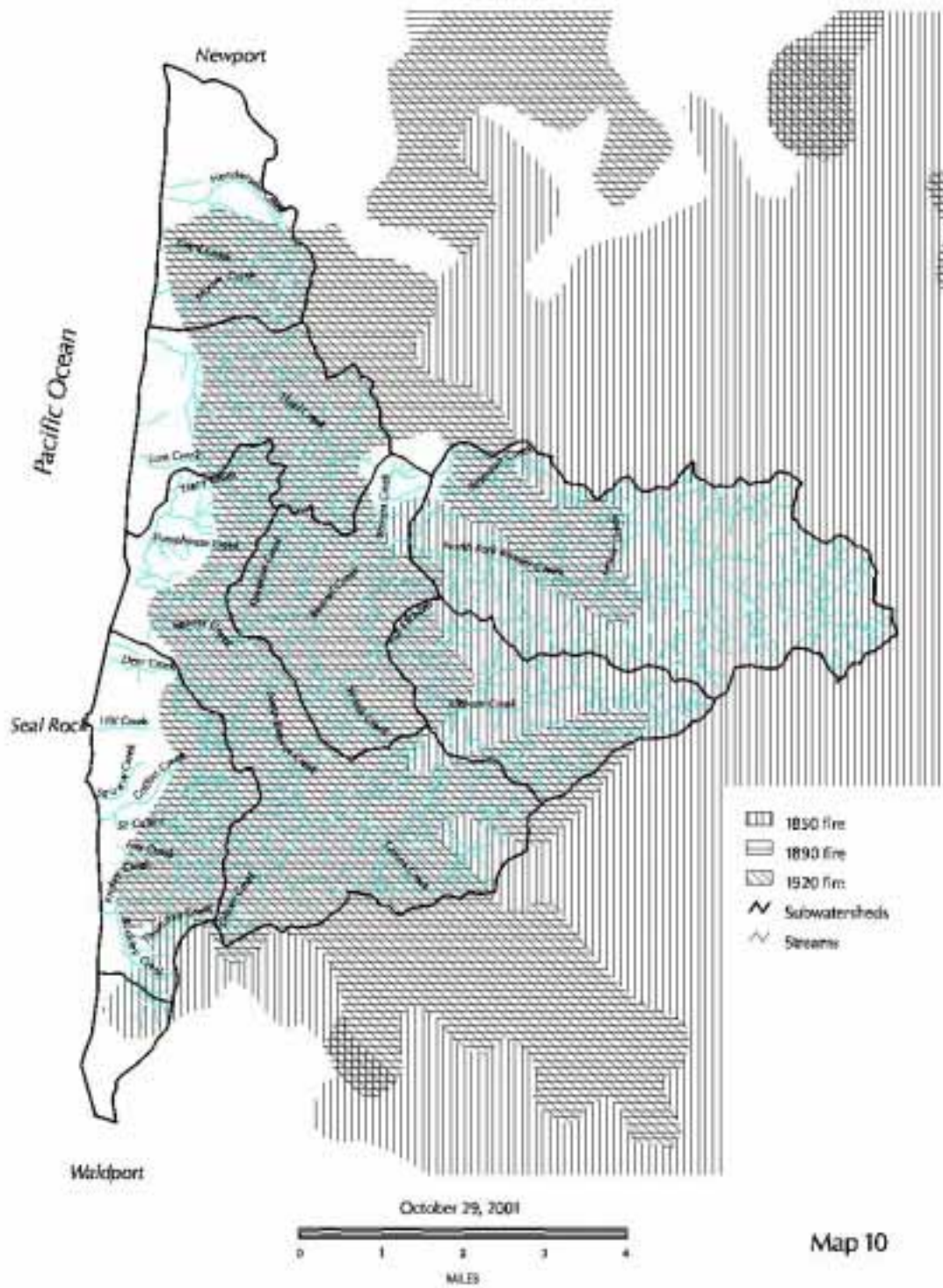


Table 8: Fire History

Year of Fire	Acres
1850	8,773
1890	17,966
1920	17,964

Blowdown

In the winter, frequent and widespread strong winds blow from the southwest in association with storms moving onto the coast from the Pacific Ocean. At the most exposed ridges of the Coast Range it is estimated that gusts up to 150 mph and sustained speeds of 110 mph occur at 5 - 10 year recurrence intervals (Wade, 1987).

Wind is a more dominant disturbance factor in the Coastal Fog Zone than in the Interior. The effect is to cause small (1 to 10 acre) patches of trees to blow down, creating openings in the forest and providing woody material to the forest floor and stream channels. Less frequently, surface winds cause diffuse blowdown over large areas and widespread property damage. The most destructive winds are those which blow from the south, parallel to the mountain ranges. The Columbus Day storm of 1962 was of this type. The resulting openings provide places for shade intolerant species, such as Douglas-fir and hemlock to move in, thus increasing species diversity in a stand of trees and possibly speeding up succession toward multistory and late-successional conditions.

Coarse Woody Material

The amount of coarse woody material remaining on a site after harvest is a small fraction of that found in natural young stands (Spies and Cline 1988). During the 1960's through 1983 over 90 percent of the clearcuts were broadcast burned for site preparation and fuels reduction. Beginning in 1984 the Waldport Ranger District drastically reduced its broadcast burning for site preparation.

Historical Anecdotes about Natural Vegetation

A 1918 report by land classifier Lawrence Pagter describes the National Forest land as having once “supported a fine stand of fir, which had been destroyed by fire, but that fir production was present throughout”, ranging from 2 - 30 inches in diameter, 10 - 60 yrs in age and from 2 - 10 thousand board feet (mbf) per acre. Brush was prevalent throughout and very dense in places. Pagter noted, “This township is one of the best timber producing areas found within this Forest”. Pagter found red alder, maple and shrubs in the bottom of canyons.

Local long time resident, Ike Trevarian, noted that most of the watershed was still uncut in the 1920's. The North Fork of Beaver was pretty well covered with trees, but was heavily cleared for agriculture. He remembers removing mostly 2-3' diameter but some 4-5' diameter old spruce stumps.

Disease And Insects

Swiss Needle Cast

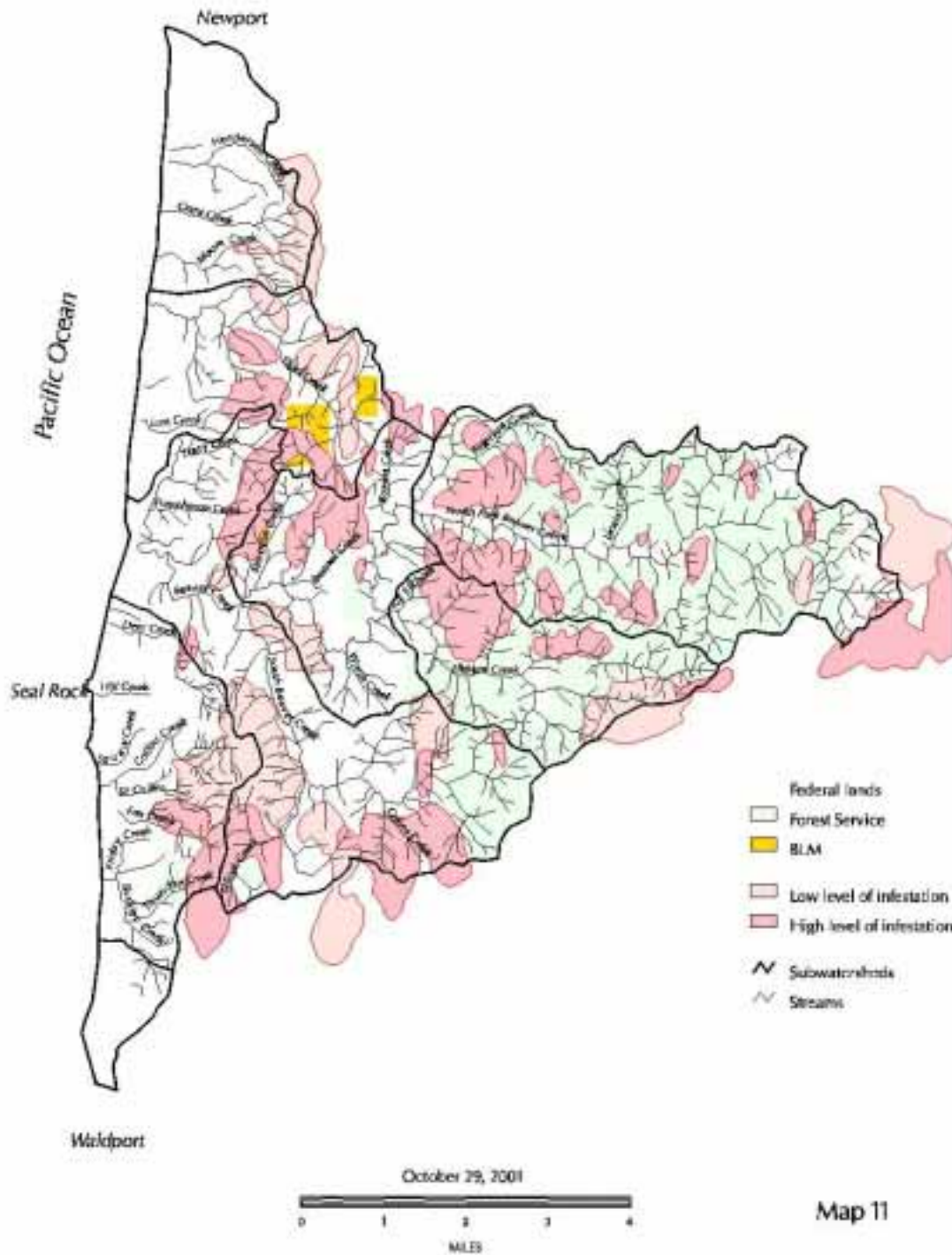
The distribution and severity of Swiss Needle Cast, (*Phaeocryptopus gaumanni*) has increased dramatically over the last four years along the Oregon coast and more recently, in the Cascades. It causes crown yellowing, a loss of older needles, growth loss and mortality in Douglas-fir. Hansen, 1997 reported that the disease is more prevalent within the Spruce Zone, especially during cycles of above-average precipitation. (Hansen 1997). Despite wet weather cycles in the past, the disease never was as pervasive as today.

Map 11 and Table 9 display data from aerial surveys done in 1998 and 1999. The data indicates that this disease occurs in both the Hemlock and Spruce Zones, with smaller infection sites within the hemlock zone (36 acres vs. 104 for spruce). Field observations indicate that the map probably underestimates the infection level within stands that have less Douglas-fir. Little is known about management effects on this disease, nor why it is increasing so dramatically at this time. One theory is that planting high proportions of Douglas-fir in the Spruce Zone has exacerbated the problem. Other theories suggest that thinning may actually increase the level of infection.

Table 9: Swiss Needles Cast Survey Data

	Acres of Swiss Needle Cast by Severity Level 1998 and 1999					
	USFS	BLM	State	Industrial	Other Private	Total
1998 Low Level	881	32	0	649	560	2122
1998 High Level	2471	50	224	2496	782	6023
1998 Total Infected Acreage	3352	82	224	3145	1342	8145
1998 Landbase Percentage Infected	30%	25%	3%	37%	12%	25%
1999 Low Level	1954	99	0	2136	642	4831
1999 High Level	483	1	39	1465	826	2814
1999 Total Infected Acreage	2437	100	39	3601	1468	1745
1999 Landbase Percentage Infected	22%	33%	4%	42%	13%	24%
Change Between 1998 and 1999	-8%	+8%	+1%	+5%	+1%	-1%

Beaver Creek Watershed Analysis Area Swiss Needle Cast Infestation, 1999



Douglas-fir Beetle

Douglas-fir beetle (Dendroctonus pseudotsuga) is endemic to the Coast Range and can be expected to operate in areas where trees are weakened or killed such as around windthrow pockets and in patches infected by root disease (Hostetler 1996). This beetle is a concern when planning for coarse woody material creation.

Other Diseases

Sitka spruce tip weevil, Pissodes strobi (also known as white pine weevil) generally affects spruce trees under 50 feet tall and 8 to 30 years old. The tip weevil lays its eggs around the circumference of the terminal shoot, the growing larvae effectively girdle that shoot. Results include top die back, multiple tops, crooks, and stunted height growth.

Light infection levels of hemlock dwarf mistletoe (Arceuthobium tsugense) were noted. Symptoms include swelling on the limbs, witches' brooms, burl like swellings and multi-forked tops. This parasite spreads most rapidly in multi-storied and more open stands. (Sterling, Richard T. 1962.) Hemlock dwarf mistletoe is an endemic pathogen that does produce some favorable habitat characteristics for wildlife, in particular branching platforms that can serve as nest sites for the marbled murrelet.

Root diseases are also light in this area. They include Fomes annosus in western hemlock and Phellis weirii (laminated root rot) in Douglas-fir. Western hemlock is sensitive to decay through wounds due to its thin bark and shallow roots. Laminated root rot kills trees creating snags, down wood and hardwood pockets.

Historical Insect and Disease

In historic times insects and disease were endemic with cycles of increasing frequencies and reductions. They were a disturbance agent that helped provide diversity through time and over the landscape. They contributed to creating openings, snags, down wood and different seral stages.

Botanical Resources - Vascular Plants

Plant habitats and botanical resources have been greatly altered over the past 5 decades when compared to historic conditions. Saltmarsh and tidewater habitats have all been adversely impacted by human activities. Native saltmarsh species and inhabitants of tidal areas occur on fewer acres today when compared to historic levels. These changes are due in large part to diking, channelizing and recreational development along main Beaver Creek.

Surveys for all Regional Forester's sensitive plant species were performed prior to past ground disturbing activities (primarily timber harvest). A conservation and monitoring strategy for loose-flowered bluegrass (Poa laxiflora) was developed by the forest botanist in April, 1993. The Beaver Creek watershed contains no documented locations of loose-flowered bluegrass, however it does contain suitable habitat. This habitat is not considered vital to the persistence of this species. No other sensitive plant species have been located during botanical survey efforts in the watershed.

Noxious Weeds and Undesirable Non-Native Plant Species

Noxious weeds pose an ever-increasing threat to native ecosystems, croplands and other plant communities. Some noxious weeds were purposely introduced to stabilize streambanks (reed canarygrass) or invaded and expanded due to forest road building, clearing of land, or other surface disturbances that made soil/surface conditions suitable for invasion (Scot's broom, blackberry, yellow tansy, thistle, dock, etc.). Many of these species, once established, have the capacity for long term site occupancy (20+ years) and the potential to disrupt natural successional development. Some species that are aggressive colonizers of disturbed sites require frequent disturbance (such as grazing or roadside brushing) for long term site occupancy.

Open roads that allow year-long travel throughout the watershed are the major factor in noxious weed dispersal. The Forest Service currently coordinates the management of noxious weeds through a Memorandum of Understanding with the Oregon Department of Agriculture. Noxious weed lists are maintained by the state agency.

Botanical Resources - Nonvascular Plants

Forty-five species of epiphytic macro-lichens were inventoried in 1995, 1996 and 1997 on a landscape grid of 3.4 mile spacing over a large area of the Siuslaw National Forest. The biodiversity of lichens is highly positively correlated with the percent gaps, wolf trees, and old-growth remnants in the stands. Lists of nonvascular plants that may be in the analysis area are available at the Siuslaw National Forest Headquarters.

The Biological Environment: Terrestrial Wildlife and Habitats

Older Forest Habitat

Table 7 previously displayed seral classes by land ownership. The most important seral stages for terrestrial species of concern include mature and old growth conifer dominated communities (large and very large conifer and conifer/hardwood mix stands).

National Forest lands in the Beaver Creek watershed are entirely allocated to Late-Successional Reserve (LSR), within the northwest portion of R0268, the largest LSR on the Siuslaw National Forest. LSR management guidelines are intended to maintain and restore older forest habitat.

Mature forests currently occupy about 45 percent of federal lands in the watershed. About 23 percent of the private lands are currently mature. The amount of mature/old-growth conifer habitat in the Beaver Creek drainage today (31 percent) is likely less than the average amount that existed in the watershed over the past 100 -10,000 years. Logging, along with residential and agricultural development within the last 100 years removed many stands of older forest, especially within the lower reaches of the watershed.

When mature forest is disturbed or removed, the microclimate within adjacent stands is affected by increased wind, temperature and radiation, and less humidity (edge effect). Edge effects diminish within two tree heights away from an open area.

The amount and pattern of interior mature forest habitats is important for many species that require relatively moist, cool, dimly lighted environments which are also secure from wind and predators. Species such as northern spotted owl and marbled murrelet have evolved on landscapes composed of large patches of older and interior forest and are adversely affected by forest fragmentation.

In addition, many species with small home range sizes or limited dispersal ability (i.e. amphibians, small mammals, fungal and lichen species) are dependent on large patches of forest and associated habitat attributes for "genetic communication."

Table 10 displays the acres of mature and older interior forest within the analysis area. About three percent of federal lands within the watershed are currently functioning as interior forest habitat. No effective interior forest habitat remains on private land. About one percent of this watershed as a whole can currently support interior forest species near optimal levels. Historic conditions likely provided much greater security and dispersal success from continuous mature forest for long periods of time. Map 12 shows the distribution of mature and interior forest in the watershed.

Table 10: Mature And Interior Forest By Ownership

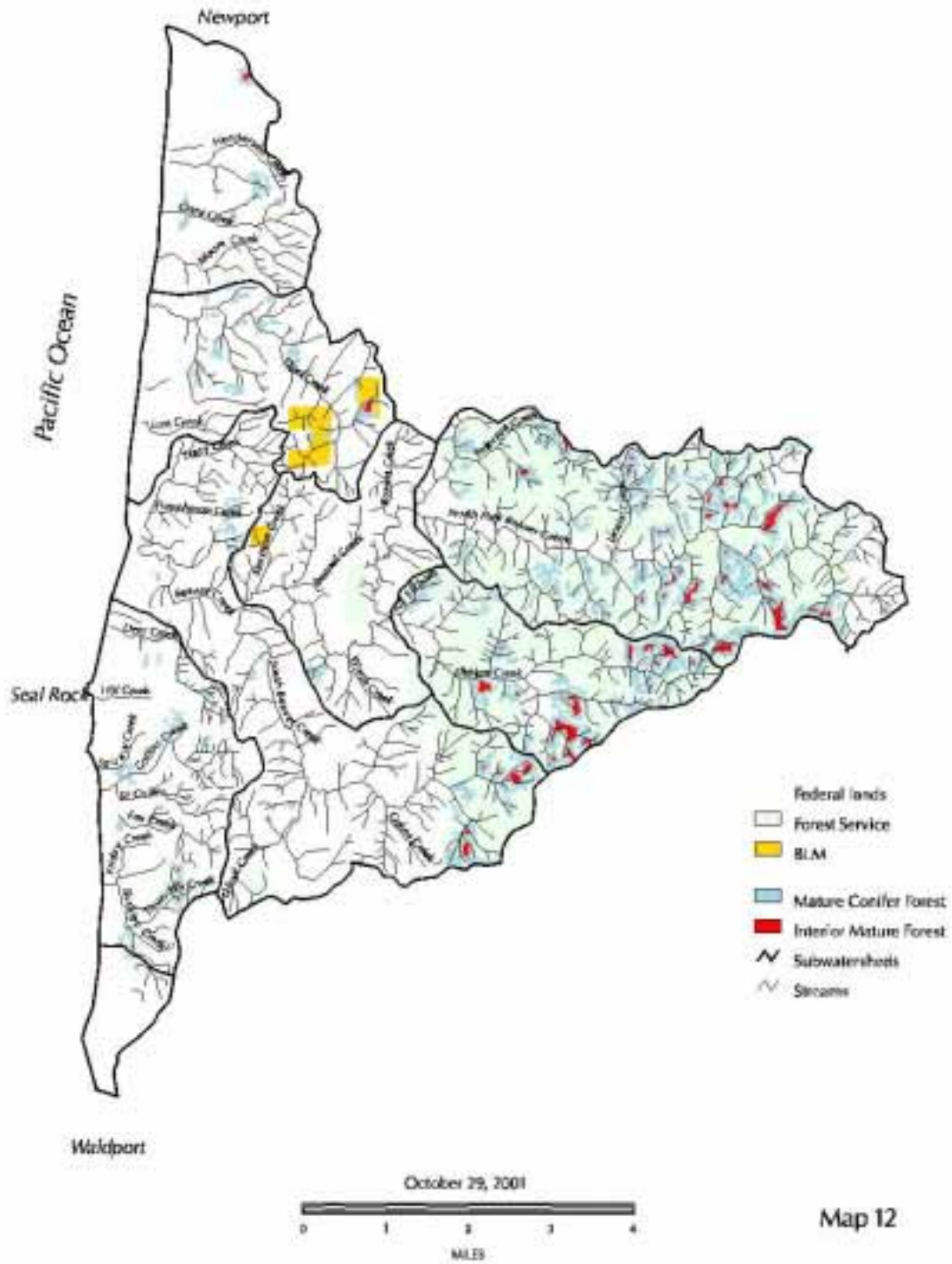
	Ownership					
	USFS	BLM	Total Federal	City & State	Private	Total
Acres of Mature Forest Habitat	5,111	114	5,225	54	4,726	10,005
Percent of the Land Base	45%	35%	44%	6%	24%	31%
Acres of Interior Forest Habitat	394	20	414	--	--	414

Connectivity through and to other areas of mature/old growth habitat on the landscape is an important role this watershed plays on a large scale. To the south and east, dispersal habitat for mature/old growth dependent species is good due to the presence of Drift Creek wilderness and public lands. To the north, dispersal habitat for mature/old growth dependent species is very poor due to large areas of private land intensively managed for timber production.

The July 1995 Assessment Report of Federal Lands in and Adjacent to Oregon Coast Province (pg 59-60) identified the Key Watershed portion of Beaver Creek (along with the Drift (Alsea), and Toledo watersheds) as one of five areas of the Siuslaw National Forest with relatively high proportions of mature conifer and interior forest habitat (and correspondingly low road density).

Federal lands are likely to recover to near historic levels given enough time under the LSR allocation in the Northwest Forest Plan. Private lands will not likely provide interior forest habitat in the future.

Beaver Creek Watershed Analysis Area Interior Forest



Map 12

Designated Critical Habitats

Critical habitat (CH) within the Beaver Creek Watershed is designated only on federal lands by the U.S. Fish and Wildlife Service. The purpose of critical habitat designation is to help focus conservation activities for a listed species by identifying areas that contain the physical and biological features that are essential for the conservation of that species.

Beaver Creek watershed contains CH for spotted owls and marbled murrelets. Approximately 9,400 acres are designated spotted owl (Strix occidentalis) CH, of which about 3,700 acres (30 percent) currently provide suitable habitat. Approximately 15,700 acres are designated marbled murrelet (Brachyramphus marmoratus) CH, of which about 4,300 acres (27 percent) is currently suitable.

Special Habitats

Special wildlife habitats in the watershed include ponds, marshes, sloughs, and tidewater areas where salt and fresh water mix. Beaver Creek watershed does not contain any cliffs, talus slopes, rock faces, caves or lakes.

The 77-acre Zeke's marsh (Estella Matilda Happ Wetland depicted on Map 5) in the lower portions of main Beaver Creek contains all the special habitats found in the Beaver Creek watershed in addition to groves of flooded spruce forest that are now mostly snags.

Estuarine habitats, as those found in the lower most reaches of Beaver Creek and in Zeke's marsh, are particularly unique and provide a wide variety of feeding and reproductive habitats. Alteration of these habitats has reduced their suitability for waterfowl, for instance, heron (Ardea herodias) rookeries that once existed in the Beaver Creek drainage have been logged out. Although fewer birds use the Beaver Creek watershed in the summertime (as compared to historic conditions), high flows spill over the dikes and ditches and attract over-wintering waterfowl, especially during severe storm events.

Late-Successional Forest Species and Populations

Survey information is available for several species that use primarily mature conifer forest including spotted owl, marbled murrelet, and bald eagle (Haliaeetus leucocephalus). The data were collected in cooperation with the Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service.

Spotted Owl

No spotted owl nests or territorial single sites are known within the watershed. The Beaver Creek watershed provides some high quality spotted owl habitat, and relatively large amounts of mature conifer forests stand in the Drift Creek Wilderness area. Thus, the mature conifer habitats in Beaver Creek might soon become occupied by dispersing juvenile spotted owls.

Marbled Murrelet

One marbled murrelet reserve⁶ is established on federal lands in North Beaver Creek. Only a small portion of the watershed has been surveyed for marbled murrelets. Although murrelet activity has been documented in only one area of the watershed, moderate size (50-90 acres) blocks of interior habitat conducive to murrelet use occur on the Federal lands portion.

Bald Eagle

Twenty-three Bald Eagle Management Areas are designated on the Siuslaw National Forest (11 occupied sites and 12 potential). One of these is located on private land in the central part of the Beaver Creek sub-watershed. Another eagle nest site is located on the ridge immediately south of the Estella Matilda Happ Wetland. The mouth of Beaver Creek to the South Fork Beaver Creek Bridge provides excellent feeding habitat. Suitable eagle habitat also exists on federal lands in the upper North Beaver and Elkhorn sub-watersheds.

Big Game

Elk (*Cervus elaphus*) and deer (*Odocoileus hemionus*) thrive in areas that provide a diverse range of habitats. Both openings and cover areas serve to meet the nutritional and security needs of deer and elk. Oregon Department of Fish and Wildlife (ODFW) monitors big game trends in number and specific demographic parameters through harvest levels and post hunting season counts. The Beaver Creek watershed is within the Alsea Big Game Hunting Unit (2,000 square miles), of which the Beaver Creek watershed (50 square miles) is only a part. The entire Alsea Unit population management objective for elk is 7,000 animals with a Bull:Cow Ratio of 10:100. ODFW officials believe approximately 5,600 animals currently inhabit the Alsea Unit and that the Bull:Cow Ratio is approximately 5-7:100. ODFW officials also report that Roosevelt branched antlered elk occur in higher than average numbers in the Beaver Creek watershed portion of the Alsea Unit, indicating good security due to cover areas and relatively low open road density. The current condition of the watershed is good for elk and deer due to a diverse mix of successional stages and cover conditions.

Other Selected Wildlife Species Of Interest

Amphibians and Reptiles

Formal surveys for reptiles and amphibians have not been done in this analysis area. However, species that would be expected to occur in the watershed based on habitat conditions include (but are not limited to) roughskin newt (*Taricha granulosa*), Western redbacked salamander (*Plethodon vehiculum*), Northern alligator lizard (*Gerrhonotus coeruleus*), Dunn's salamander (*Plethodon dunni*), Western terrestrial garter snake (*Thamnophis elegans*), and red-legged frog (*Rana aurora*). Surveys within the Beaver Watershed are recommended during the months of April to June.

⁶ A reserve is an area of contiguous murrelet suitable habitat within 0.5 miles of an occupied site.

Northwestern Pond Turtle

The Northwestern pond turtle (*Clemmys marmorata marmorata*) is a listed sensitive species inhabiting marshes, sloughs, ponds and slow-moving sections of rivers and streams. Formal surveys for this species have not been done in the watershed. The best habitat in the watershed occurs in the vicinity of the 77-acre Zeke's marsh (Estella Matilda Happ Wetland). Pond turtles likely inhabit other areas within the watershed where slow moving water exists adjacent to forested riparian vegetation.

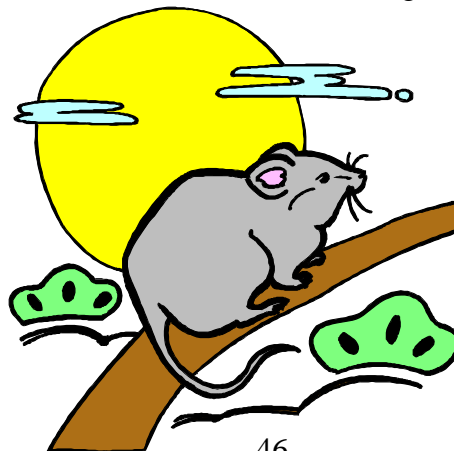
Bats

Ten bat species are known to inhabit the Oregon Coast Range. Beaver Creek watershed likely contains habitat suitable for all of these species. In 1996, a study by Oregon State University of use of bridges by night roosting bats was initiated on the Siuslaw National Forest, as well as adjacent BLM lands. Although none of the bridges in the Beaver Creek watershed were surveyed, seven of the ten species of bats in the survey area were found to be using bridges for night roosts that are similar to bridges in the Beaver Creek watershed. Yuma myotis (*Myotis yumanensis*); little brown myotis (*M. lucifugus*); long-legged myotis; and big brown bat, (*Eptesicus fuscus*) were the most commonly caught species.

Three additional species were documented in the survey: long-eared bat (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), and Townsend' big-eared bat (*Corynorhinus townsendii*). Fringed myotis is documented as occurring in the watershed on the southern boundary of the Elkhorn sub-watershed. Abandoned buildings and barns, snags, loose tree bark and canopies of mature forest also provide habitat necessary for roosting, hibernation and raising of young. Mature conifer forest may provide the best habitat for bats within the watershed. Surveys of bridges and other suitable bat habitat are recommended in the Beaver Creek watershed.

Red Tree Vole

Red tree vole (*Arborimus longicaudus*) is listed as a Survey and Manage Category C species in the Northwest Forest Plan. The red tree vole (RTV) is closely associated with old-growth Douglas-fir forests however it has also been found in young-mature Douglas-fir forests as well. RTV tend to select large, live trees with large branches for nest sites and shelter and feed almost exclusively on Douglas-fir needles. Suitable habitat for RTV exists in the watershed with approximately 66 percent of the land in Federal ownership meeting the habitat minimum of Douglas-fir dominated forests of 11" diameter at breast height and 60 percent crown closure.



The Social Environment

Native American Influence

The Yaquina /Alsea Indian people inhabited the Beaver Creek area. They shared language and many cultural practices in common and are usually treated as one cultural unit. Never a numerous people (Drucker 1939), they were content to exploit the rich resources of the ocean and estuaries, making some trips inland to hunt or to gather camas and berries. They collected fish and shellfish in large quantities; salmon was of foremost importance due to its abundance and being able to dry it for winter storage. Infrequently, sea mammals were hunted.

An Executive Order created the Siletz Reservation on November 9, 1855, which closed the coastal area of Oregon from Lookout Point to the Tahkenitch Lake outlet to non-Indian settlement. The intent of the government was to reserve that vast region as a permanent homeland for the warring tribes of southwestern Oregon as well as the peaceful coastal bands. On December 21, 1855 an Executive Order opened the region from two miles south of Siletz Agency to the mouth of the Alsea (which included the Yaquina and Alsea estuaries) to form a corridor through the center of the reservation so that a railroad could be built to Yaquina Bay. A great rush of settlers poured in. The Indians were literally driven out as the settlers moved into this area and made their claims. The Indian culture had by that time already been altered. Populations had been reduced by exposure to diseases they had no resistance to and reservation life had eroded their traditions.

Euro-American Influence

Euro-American settlement increased steadily in the 1880's and 1890's. Homesteaders moved far up into the local valleys and cleared forests, grazed dairy cattle and raised hay and garden crops. Farming and ranching occur today.

Commercial logging operations began after settlement in the 1870's and 1880's. Small family-based mills were established for mostly local consumption.

Forest Service Management History

Lands now identified as the Siuslaw National Forest were created on March 2, 1907, when President Theodore Roosevelt signed an Executive Order adding 16 million acres to the forest reserves. In 1916, some lands in the watershed came under federal management through the Chamberlain-Ferris Act, coming under jurisdiction of the Bureau of Land Management in 1946 (Indian/Deadwood WA, 1996).

After World War II, the demand for lumber increased and political pressure was exerted on National Forests in the to provide wood. The harvest of national forest acres increased rapidly after the 1950's.

The vast majority of the harvest activity after 1960 was clearcutting, with regeneration of Douglas-fir, the fastest growing timber-producing tree in this area. In the 1970's, the use of skyline cable yarding allowed harvest of trees from very steep slopes. By 1995, nearly 5,000 acres of National Forest land in the Beaver Creek watershed had been logged.

Roads

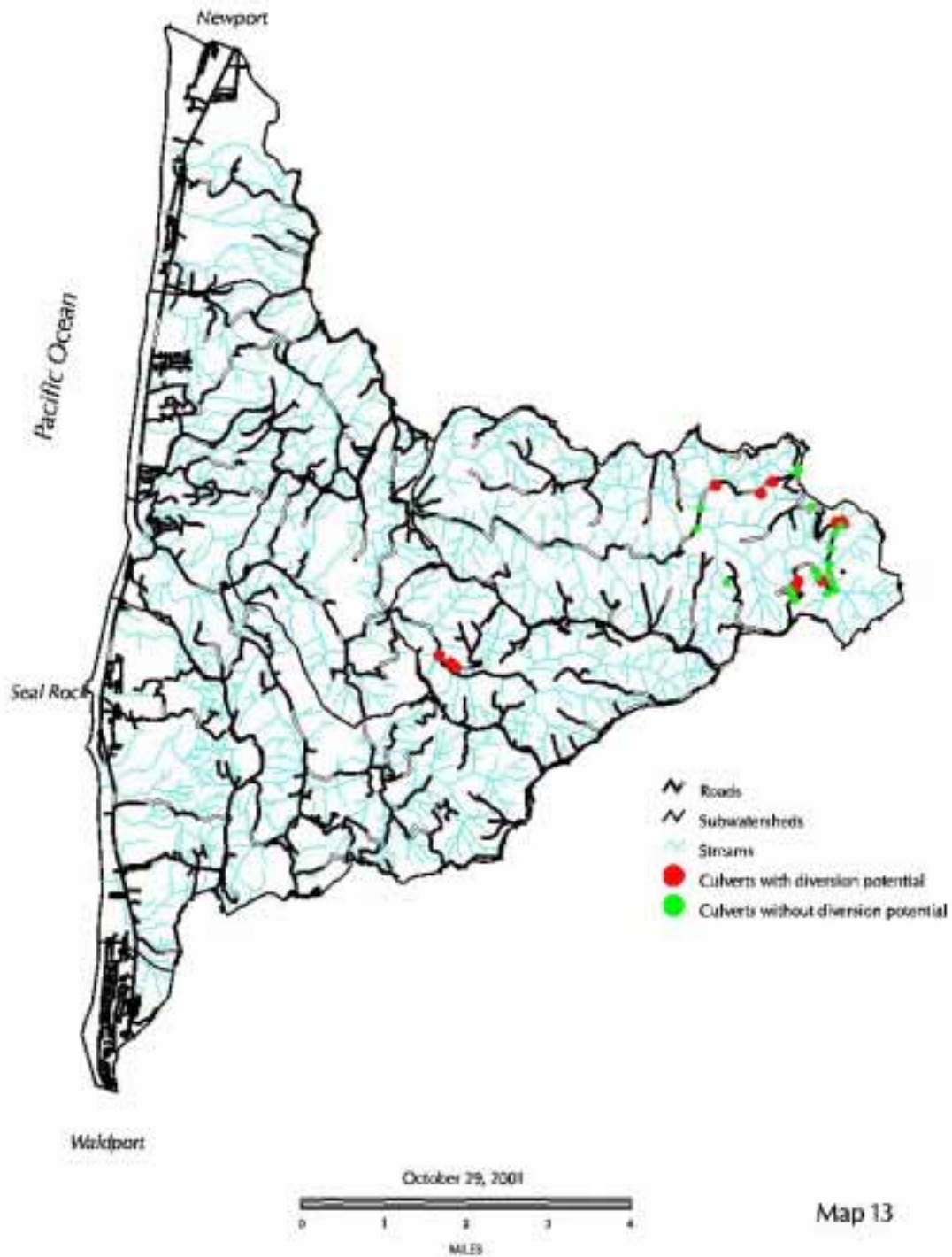
The Forest Service road system within the Beaver Creek watershed is one of the newest road systems on the Siuslaw National Forest. Most roads are located on ridge tops, and are considered stable. Road decommissioning has occurred on a portion of Forest Road 5000.

Culvert data from a survey done in 1995 was analyzed to see if any culverts need replacement or modification. The information is listed in Table 11 and Map 13. A culvert/fish passage survey in summer 2000 did not reveal any new problem areas.

Table 11: Culvert conditions in the Beaver Creek Watershed from the 1995 road survey.

Culvert (NSID) Number	Road Number	Stream Affected	Problem	Culvert Diameter	Diversion Potential
44	5031	N.Fk Beaver	ok	9 ft	none
45	5031	N.Fk Beaver	Rusty pipe, erosion at outlet	18 inches	none
46	5031	N.Fk Beaver	Slide at outlet, outlet partially plugged	24 inches	yes--200 feet
47	5031	N.Fk Beaver	Slide at outlet, outlet partially plugged	18 inches	yes--200 feet
48	5031	N.Fk Beaver	ok	18 inches	yes--70 feet
51	spur 49 off Rd 5000	N.Fk Beaver	Inlet almost completely plugged	15 inches	none
52	spur 49 off Rd 5000	N.Fk Beaver	Inlet partially plugged. Outlet eroding and undercutting road	18 inches	none
87	5000-240	N.Fk Beaver	Rusty pipe	36 inches	none
88	5100	Elkhorn	Badly rusted pipe	18 inches	yes-30 feet
89	5100	Elkhorn	Partially plugged inlet	24 inches	yes--400 feet
90	5100	Elkhorn	Erosion at outlet	18 inches	yes--800 feet

Beaver Creek Watershed Analysis Area Roads and Culverts



CHAPTER FOUR:

WATERSHED RESTORATION ASSISTANCE

Assistance Available for Restoration Projects on Private Land

USDA Programs

A brochure describing the details of 7 different programs administered by the USDA is available from the contact listed below. The programs are briefly listed below.

- A. Conservation Reserve Program (CRP)- Primarily aimed at reducing soil erosion.
- B. Conservation Reserve Enhancement Program (CREP)- Primarily aimed at riparian areas that provide habitat for species listed under the Endangered Species Act.
- C. Environmental Quality Incentives Program (EQIP)- Targeted toward livestock and other active agricultural producers.
- D. Forestry Incentives Program (FIP)- Aimed at nonindustrial private forest landowners.
- E. Stewardship Incentive Program (SIP)- Assists landowners with planning and implementing multi-resource stewardship practices on forest land.
- F. Wetlands Reserve Program (WRP)- Designed to restore, protect, or expand wetland areas on private property through easements and restoration agreements
- G. Wildlife Habitat Incentives Program (WHIP)- Private land, including non-agricultural land is eligible. Habitat development practices maintained for 5-10 years.

Contact: Kate Danks, Lincoln SWCD 541-265-2631

Wyden Amendment Authority

U.S. Forest Service funding can be applied to restoration projects on non-federal lands. In the central Oregon coastal area, funds are administered by Cascade Pacific Resource Conservation and Development Area, Inc. Projects must be located in a watershed that contains Siuslaw National Forest lands with a completed watershed analysis.

Contact: Karen Strohmeier, Cascade Pacific RC&D, 541-757-4807

OWEB Grants

The Oregon Watershed Enhancement Board (OWEB) administers a state-wide grant program. Applications for on-the-ground projects are submitted to the OWEB “Capital Fund”, applications for assessments, monitoring, education, etc. are submitted to the “Non-capital Fund”.

Contact: Tom Schaefer, North Coast OWEB office, 541-528-7451 or Wayne Hoffman, Mid-Coast Watersheds Council, 541-265-9195, <http://www.oweb.state.or.us/>.

Oregon Department of Fish and Wildlife Programs

Private landowners may apply to the Salmon and Trout Enhancement Program (STEP) through the Oregon Department of Fish and Wildlife (ODFW) for projects which provide fish habitat improvement. ODFW also reviews and approves applications for the Riparian Land Tax Incentive Program. The program provides exemption from ad valorem taxation where requirements are met.

Contact: Tony Stein, ODFW 541-867-0300 x253 or Tammy Wagner, ODFW 541-867-0300.

Central Coast Land Conservancy

This group is available to assist landowners with the planning and paperwork involved in applying to various conservation programs. They are currently seeking funding for acquisitions.

Contact: Fran Recht, Central Coast Land Conservancy, 541-765-2234

Mid-Coast Watersheds Council

This group has technical and logistical resources available to help with planning, funding, implementing, monitoring, and evaluating projects for any landowner in the watershed.

Contact: Wayne Hoffman, Mid-Coast Watersheds Council, 541-265-9195, www.midcoastwatershedcouncil.org

For the Sake of the Salmon

This group maintains a large website with a section specifically for grant announcements, articles about funding sources and fundraising, and an extensive list of funding programs offered by federal and state governments and private foundations. The list is intended to give watershed groups an idea of the various sources of funding available to them and links have been added to specific agencies and organizations with funding sites on the web.

Contact: www.4sos.org 503-223-8511

River Network

The River Network makes grants available through their Watershed Assistance Grants program to local watershed partnerships to support their organizational development and long-term effectiveness. This particular program is NOT for on-the-ground projects.

The River Network also publishes a Directory of Funding Sources for Grassroots River and Watershed Conservation Groups 2001-2002. The directory profiles foundations, corporations, state and federal agencies and other nonprofits that support small, nonprofit watershed groups, as well as a few sources that support Tribes. Only multi-state funders are included in this directory. Includes contact information, grant sizes and a brief description of each source's particular interests. Contains sections on grant proposal writing, indexes and resources. 102 pgs. Updated annually.

Contact: www.rivernetwork.org 503-241-3506 x47

Rivers Conservancy

This is the land conservation arm of the River Network. Intended to assist with funding to purchase or lease conservation easements.

Contact: www.rivernetwork.org 503-241-3506 x47

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REFERENCES

Buckman, Oregon Department of Fish and Wildlife and Beaver Creek resident; personal communication, 1999.

Baldwin, E.M., 1981, Geology of Oregon, Kendall/Hunt Publishing Co., Dubuque, Iowa, 170 p.

Sterling, Richard T. Dwarf Mistletoe: Parasite of Western Hemlock. Proceedings of 5th World Forestry Congress, Vol. 2: p. 893-896, 1962.

Hadfield, James S., Pathological Significance of Wounds on Western Hemlock. 1974. USDA Forest Service, Region 6

Hansen, Everett. 1997. Thinning Workshop notes-April 1997. Oregon State University, College of Forestry, Corvallis, OR

Hostetler B.B, and D.W. Ross. 1996. Generation of Coarse Woody Debris and Guidelines for Reducing the Risk of Adverse Impacts by Douglas-fir Beetle.

Beckman, Stephen D.; Toepel, Kathryn A.; Minor, Rick. Cultural Resource Overview of the Siuslaw National Forest, Western Oregon. Heritage Research Associates, Lake Oswego, Oregon. 1982.

Land & Resource Management Plan-Siuslaw National Forest-Final Environmental Impact Statement, Appendices-Vol. 1, Siuslaw National Forest, U.S.D.A Forest Service. 1990.

The Northwest Forest Plan, A report to the President and Congress. Tuchmann, E. Thomas, Commaughton, Kent D., Freedman, Lisa E., Moriwaki, Clarence B.; U.S.D.A. Office of Forest & Economic Assistance. December 1996.

Personal Communication. Buckmann (of ??), Bruce Buckley, Loyd Palmer and Phyllis Steeves of the Waldport Ranger District

Agee, J. K. 1993. Fire Ecology of Pacific Northwest Forests. Covela, CA: Island Press 475 pp.

Badura, G.J., H.Legard, and L.Meyer. 1974. Siuslaw National Forest Soil Resource Inventory. USDA-Pacific Northwest Region. 139 pp.

Beckham, Stephen D., K.A. Topel, and R. Minor. 1982. Cultural Resource overview of the Siuslaw national Forest, Western Orgon. Heritage Research Associates Report No. 7

Berry, J, and Jim Maxwell, 1983. Landtype Associations of the Siuslaw National Forest. Report to the Siuslaw National Forest, on file Corvallis, OR

Chen, J. 1991. Edge effects: Microclimatic pattern and biological responses in old-growth Douglas-fir forests. Ph.D. Thesis. College of Forest Resources, Uni. of Wash., Seattle. Concannon, J.A. 1995. Characterizing structure, microclimate and decomposition of peatland, beachfront, and newly-logged forest edges in Southeast Alaska. Ph.D. Thesis. College of Forest Resources, Uni. of Wash. 326pp.

Department of Environmental Quality, 1995. Water Quality Standards Review 1992-1994; Final Issue Papers. Salem, Oregon

Earth Design Consultants Inc. and Green Point Consulting, 2001. Mid-Coast Watersheds Council 6th Field Watershed Assessment.

Ellis, B.J., et. al., A Hierarchical Approach to Classifying Landforms and Stream Systems in the Oregon Coast Range - in prep. Report to the Siuslaw National Forest

Frazier, M. 1986. Silvicultural Prescription for Morris Creek. Mapleton Ranger District. Siuslaw National Forest.

Hansen, Everett. 1997. Thinning Workshop notes - April 1997. Oregon State University, College of Forestry, Corvallis, OR

Hemstrom, M. and Frazier, M. 1987. Paper presented at the symposium, "Land Classifications Based on Vegetation: Applications for Resource Management," Moscow, Idaho. November 17-19.

Hemstrom, M. A., and S. E. Logan. 1986. Plant Association and Management Guide Siuslaw National Forest. USDA R6-Ecol 220-1986a. 121 p.

Hostetler, B.B., D.W. Ross. 1996 Generation of Coarse Woody Debris and Guidelines for Reducing Risk of Adverse Impacts by Douglas-fir Beetle. Report to the Siuslaw National Forest. On file Siuslaw National Forest, Corvallis OR.

Juday, G.P. 1977. The Location, Composition and Structure of Old-Growth Forests of the Oregon Coast Range. Ph.D. Thesis. Oregon State University.

Montgomery, D.R. and J.M. Buffington. 1993. Channel classification, prediction of channel response, and assessment of channel condition. Report TFW-SH10-93-002 for the SHAWM committee of the Washington State Timber/Fish/Wildlife Agreement, Olympia, Washington 84 pp.

NACSI Technical Bulletin No. 456 Catalog of Landslide Inventories for the Northwest, April, 1985.

Oregon Department of Fish and Wildlife, 1993. Oregon All Tags Sport Catch 1993, Portland, Oregon

Oregon Department of Fish and Wildlife, 1994. Big Game Statistics, Portland, Oregon: May 12, 1994.

Pierson 1977 - Storms and Landslides

Powell and Wright. 1994. Amphibians

Price, F. 1996 - Fire

USDA-USDI. 1995 Regional Ecosystem Office, Ecosystem Analysis at the Watershed Scale - Federal Guide for Watershed Analysis Revised August 1995 Version 2.2, Portland, OR.

Regional Foresters' List of Sensitive Plant and Animal Species. U.S.D.A. Forest Service, Region 6. Updated September, 1996.

Ryu, 1996. Geology

Shaw, S.C., and Johnson, D.H., 1995, Slope morphology model derived from digital elevation data: In Proceedings, Northwest Arc/Info Users Conference, Oct. 23-25, 1995, Coeur d' Alene, ID.

Spies, T.A.; Cline, S.P. 1988. Coarse woody debris in forests and plantations of coastal Oregon. In: Maser, C.; Tarrant, R.F.; Trappe, J.M.; Franklin, J.F., tech eds. From the forest to the sea: a story of fallen trees. General Tech. Rep. PNW-GTR-229. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 5-24.

Teensma, P. D., J. T. Rienstra, and M. A. Yeiter. 1991. Preliminary reconstruction and analysis of change in forest stand age classes of the Oregon Coast Range from 1850 to 1940. Tech. Note USDI T/N OR-9 Filing Code:9217.

USDA Forest Service, 1983. GPO Forest Disease Management Notes. 695-726.

USDA Forest Service. 1967. Multiple Use Plan Smith River Ranger District. Siuslaw National Forest. 45pp.

USDA Forest Service. 1969. Gillmore Report. Siuslaw National Forest, Corvallis OR

USDA Forest Service, ``Value Analysis," Mapleton Ranger District, March 31-April 4, 1986. Gives recommendations for fish enhancement projects on the North Fork Smith River.

USDA Forest Service, ``Forest Plan Standards and Guidelines Applicable to 1990 North Fork Smith Fish Habitat Project," Mapleton Ranger District, undated, ca. 1990.

USDA Forest Service. 1990. Final Environmental Impact Statement for the Land and Resource Management Plan. Siuslaw National Forest, Corvallis, OR.

USDA Forest Service, Letter on North Fork Smith River, from Al. Grapel, Forest Landscape Architect to District Ranger (et.al.) August 4, 1993.

USDA Forest Service. 1993. Watershed Protection and Restoration in the Mid-Oregon Coast Range. Unpublished report. Siuslaw National Forest, August 18, 1993, 18 pp.

USDA Forest Service, ``Notes from Meeting to Set Up Process for Resolving Fisheries/Scenery Conflicts on North Fork Smith River," Mapleton Ranger District, August 18, 1993.

USDA Forest Service, North Fork Smith River Scenery Protection and Fish Habitat Enhancement Map, Mapleton Ranger District, Sept. 1993. Three maps in set.

USDA Forest Service, Siuslaw National Forest, 1995. Assessment Report - Federal Lands in and Adjacent to the Oregon Coast Range.

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

USDA Forest Service. 1996. Indian / Deadwood Watershed Analysis. Siuslaw National Forest, Corvallis OR

USDA Forest Service and USDI Bureau of Land Management, Environmental Protection Agency, National Marine Fisheries Service, U.S. Park Service, and U.S. Fish and Wildlife Service. July 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Assessment Team (FEMAT).

USDA Forest Service and USDI Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. 74 pp. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Appendices.

USDA Forest Service and USDI Bureau of Land Management, 1997. Late Successional Reserve Assessment - Oregon Coast Range Province - Southern Portion

USDA Soil Conservation Service et, al. Soil Survey Alsea Area, Oregon , U.S.
Government Printing Office, October 1973

USDI 1992. Coos Bay District Resource Management Plan and Environmental Impact Statement, August 1992. BLM - Coos Bay District Office, North Bend, OR.

USDI 1995. Coos Bay District Record of Decision and Resource Management Plan, May 1995. BLM - Coos Bay District Office, North Bend, OR.

USDI 1996a. Middle Smith River Watershed Analysis Draft Report.BLM - Coos Bay District Office, North Bend, OR.

USDI 1996b. West Fork Smith River Watershed Analysis Draft Report.BLM - Coos Bay District Office, North Bend, OR.

Wright, P. 1997. Coarse Woody Debris Groups for the Siuslaw National Forest. (Draft) Siuslaw National Forest. Corvallis, Oregon.