Chapter 2. Watershed Analysis Area Overview

PHYSICAL SETTING

Watersheds and Ecoregions

The streams draining the main block of the Elliott State Forest flow into one of three water bodies. About 47% of the Forest drains southwest into Coos Bay, 30% drains north to the Umpqua River, and 23% drains west to the North and South Tenmile Lakes (Map 2.1 and Table 2-1). Natural processes, current conditions, and management of these three watershed regions (hereafter referred to as the Coos, Umpqua, and Tenmile) differ. The general characteristics of these regions are described below.

Coos region. Currently, the majority of timber harvest occurs in this region. Slopes are somewhat more moderate than elsewhere on the Forest. Roads parallel many of the larger streams. The West Fork Millicoma River dominates this region and is important for producing coho salmon and steelhead. Summer fog is less common in this region.

Umpqua region. Timber harvest has been curtailed in those portions of the region directly upslope of Highway 38 (along the Umpqua River) and Loon Lake Road (along Mill Creek) because of landslide safety concerns and to provide a visual corridor. Land directly upslope of Highway 38 has been designated as scenic conservancy with the provision of no timber harvest. Landslide concerns have extended the no harvest provision to as far as Charlotte Ridge. Many of the basins in this region are designated as "160-240 year-old rotation." Few streams have roads along them. Streams in the eastern portion tend to be steep and short. The eastern portion is warmer and freer of fog than the western portion. The Dean Creek Basin, in the western portion, supports a large elk population.

Tenmile region. Currently, timber harvest is limited because the basins in this region are designated as 160-240 year-old rotation and past harvesting does not allow much additional harvest in the near-term. Most northern spotted owls on the Forest are found in this region. None of the fish-bearing streams have active roads along them. The streams are important for coho salmon because of the high-quality rearing habitat found within them and in downstream waters. Fog can be persistent, especially in mid-summer, leading to moderate temperatures and less moisture stress for vegetation.

Nearly all of the Forest lies within the Mid-coastal Sedimentary Ecoregion (Table 2-1). A small portion (6%) in the far northwest corner is within the Coastal Uplands Ecoregion, which has more marine air influence. This difference is expressed in the species mix of conifer trees. Lower summer soil moisture stress in the Coastal Uplands tends to support a mixed species stand of Douglas-fir, western hemlock, Sitka spruce, and western redcedar, while the Mid-coastal Sedimentary Ecoregion supports forests mainly of Douglas-fir.

Table 2-1. Area of the Elliott State Forest by region and ecoregion.

Region	Acres	Percent of Total
Coos	43,432	47
Umpqua	28,528	30
Tenmile	21,528	23
Combined	**93,488**	**100%**

Ecoregion	Acres	Percent of Total
Mid-coastal Sedimentary	88,152	94
Coastal Uplands	5,171	6
Coastal Lowlands	165	< 1
Combined	**93,488**	**100%**

Analysis Basins

For purposes of this analysis, the Forest was divided into 13 basins based mainly on major drainage areas. The analysis basins are based on hydrologic boundaries (for the most part) and can be aggregated up to fifth-field watersheds. These 13 analysis basins may be used in the future for day-to-day management of the Forest or incorporated into a revised *Forest Management Plan*. The 1995 HCP (ODF 1995) for northern spotted owls is based on the "old" management basins that follow different boundaries.

Four ODF foresters have been assigned a subset of the "old" management basins for which they plan and design timber harvest units. One basin forester covers basins draining into the two Tenmile Lakes plus an eastern portion of the Umpqua region. A second forester covers the western portion of the Umpqua region plus a middle portion of the West Fork Millicoma River drainage. A third forester covers basins in the southwest and south portion of the Forest, including Palouse, Larson, and Marlow Creeks. A fourth forester covers basins in the headwaters of West Fork Millicoma River and Elk Creek plus the eastern fringe of the Forest, which includes Glenn, Mill, and Lake Creeks.

Geology, Landforms and Soils

Gravity and precipitation have combined to erode the relatively weak sedimentary rock underlying the Forest into sharp ridges and slopes dissected by many streams and draws (Maps 2.3 and 2.4). A main north-south ridge separates the West Fork Millicoma drainage to the east from streams that flow directly to the west. Another main ridge, this one going east and west, separates the upper West Fork Millicoma River drainage from those streams that flow north directly to the Umpqua River. The steepest terrain in the Forest occurs off of ridges that branch west and north from the two main ridges. The southeast corner of the Forest has broader ridges and more moderate slopes. Rock outcrops and cliffs occur throughout the Forest but are most common along steep draws.

Although a few large-scale landslide features have been mapped on the Forest, others likely exist that have not been mapped. A landslide located in the northeast corner (230 acres, of which the upper 37 acres are within the Forest) begins at the top of the ridge and extends to Camp Creek. A gently sloping earth flow of 95 acres exists on the downstream end of a tributary to the West Fork Millicoma River near Stulls (Stahls) Falls. Further downstream [near river mile (RM) 13] is an earth flow of about 80 acres that occurs where several small

tributaries come together near the West Fork Millicoma River. Field visits indicated that none of the three large-scale landslides are active. A hillslope landslide, probably similar to the one identified above Camp Creek, occurred on Mill Creek many centuries ago and now forms Loon Lake. Mill Creek begins at the 215-acre lake and flows through the northeast corner of the Forest. The dam created by the landslide is impassible for fish.

The mountains on the Forest result from ongoing tectonic activity associated with the Pacific Juan de Fuca plate being forced against the North American continental plate margin (Beaulieu and Hughes 1975). The Oregon coastal margin of the Pacific tectonic plate goes underneath the North American plate resulting in uplift of the overriding North American plate and intermittent thrusts of seafloor sediment against the leading edge of the continent (Goldfinger et al. 1992). Uplift rates of the North American plate in the general area of the Forest are approximately 13 inches per century. Erosive forces more or less counter uplift resulting from tectonic activity (Reneau and Dietrich 1991). As a result, the mountains on the Forest have remained the same height for centuries.

The uplifted strata in the general area of the Forest are primarily marine sedimentary rocks interspersed with some basaltic pillow lava formations (although only sedimentary rock underlies the Forest). These marine sedimentary rocks are part of the Tyee geologic unit, which is notably weak in shear and tensile strength (Ryu et al. 1996). The rock is composed of thick sandstone beds (3-30 feet deep) separated by thin beds of mudstone (2-12 inches deep). The beds dip gently and therefore, the occurrence of landslides is about equal among slope aspects. Since crushed marine basalt rock obtained from nearby pits and river rock mined from the Umpqua River is much stronger than the sedimentary rock underlying the Forest, it is used to surface roads.

Soils tend to be shallow near ridgelines and deeper in valley bottoms and terraces. The downhill accumulation of soil is commonly in the form of soil creep. Soil creep is the gradual plastic flow of the soil mass under gravity. Other natural forms of downhill soil movement include shallow landsliding, deep-seated landsliding, raveling, and soil displacement due to the burrowing of small mammals. Streams often incise soil terraces that develop at the base of valleys. The detachment of particles from the earth's surface under the erosive power of rain is limited, to some extent, by the vegetation and organic material that accumulates at the soil surface. More importantly, soils on the Forest are highly permeable so overland flow rarely occurs and is limited to areas where soils are very shallow or compacted by machinery.

The Forna and Valino soil series overlie three-quarters of the Forest (Map 2.5, Table 2-2). These moderately deep-to-deep soils have surface layers of clay loam with subsoil layers consisting of rock and clay loam. A clay loam is a soil with varying degrees of clay and silt, with clay as the dominant texture. The deeper Valino soils are slightly more productive (Douglas-fir site class II+ to II-) than the shallower Forna soils (site class III+ to III-). The most productive soils (I-) are the Bessee, Noah, and Yoakum soil series but they comprise only 1.4% of the Forest. Site class is an index of the rate of tree height growth, with lower values indicating faster growing trees.

Table 2-2. Description of soils on the Forest.

Code	Soil Series	Area (%)	Drainage	Surface Soil	Subsoil
Bs	Bessee	0.0	imperfectly drained	fine-textured derived from older alluvium	clay with low permeability
Ca	Callahan	2.5	well-drained	stony loam	stony sandy loam
Ct	Cooston	0.1	imperfectly drained	loam	clay loam often with low permeability
FL	Flournoy	1.3	well-drained	clay loam	clay with highly-weathered rock
Fz	Forna	38.8	well-drained	stony loam	stony clay loam
Hk	Hawkins	0.0	well-drained	fine-textured derived from siltstone	clay with soft siltstone rock
Je	Jerden	3.7	well-drained	sandy loam	stony loam
Js	Jolson	0.5	well-drained	stony loam derived from sandstone	stony loam
Mb	Millicoma	3.1	well-drained	clay loam derived from siltstone	clay loam with siltstone rock
Nb	Nabb	0.6	well-drained	med.-textured from sandstone alluvium	sandy loam
Nq	Noah	1.3	well-drained	fine-textured derived from sandstone	clay loam
OK	Ork	1.2	---	---	---
VL	Valino	37.4	well-drained	granular loam	clay loam with sandstone rock
Ws	Wassen	0.0	poorly drained	fine-textured derived from alluvium	clay to clay loam
Yk	Yoakum	0.1	well-drained	fine-textured derived from siltstone	clay loam
Ag	Agriculture	0.4	N/A	N/A	N/A
RS	Rock	0.5	N/A	N/A	N/A
XX	Not mapped	8.4	N/A	N/A	N/A
Sum	**---**	**100.0**	---	---	---

Code	Depth	Douglas-fir Site Class	Position
Bs	deep	I-	along major drainages
Ca	moderately deep	II- to III+	on steep and precipitous slopes
Ct	deep	II+	on toe slopes and benches
FL	shallow	III+	on ridges
Fz	moderately deep	III+ to III-	on steep and precipitous slopes and on ridges
Hk	deep	II+	on smooth upland topography
Je	mod. deep to deep	II-	on colluvial fans and on steep and precipitous slopes
Js	shallow to mod. deep	IV+	on steep and precipitous slopes
Mb	mod. deep to deep	II-	on moderately-sloping and smooth upland surfaces
Nb	deep	II+	along river terraces
Nq	deep	I-	on gently sloping uplands, benches, and toe slopes
OK	---	---	---
VL	mod. deep to deep	II+ to II-	steep and precipitous slopes, highly dissected
Ws	moderately deep	too wet	along river terraces
Yk	deep	I-	on smooth, gently sloping terrain

Climate Patterns

The climate of the Forest is moderate with most precipitation falling from October through May. The temperature is usually mild in the winter, with few days below freezing. Maximum temperatures in the summer can approach 90-100° F on occasion, but marine air often keeps summer temperatures more moderate. Summer fog, especially in mid-summer, often keeps the western fringe of the Forest cooler than inland portions. Since the main ridges of the Forest are only about 1,600 to 1,800 feet in elevation, snow is uncommon.

Average annual precipitation is 70-90 inches, with the highest amounts along high ridges (Map 2.6). A rain shadow caused by the interior high ridges occurs along the eastern boundary of the Forest where precipitation drops to about 60 inches. Short-term, high-intensity rainfall controls the initiation of shallow landslides on steep slopes in this region. High-intensity rainfall in the winters of 1981-1982 and 1996-1997 triggered many shallow landslides throughout the Forest. In November 1996, 6.7 inches of rain fell in 24 hours as measured at North Bend, which resulted in widespread landslides throughout the southern Coast Range.

Streams and Other Water Bodies

The Forest has a high density of streams but few lakes, ponds, and wetlands (Map 2.7). Where they do occur, ponds and wetlands are a part of stream channels and are often a result of beaver activity. These areas tend to be small, and on aerial photographs are often obscured by trees. Almost all ponds have been mapped as water sources for fighting fire. The 215-acre Loon Lake has about 1 mile of Forest ownership along its downstream end.

The ODF has adopted a stream size classification based on the estimated average annual flow of a stream. Average annual flow is estimated by using an empirical equation based on watershed area and average annual precipitation. There are three size classes: (1) large streams have an average annual flow greater than 10 cubic feet per second (cfs); (2) medium streams have an average annual flow between 2-10 cfs; and (3) small streams have an average annual flow less than 2 cfs. Overall, the Forest has similar densities of large and medium streams (0.45 and 0.47 miles per square mile, respectively; Table 2-3). The density of large streams in the Coos region is about twice that found elsewhere in the Forest.

Table 2-3. Length of stream by size class for each watershed region.

Region	Area (sq. mi.)	Stream Length (mi.)			Stream Density (mi./sq. mi.)		
		Large	Medium	Small*	Large	Medium	Small
Coos	67.9	41.1	32.3	277.1	0.61	0.48	4.08
Umpqua	44.1	14.6	22.2	165.4	0.33	0.50	3.75
Tenmile	33.6	9.4	14.6	140.5	0.28	0.43	4.18
Combined	**145.6**	**65.1**	**69.1**	**583.0**	**0.45**	**0.47**	**4.00**

* Stream length for the small size class is dependent on subjective decisions on how far upstream to extend channels and which channels to include during mapping. No obvious criteria dictated the extent or inclusion of small channels when a map was developed for the Forest using the 1996 orthophotos.

The Forest has about 134 miles of large and medium streams, most of which are important for fish, and 583 miles of small streams, many of which also support fish. The mileage of small streams provided in Table 2-3 is not particularly meaningful since it is dependent on how far uphill the original cartographers extended stream lines and which drainages or draws they chose to include a stream line. Such decisions varied among cartographers and the year in which a map was made.

Channel Habitat Types

A system of delineating stream segments with similar channel gradient and geometry is proposed in the *Oregon Watershed Assessment Manual* (OWEB 1999) and this system was used in this project to provide a coarse evaluation of fish habitat and sediment transfer characteristics for the Forest.

For the Forest, stream segments were identified that were fish bearing. Combinations of channel gradient classes (<1%, <2%, 2%-4%, 3%-10%) and channel confinement classes were determined for each segment. For Forest streams, these confinement classes included:

- Large flood plain; broad valley flood plain not confined by hillslopes.
- Moderately confined; flood plain width more than 2 times but less than 4 times the bankfull width.
- Confined; flood plain width less than 2 times the bankfull width

Channel gradient was determined using a digital elevation model of the Forest. Channel confinement was determined using a combination of field observations from Oregon Department of Fish and Wildlife (ODFW) fish habitat surveys and contour maps. This resulted in six distinct channel habitat types for fish-bearing streams on the Forest:

FP = low gradient (<1%), large flood plain
- FP1 = large streams
- FP2 = medium streams
- FP3 = small streams

LM = low gradient (<2%), moderately confined
LC = low gradient (<2%), confined
MM = moderate gradient (2%-4%), moderately confined
MC = moderate gradient (2%-4%), confined
MV = moderately steep (3%-10%), narrow valley

For the Forest, over one-half of fish-bearing stream mileage is moderate gradient, confined channel (MC); this type occurs in each of the 13 analysis basins (Map 2.8, Table 2-4). Moderately steep, narrow valley channels (MV) also are widespread, making up about 19% of the overall stream mileage. The percentage of this type in the Tenmile region is only one-half of that found elsewhere in the Forest. Confined channels, irrespective of gradient, make up nearly three-quarters of the miles of stream that support fish.

The moderate gradient, moderately confined stream type (MM) is found mostly in analysis basins #10 (Marlow Creek) and #9 (lower West Fork Millicoma River drainage) in the Coos region. The low gradient, moderately confined stream type (LM) is relatively rare and occurs mostly in analysis basin #8 (Palouse and Larson Creeks).

Low-gradient channels with a large flood plain occur exclusively in analysis basin #4 (Scholfield Creek) and at the downstream end of larger streams in the Tenmile region. Over one-third of the fish-bearing stream miles in the Tenmile region are of this channel type.

Fish-bearing streams throughout most of the Forest have favorable gradients for salmonids (less than 4%) but are tightly confined by adjacent hillslopes. Although not quantified, some roads constructed parallel to streams have additionally confined stream channels. The energy conveyed by water flowing through narrow and non-meandering channels is considerable at high flows. Consequently, zones of slower water that can be used for refuge by fish during high flows are limited mostly to that provided by large wood in the channel. Unconfined streams common to the Tenmile region provide unique, high-quality habitat for fish not found elsewhere on the Forest. These low-gradient streams are more likely to provide high-quality refuge habitat during high water since the channel can meander freely and create backwater areas.

Table 2-4. Channel habitat types for fish-bearing streams by region and analysis basin.

Region	**Gradient**	**< 1%**	**< 2%**	**< 2%**	**2%-4 %**	**2%-4 %**	**3%-10%**
	Confinement	**Unconfined**	**Moderately Confined***	**Confined****	**Moderately Confined**	**Confined**	**Confined**
	Code	**FP**	**LM**	**LC**	**MM**	**MC**	**MV**
	Analysis Basin	*Length of fish-bearing stream (miles)*					
Coos	8	---	3.1	---	---	4.7	---
	9	---	0.1	---	9.6	4.8	2.6
	10	---	---	---	3.9	3.4	2.5
	11	---	---	---	---	24.1	7.6
	12	---	---	---	9.1	15.7	6.5
	Combined	**0.0**	**3.2**	**0.0**	**22.6**	**52.7**	**19.2**
Umpqua	1	---	---	5.5	---	2.2	1.2
	2	---	---	---	---	0.7	5.3
	3	---	---	---	---	7.5	---
	4	4.1	0.2	---	---	2.0	1.0
	13	---	---	---	---	3.5	0.7
	Combined	**4.1**	**0.2**	**5.5**	**0.0**	**15.9**	**8.2**
Tenmile	5	7.7	---	---	0.8	3.0	1.5
	6	1.7	0.5	---	---	5.7	1.5
	7	1.8	1.2	---	---	5.8	0.8
	Combined	**11.2**	**1.7**	**0**	**0.8**	**14.5**	**3.8**
Total		**15.3 (9.4%)**	**5.1 (3.1%)**	**5.5 (3.4%)**	**23.4 (14.3%)**	**83.1 (50.8%)**	**31.2 (19.1%)**

* Moderately confined = flood plain width is more than 2 times but less than 4 times the bankfull width.
** Confined = flood plain width is less than 2 times the bankfull width.

BIOLOGICAL FEATURES

Historic Hillslope Vegetation

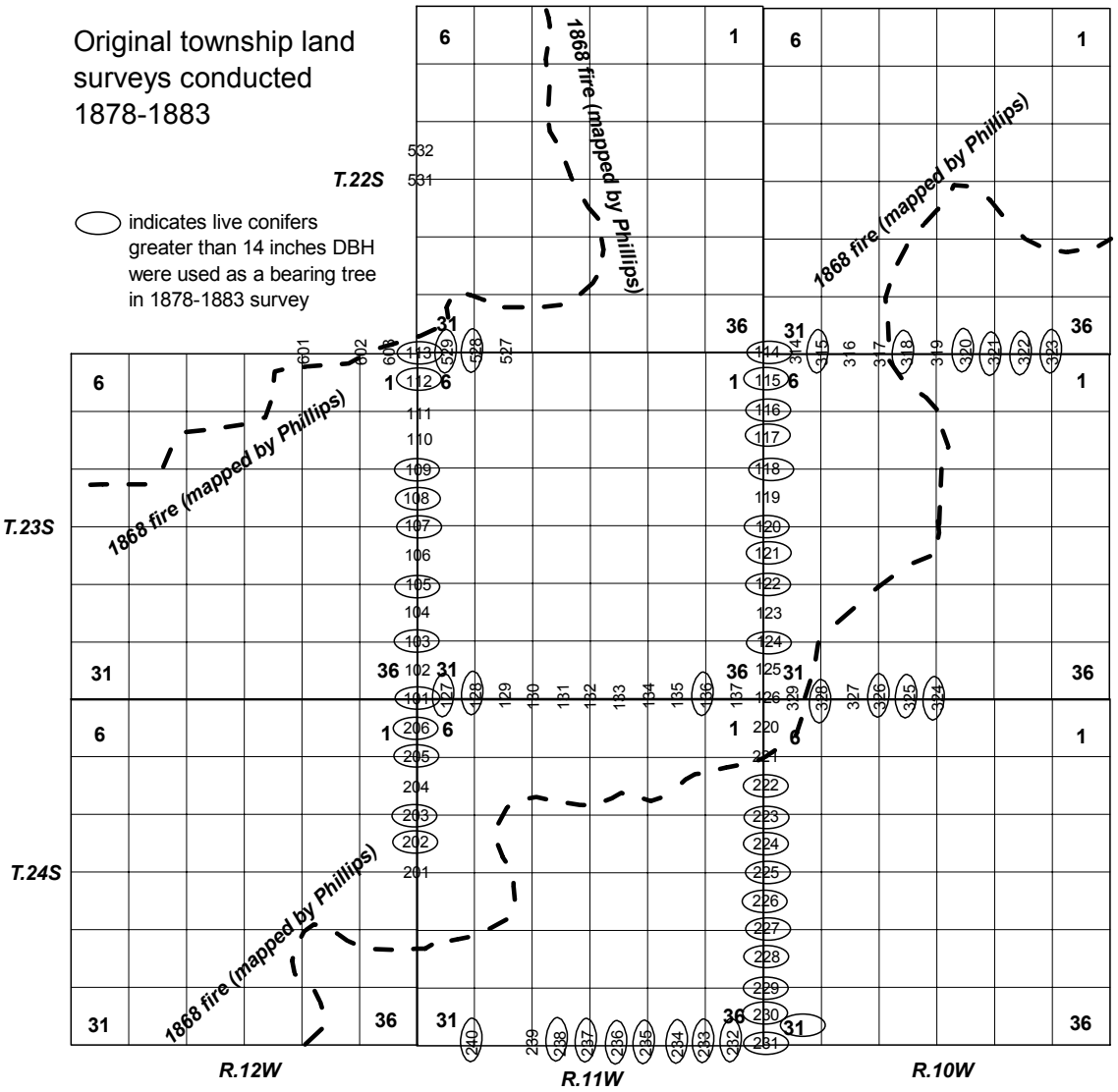
It is commonly believed that much of the vegetation within the boundaries of the Forest was initiated following a single, stand-replacement fire in 1868 (Morris 1934). Mature trees were logged from the Marlow Creek drainage about 50-75 years ago, so early fires appear to have missed this drainage.

To examine this assumption, the General Land Office original land survey notes were obtained for both township lines (surveyed from 1878-1883) and section lines (surveyed around 1893) for the Forest. The analysis team used a typed version of the original notes located at the ODF office in Coos Bay. There were some gaps in notes for the township line coverage; most notable was the line between T.22S and T.23S in R.11W (Figure 2-1). For each township corner indicated in the survey note, the analysis team noted the diameter and species of bearing trees used to mark the corner. Also noted was whether or not bearing trees were living or dead. Any comments about fire-killed timber also were included. Corners were segregated into two groups; those with at least one bearing tree consisting of a live conifer greater than 14 inches in diameter at breast height (DBH) were termed "older stand" and the remainder were "younger stand." Corners associated with older stands are designated by an oval in Figure 2-1. Added to Figure 2-1 is the boundary of an 1868 wildfire that was mapped by J. Phillips, Coos District Forester from 1952-1989. The Phillips map does not indicate what information was used to define the fire boundary.

For a comparison with current stand conditions, the analysis team calculated average values for quadratic mean diameter of conifers within current stands ranging from 50-331 years old using the state forest inventory system (OSCUR) database. This was compared to the calculated average value of quadratic mean diameter of conifers in older stands noted in the township line surveys.

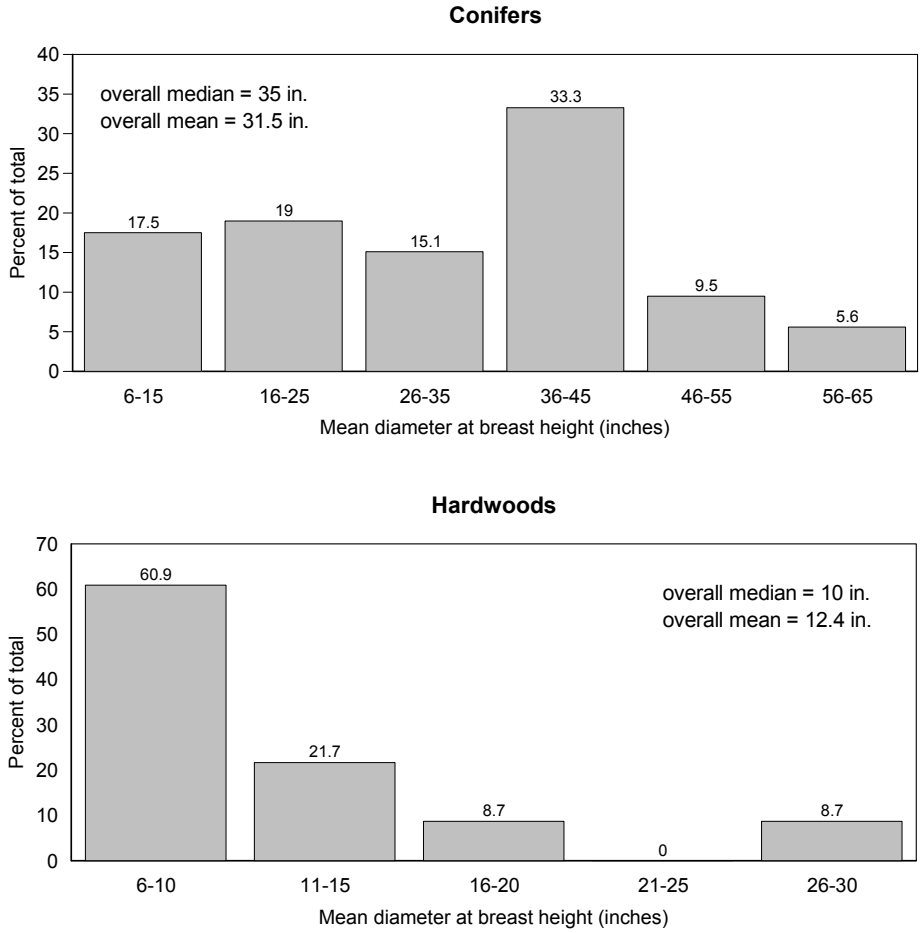
The survey notes indicate that about one-half of the corners in the 1878-1883 township surveys within the boundaries of the Forest and the 1868 fire perimeter had bearing trees that included at least one live conifer greater than 14 inches DBH. This indicates that the 1868 fire had not killed trees at these spots. The remaining corners had young trees or dead conifers as bearing trees corresponding in age to the 1868 fire. This suggests that the 1868 fire was spotty, burning only a portion of the Forest within the boundaries mapped by Phillips. However, by 1893, when corners for the section line surveys were established within the previously surveyed township boundaries, nearly all bearing trees were young trees or fire-killed conifers, indicating either the possibility of a second fire that occurred sometime from 1881-1893, widespread insect infestation and mortality, or widespread windthrow. The analysis team could not find any independent information confirming a second large fire. Reburning of fire-scorched areas has occurred in the Oregon Coast Range. Most notable is the Tillamook State Forest which initially burned in 1933, followed by reburns every 6 years in 1939, 1945, and 1951.

Figure 2-1. Location of township corners and identification numbers created from the General Land Office township survey notes for the Forest and the 1868 fire boundaries as mapped by Phillips.



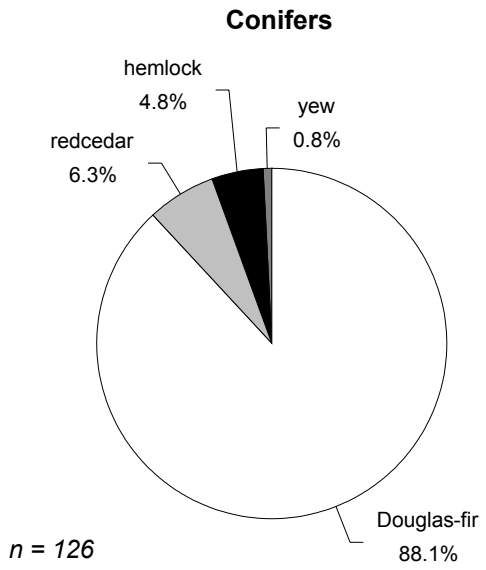
An evaluation of bearing trees associated with the older stand that survived the 1868 fire indicates a forest of mostly conifers dominated by trees in the 36- to 45-inch diameter range (Figure 2-2). Median conifer diameter was 35 inches. No bearing trees were greater than 60 inches DBH. The median diameter for hardwood bearing trees was 10 inches and most trees were in the 6- to 10-inch diameter class. Over 88% of the conifer bearing trees were Douglas-fir (Figure 2-3). Western redcedar (6%), western hemlock (5%), and Pacific yew (1%) made up the remainder. Among hardwoods, most bearing trees were red alder, bigleaf maple, or Oregon myrtle, with some vine maple, “bluewood” (possibly the name used for tanoak), and “greasewood” (possibly the name used for madrona).

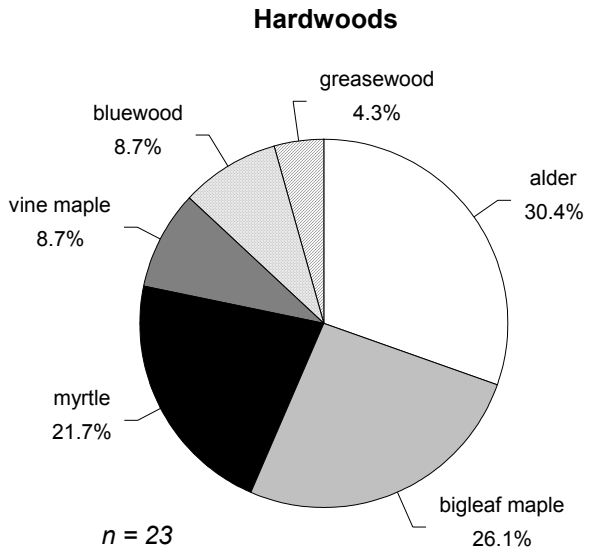
Figure 2-2. Diameter distributions of live-bearing trees that survived the 1868 fire for the original land survey of township lines in the Forest.



Note: Only those bearing trees for corners where at least one tree was a live conifer greater than 14 inches DBH are included.

Figure 2-3. Species distribution of live-bearing trees that survived the 1868 fire noted in the original land survey of township lines in the Forest.



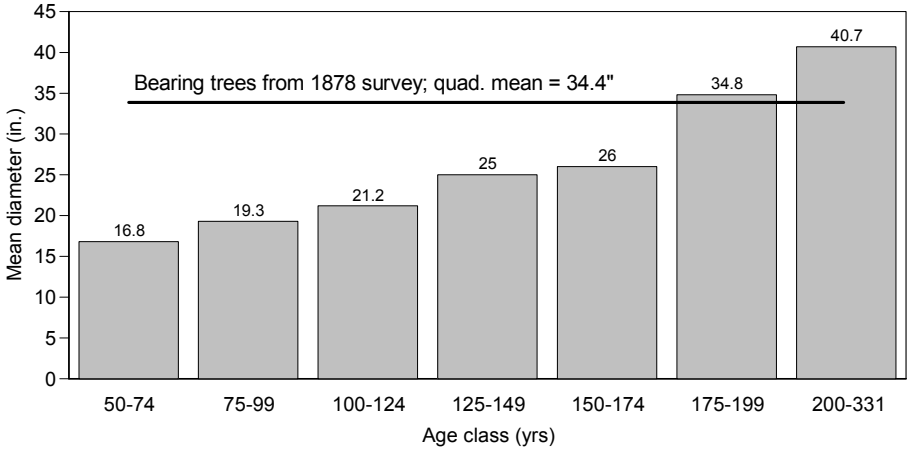


Note: Only those bearing trees for corners where at least one tree was a live conifer greater than 14 inches DBH are included.

The validity of the above analysis is based on the assumption that the original land surveyors selected the *nearest* suitable bearing tree in each quadrant (for section corners) or the nearest suitable tree in each semi-sphere (for quarter corners), as per their instructions.

The quadratic mean diameter of conifers noted in the township line survey was 34.4 inches. This corresponds to the quadratic mean diameter of conifers that are 175-199 years old growing in the Forest today (Figure 2-4). Consequently, the trees consumed by the late nineteenth century fires were about 185 years old. The stands originated about 1693. The species mix of trees noted in the township line survey is about the same as that found in older stands currently growing on the Forest, except that young plantations (<40 years) on the Forest today lack the western redcedar component noted in these earlier stands.

Figure 2-4. Quadratic mean conifer diameter by age class for current stands in Forest and for conifer bearing trees noted in the 1878-1893 land surveys.



The cause of the 1868 fire is unknown. The common use of fire by Native Americans to improve browse for deer and elk, allow easier travel, and promote growth of food plants has been documented for areas in the nearby Umpqua River and Rogue River Basins (LaLande and Pullen 1999). Early settlers also sometimes caused large, long-burning fires that consumed forests indiscriminately (Morris 1934). The U.S. Forest Service began a campaign in 1910 to control settlers burning forests in southwest Oregon (LaLande and Pullen 1999).

Current Hillslope Vegetation

The analysis team used the Forest's coverage of stand characteristics in 2000 to evaluate current vegetation throughout the Forest. Stand ages included in this database are based on aerial photograph interpretation, field measurements of individual trees, and timber harvest unit records (for younger stands).

Trees currently growing on the Forest are predominantly a mixture of fire stands (>100 years old) and younger plantations (<25 years old). Combined, these stands make up about

75% of the Forest. Stands 25-100 years old dominate along the southern and southeastern Forest fringe and reflect a series of land exchanges between the ODF and other landowners (Map 9.4). Trees from 200 and 350 years old account for only 190 acres of the Forest. The 165 acres of private inholdings on the Forest support timber in the 25- to 49-year age class.

The distribution of stand age classes by region and analysis basin in 2000 is provided in Table 2-5. During the last few years, about 425 acres annually of clearcut harvesting has occurred on the Forest (mostly from the 100- to 199-year age class). Map 9.4 and Table 2-5 do not reflect these recent harvests, however. Although not displayed, a number of stands have been thinned over the last several decades.

Table 2-5. Stand age by region and analysis basin, 2000.

Region	Analysis Basin	Acres by Stand Age (percent in parenthesis)						
		0-12 yrs	13-24 yrs	25-49 yrs	50-99 yrs	100-199 yrs	200 + yrs	Combined
Umpqua	1	181	1,229	1,324	185	2,340	92	5,352
	2	416	661	499	627	4,208	0	6,412
	3	537	1,627	1,016	398	3,648	67	7,293
	4	189	1,968	584	265	1,985	0	4,990
	13	153	522	1,184	514	1,728	31	4,132
	Combined	**1,476 (5%)**	**6,007 (21%)**	**4,607 (17%)**	**1,990 (7%)**	**1,3909 (49%)**	**189 (1%)**	**28,178 (100%)**
Tenmile	5	350	2,186	345	909	4,032	0	7,822
	6	529	1,493	450	248	4,606	0	7,326
	7	385	1,374	830	734	2,996	0	6,320
	Combined	**1,263 (6%)**	**5,054 (24%)**	**1,625 (8%)**	**1,892 (9%)**	**1,1634 (54%)**	**0 (0%)**	**21,468 (100%)**
Coos	8	382	1,459	884	921	2,905	0	6,551
	9	461	1,416	2,297	955	3,225	0	8,353
	10	579	961	2,059	2,172	740	0	6,512
	11	993	2,656	1,004	666	5,554	0	10,872
	12	1,475	3,012	1,114	572	5,148	0	11,321
	Combined	**3,890 (9%)**	**9,503 (22%)**	**7,358 (17%)**	**5,286 (12%)**	**17,572 (40%)**	**0 (0%)**	**43,609 (100%)**
	Total	**6,630 (7%)**	**20,564 (22%)**	**13,591 (15%)**	**9,167 (10%)**	**43,115 (46%)**	**189 (0.2%)**	**93,255 (100%)**

Analysis basin #6 (Benson Creek and Roberts Creek), and basin #2 (Charlotte Creek and Luder Creek) have the highest percentage of forest in older timber (>100 years old) at 63% and 66%, respectively. Older timber makes up the lowest percentage of the Forest in basin #10 (Marlow Creek and Glenn Creek) at 11% (Table 2-5). On a broader scale, the Coos region has less area in older timber (40%) than the other two regions (both about 50%).

Riparian Vegetation

Streamside stands regenerate and grow differently than upslope stands. Under natural conditions, conifer regeneration along streams tends to be sparse, probably due to competition from riparian brush and the presence of streamside terraces, which can be too moist for conifers. Also, the mortality of young trees caused by beaver, mountain beaver, and elk tends to be greater close to streams. Furthermore, unstable or shallow soils often occur on steep-sided slopes next to streams and may not support a conifer tree once it reaches a certain size. The mortality of conifer trees next to streams seems to be rarely associated with competition among trees since initial tree density is rarely great enough for self-thinning to occur, and snags are scarce (Andrus and Froehlich 1988).

Timber management also can influence riparian vegetation competition. Swaths adjacent to streams that were cleared for the construction of streamside roads have often regenerated to stands of mainly hardwoods. The cut slopes and road surfaces do not normally support tree roots, resulting in a reduced density of trees along streams. Nevertheless, after several decades, trees growing each side of the road often do create a closed tree canopy over a streamside road. The intensity of effort to establish conifers in clearcut areas next to streams has varied over the decades, resulting in variable plantation success in these areas.

In order to characterize current streamside forests on the Forest, the analysis team conducted an inventory of streamside stands along all fish-bearing streams using aerial photographs. Color orthophotos from 1996 incorporated into a Geographic Information System (GIS) layer provided the base map for delineating stands of different age class and conifer dominance. Initial stand demarcations were digitized on the computer screen. High quality color aerial photographs (1:12000 scale) from 2002 were then used to refine stand boundaries and identify general classes of conifer and hardwood mixes and stand age. A GIS layer of general stand age based on hillslope trees was used to help estimate the age class of a streamside stand. The detailed aerial photographs were used to identify the age of stands (using color and texture) where the streamside stand age was visually different than the upslope stand age. Areas without trees also were delineated by type when they appeared through the tree cover. Stand classes included:

Stand age class	< 12 years
	13-24 years
	25-49 years
	50-99 years
	> 100 years
Crown cover class	Hardwood (less than 30% conifer)
	Conifer/hardwood (between 30%-70% conifer)
	Conifer (more than 70% conifer)
Areas without trees	Wide mainline roads
	Wide rivers
	Brush/grass

No attempt was made to distinguish hardwood-dominated stands that were 50-99 years old from those that were greater than 99 years old. Hardwood stands in which the majority of the basal area is composed of trees 100 years old and greater may not actually exist on the Forest. A study of streamside stands in the coastal area of southwest Washington suggests that hardwood stands tend to become multi-aged after about 80 years or revert to brush (Rot 1995, Hibbs and Giordano 1996). As a result, the combined age class for the oldest hardwood trees was labeled as 50-99 years.

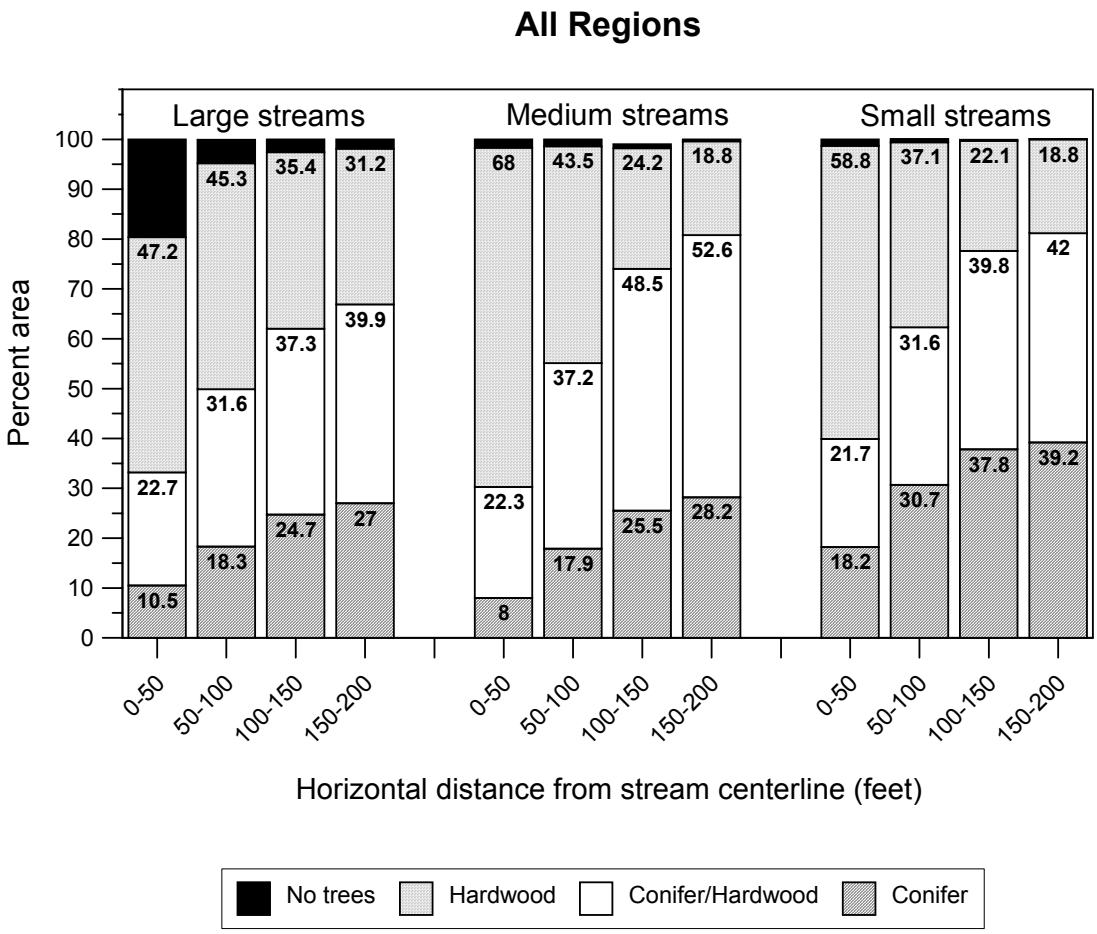
Streamside forest delineations occurred from the centerline of the stream (as shown in the GIS stream layer developed from the 1996 orthophotos) out to a horizontal lateral distance of 200 feet. General results from this analysis are reported in this section. A more detailed discussion is provided in Chapter 7, *Riparian Vegetation and Large Wood*.

The resultant map of streamside vegetation (Map 7.1 shows an example for Scholfield Creek) displays a patchy array of conifer/hardwood dominance classes reflecting the history of harvesting, road building, and debris torrents in the Forest. In addition, young hardwood trees along some of the larger streams, especially in the Tenmile region, are a result of tree invasion into streamside areas that were previously pasture.

Hardwoods are the most dominant stand type found within 100 feet of the stream for all stream size classes (Figure 2-5). Hardwood dominance decreased with increasing distance from the stream but, along large streams, hardwoods still occupy 31% of the land within 150-200 feet from the stream. Conifer/hardwood stands occupied the majority of the area at distances of 100-200 feet from the stream. Conifer-dominated stands made up a minority of the streamside area for all stream size class and distance intervals. Areas with no trees include open water associated with the largest of streams, wide roads, and areas of brush or grass.

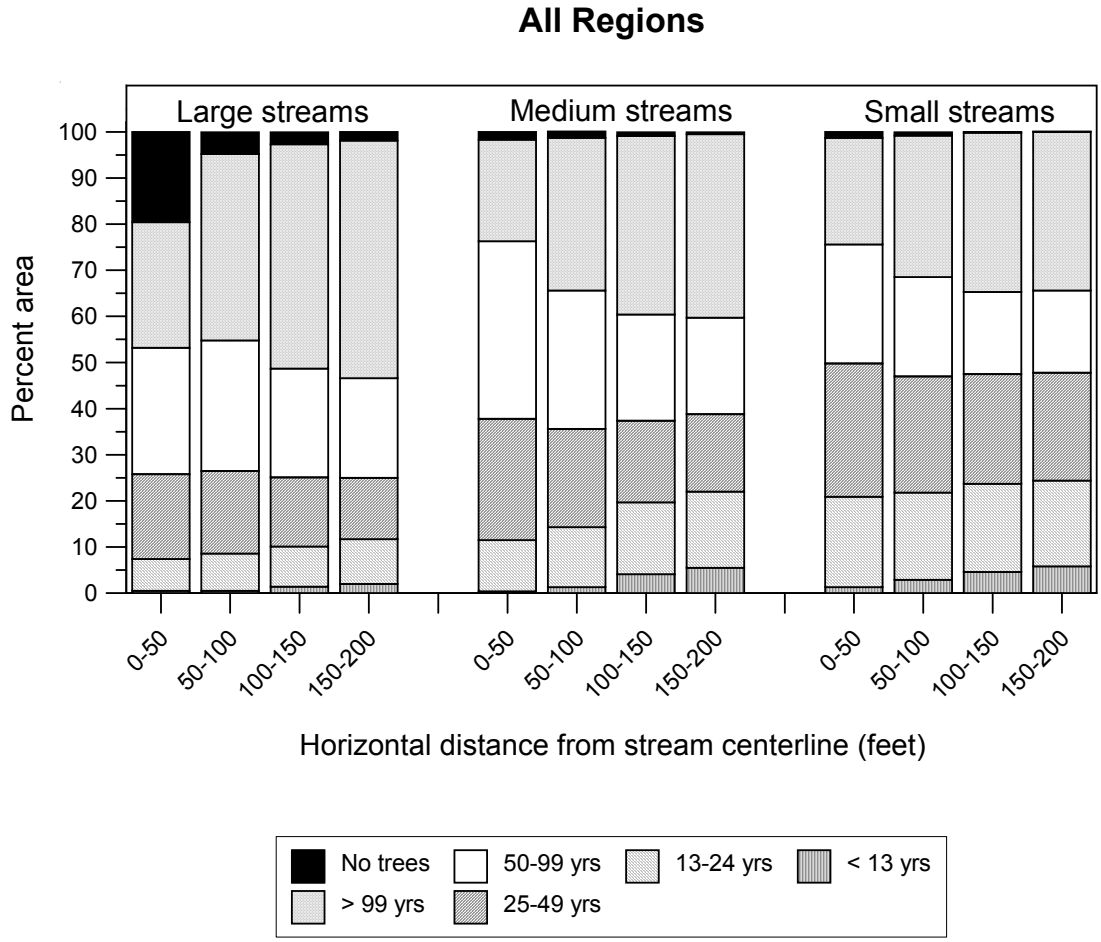
Some of the hardwood dominance along streams is natural; even the old fire stands with no streamside roads or debris torrents usually have a band of hardwoods growing closest to the stream. Among managed stands, hardwood domination of streamside stands seems to be the greatest where a road paralleled the stream, where buffers were retained 7-12 years ago, or where harvest occurred 35-60 years ago, a time when efforts to regenerate conifers near streams were weak. Conifers next to streams in managed stands were most abundant next to recent clearcut harvest units (up to 6 years ago) and harvest units with trees in the 15- to 35-year age class. Trees within units from this latter age class were typically harvested to the edge of streams followed by aggressive site preparation and conifer planting.

Figure 2-5. Percent riparian stand type by stream size for all Forest regions (fish-bearing streams only).



The age-class distribution of riparian stands is equally patchy throughout the Forest, and again corresponds to past management activities. Stands 100 years old or older are the dominant age class, except within 50 feet of medium and small streams (Figure 2-6). The area with trees less than 13 years old is very small, even up to 200 feet from the stream, and reflects the recent practice of retaining wide buffers along fish-bearing streams when timber is harvested and a general pattern of conifer plantation failure in clearcut areas nearest streams. While conifer trees were likely planted to the edge of the retained buffers within harvest units, competition from brush can quickly overwhelm the trees.

Figure 2-6. Percent riparian stand age by stream size for all Forest regions (fish-bearing streams only).



Fish and Wildlife Resources

Four species of salmonids are found on the Forest including coho salmon, chinook salmon, steelhead, and cutthroat trout. Coho salmon are listed as threatened under the federal ESA. All four species are anadromous, although cutthroat trout also are resident. Species of fish found on the Forest are listed in Table 2-6.

Coho salmon are the most dominant anadromous fish on the Forest and are found in most streams with a gradient less than 6% and with sufficient flow to provide cover and living space. Steelhead trout rear throughout the Forest. Some steelhead are reared at a hatchery on the lower reach of the West Fork Millicoma River (on the Forest). Surveys of nearby tributaries by the ODFW (Charleston office) indicate that straying of hatchery fish is limited to only a few streams nearest the hatchery. Steelhead can occupy steeper channels than coho salmon and often segregate into the steeper channels to avoid competition from coho salmon in lower gradient streams.

Table 2-6. Fish species occurring on the Forest.

Common Name	Scientific Name
Coho salmon	*Oncorhynchus kisutch*
Fall chinook salmon	*Oncorhynchus tshawytscha*
Winter steelhead trout	*Oncorhynchus mykiss*
Sea-run cutthroat trout	*Oncorhynchus clarki clarki*
Resident cutthroat trout	*Oncorhynchus clarki clarki*
Dace species (Millicoma and speckled)	*Rinichthys cataractae, R. osculus*
Redside shiner	*Richardsonius balteatus*
Lampreys (Pacific and western brook)	*Lampetra tridentate, L. richardsoni*
Largescale sucker	*Catostomus macrocheilus*
Threespine stickleback	*Gasterosteus aculeatus*
Sculpins (Coast Range and prickly)	*Cottus aleuticus, C. asper*

Chinook salmon spawning and rearing are limited to the lower reaches of the West Fork Millicoma River and Mill Creek. About 100,000 juvenile chinook are reared at the West Fork Millicoma River hatchery.

Although the anadromous form of cutthroat (sea-run) occurs in Forest streams, not much information is known about run sizes or which streams produce more sea-run cutthroat. Chum salmon, now rare in streams of the Coos Bay area, occur in the lower reach of Marlow Creek on private land but not on the Forest. Since chum salmon are naturally limited to low-gradient streams near bays or estuaries, the streams on the Forest were probably never significant producers of chum salmon.

The Forest hosts three species of frogs, seven species of salamanders, and one species of newt (Table 2-7). Those that are aquatic and most influenced by timber harvest include the tailed frog, southern seep salamander, and Dunn's salamander. Tailed frog tadpoles require very cold water for survival, especially during their first year. The southern seep salamander and Dunn's salamander are found mainly along small streams in the splash zone of falls and cascades. The Pacific giant salamander (reaching a length of up to 12 inches) is common in the Forest. This species and cutthroat trout prey upon each other's young in headwater streams. Above the most upstream extent of cutthroat trout use, there is often an increase in the numbers of juvenile Pacific giant salamander.

There are 161 miles of known fish-bearing waters in the Forest (Table 2-8). More miles of fish-bearing streams probably exist but field surveys are incomplete. Field studies done elsewhere in the Coast Range (ODF, Forest Practices, information prepared for the early 1990s review of stream protection rules) indicate that fish typically use nearly all large- and medium-sized streams. However, the database on fish use for the Forest classifies 12.5 miles of medium-sized stream as not fish bearing. About 2.8 miles of these medium-sized streams were examined and did not have fish. For the remaining 9.7 miles, no field examination has

been done to confirm whether fish use occurs. Similarly, there are probably a number of miles of small size streams with fish use that have not been identified through field surveys.

Table 2-7. Amphibian species occurring on the Forest.

Species	General Habitat
Tailed frogs, *Ascaphus truei*	Aquatic/Riparian
Red-legged frog, *Rana aurora*	Aquatic/Riparian
Southern seep salamanders (or southern torrent salamander), *Rhyacotriton variegatus*	Aquatic/Riparian
Pacific giant salamander, *Dicamptodon tenebrosus*	Aquatic/Riparian
Dunn's salamander, *Plethodon dunni*	Aquatic/Riparian
Rough-skinned newt, *Taricha granulosa*	Aquatic/Riparian and uplands
Northwestern salamander, *Ambystoma gracile*	Aquatic/Riparian
Clouded salamander, *Aneides ferreus*	Upland
Ensatina salamander, *Ensatina eschscholtzii*	Upland
Foothill yellow-legged frog, *Rana boylii*	Upland
Western red-backed salamander, *Plethodon vehiculum*	Upland

Table 2-8. Mileage and density of known fish-bearing streams.

Region	Area (sq. mi.)	Streams Known to be Fish Bearing (mi.)	Density of Fish-bearing Streams (mi./sq. mi.)
Coos	67.9	95	1.40
Umpqua	44.1	34	0.77
Tenmile	33.6	32	0.95
Total	**145.6**	**161**	**1.11**

For this project, the analysis team did not speculate on which additional streams support fish; the analysis team used fish-bearing miles as identified in the ODF database. It is likely that many streams on the Forest, not yet identified as fish-bearing streams, do support mainly cutthroat trout, and that most stream segments occupied by salmon and steelhead have already been identified.

The density of fish-bearing streams averages 1.4 miles per square mile for the Coos region and only 0.8 miles per square mile for the Umpqua region (Table 2-8). Since the passage of anadromous fish in Mill Creek is blocked by falls at Loon Lake, the lack of salmon and steelhead in upstream waters has probably made fish absence/presence surveys less of a priority in the Umpqua region. Also, since little timber harvest has occurred in tributaries upstream of Loon Lake in the past two decades, there has been reduced impetus to identify fish-bearing streams.

Stream channel gradient is a key factor in determining the extent of fish distribution and use by species and life stage (migration, spawning, and rearing). The range of cutthroat trout generally extends to the higher gradient streams, commonly using streams up to 12% gradient; this species can even sustain isolated populations upstream of waterfalls, as long as the stream has year-round water. They will usually spawn in channels up to an 8% to 10% gradient. Steelhead trout will spawn in channels up to a 6% gradient. Coho salmon prefer spawning in channels of less than 4% gradient.

Salmonid use of streams can be seasonal. Cutthroat trout, in particular, are known to occupy the smallest headwater streams when flows are high in early spring and then migrate downstream as flow diminishes over the summer. It is not uncommon for cutthroat trout and steelhead to spawn in streams that are dry in the summer. Lamprey also have been observed in the Forest using most of the same streams as those used by anadromous salmonids.

SOCIAL CONTEXT

Population and Demographics

Although the population of Oregon as a whole is growing faster than the national population, this is not the case for many coastal areas. Out-migration was high during the recession in the early 1980s, due in part to the decline in the wood products industry. The annual rate of growth for Coos County has been positive since 1987, though less so than the annual rate of growth for Oregon as a whole.

In 2000, the population of the southern Oregon Coast (including Reedsport, Coos Bay/North Bend, Bandon and Gold Beach) was 75,512. By 2006, the population of this area is estimated to decrease slightly to 73,365. The 2000 population was 92.3% Caucasian, 0.3% African American, 2.3% American Indian, 1.0% Asian, and 3.4% Hispanic. For 2006, projections show that Hispanics will experience a 0.5% increase and Asians a 0.1% increase, with a decrease in the Caucasian population (-0.4%).

Coos County has a nearly equal amount of men (48.65%) and women (51.35%), and the median age (43.1 years) is slightly higher than the national average. The average household size is 2.3 people with an average family size of 2.8 people. Coos County is similar to the southern Oregon Coast as a whole in terms of racial demographics.

In 2002, Reedsport had a population of 4,935, a median age of 39.7 years, a median household income of $30,500 and an average household size of 2.3 people. In the same year, Coos Bay had a population of 15,136; however, its median age is a bit younger at 37.2 years, and it has a lower median household income of $28,200 with an equal average household size of 2.3 people. North Bend's population was 9,729 and it has the youngest median age (36.6), the highest median household income ($33,100) and the largest average household size (2.4 people). North Bend has the highest cost of living index at 92, compared to 90 for Reedsport and 87 for Coos Bay. North Bend also has the highest percentage of white-collar workers at 51.8%, with Coos Bay at 48.0% and Reedsport at 40.6%.

Economy

In March 2002, total employment for Coos County was 23,893 with an unemployment rate of 10.1%. The unemployment rate was 1.0% higher in March 2001. Natural resource-based industries such as commercial fishing, agriculture, timber, and tourism continue to be important in Coos County, though timber has declined significantly in recent years (Radtke 1999). Fishing and oyster culture make up about 2.3% of the total personal income of coastal residents in Coos County. Agriculture makes up about 2.5% of personal income, with the largest agricultural sector being cranberries, which generate 33% of total county agricultural personal income. Personal income from timber has declined but still contributes 7.49% of total personal income. Tourism comprises 4% of personal income for county residents and is experiencing steady growth, though this industry is characterized by low wages and seasonal demand fluctuations. There has been a dramatic increase in transfer payments (Social Security, pensions, welfare) as a percent of total county personal income. Currently, transfer payments comprise 28% of personal income. This is partially a function of the increase in retirees collecting Social Security payments (Radtke 1999).

Recreation

According to a report by Anderson and others (2001), "Recreation use of the Elliott State Forest has modest economic effects on Coos County, but these effects measure only part of the total economic contribution of recreational activity." They explain that protecting natural resources contributes to quality of life, increased expenditures by visitors outside Coos County, and the economic value received by the visitors themselves. Availability and access to recreation along the Oregon Coast is important to both local and state economies and includes non-quantitative measures, such as quality of life and environmental conservation and protection (it is interesting to note that the authors of the Anderson study identify non-quantifiable measures as important to stimulating the economy yet ignore the quantifiable multiplier measures that base industries provide).

There is currently little information on the recreational use of the Forest, although surveys performed by the ODF in summer and fall show that some is taking place (Anderson et al. 2001). Recreational use is concentrated within several small areas on the Forest. Hunting is a primary use, occurring mostly during deer and elk hunting season in the fall. Other recreational uses include fishing, off highway vehicle riding, horseback riding, hiking, kayaking, and picnicking. White-water kayaking is most common in the lower West Fork Millicoma River. Most visitors to the Forest come from nearby communities. There are numerous areas for dispersed camping along roads and streams, with the most popular areas being Elk Creek and the West Fork Millicoma River.

Trail use is of one of the fastest growing recreation opportunities in Oregon. Locally, the Coos Regional Trails Partnership has a vision, "…to work in partnership to facilitate the development of outdoor recreation and related tourism in the Coos region and promote it as the premier destination on Oregon's Coast" (Shapiro and Johnson 2000). The Trails Partnership provides opportunities to network and share resources among agencies, trail users, public opinion leaders, and businesses. A high quality hiking opportunity potentially exists in the Forest along Big Creek, which is a tributary to North Tenmile Lake. Much of

the lower slopes of Big Creek are older timber and a decommissioned road along the stream provides a level surface for establishing a trail. As its name suggests, Big Creek is one of the larger streams in the Forest, and its size and older timber makes it one of the most scenic. Charlotte Creek, a tributary to the Umpqua River, also offers a high quality hiking opportunity, but noise from Highway 38 may detract from its otherwise scenic qualities, which include older trees and rocky outcrops. The establishment of trailheads adjacent to the Forest is complicated because public roads rarely extend to the edge of the Forest.

Trends in Recreational Activities

A survey of Coos Bay residents was conducted in 2000 by the Pacific Northwest Coastal Ecosystems Regional Study (PNCERS) to help users and managers of coastal resources better understand the effects of human activities and attitudes. The survey had three objectives: (1) assess how residents value specific aspects of their communities and their surrounding natural landscapes; (2) document outdoor recreational activity levels of residents tied to the natural environments of the bays; and (3) identify threats perceived by local residents and their preferred ecosystem management approaches.

Forty percent of survey respondents (518 completed the survey) felt that views and scenery were extremely important community characteristics, which led them to reside in a community near Coos Bay. Almost 30% of survey respondents to this same question noted the importance of recreational opportunities (Table 2-9). When asked what types of outdoor recreational activities they engaged in during the last year, hiking and walking received the highest numbers of responses (Figure 2-7). This was followed by beach combing, fishing, crabbing and boating. About 25% of respondents participated in salmon and steelhead fishing and 16% participated in bird watching.

A majority of survey respondents felt that natural resource management decisions should be equally balanced between environmental and economic factors. Almost 40% felt that existing partnerships between government and citizens were the most influential in making natural resource management decisions in Coos County.

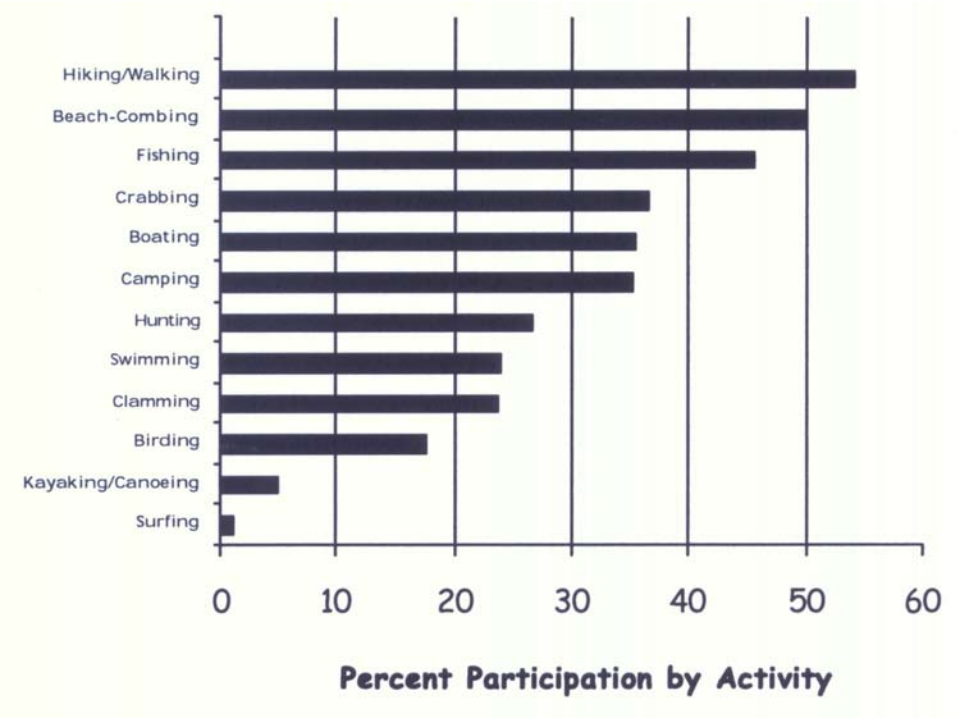
Local environmental quality has emerged as a significant factor in determining where people choose to reside, as well as where they chose to locate businesses. According to Radtke (1999), “During the second half of the twentieth century, changes in the American economy have made residential location choices increasingly important as determinants of the location of economic activity.” Today, both people and businesses are more footloose and changes in the American economy reduced costs relating to distance from economic centers due to improvements in transportation and communication. Also, economic activity is less tied to particular locations because of changes in what our economy is producing. Furthermore, non-employment income, including retirement income, is a greater percentage of personal income.

Table 2-9. Rating of community characteristics related to why people reside in a community near Coos Bay.

Community Characteristic	Percent of Row Totals						Sample Size
	Not Important	Slightly Important	Somewhat Important	Considerably Important	Extremely Important	Not Sure	
Views and scenery	7.6	3.7	15.9	31.4	40.1	1.3	459
Job opportunities	23.0	4.7	19.5	13.9	36.5	2.5	447
Low crime rate	7.8	5.1	22.6	28.0	33.8	2.7	447
Fewer people	11.5	5.3	21.4	27.5	32.8	1.5	454
Near family/friends	28.5	6.1	15.8	16.9	32.5	0.2	456
Near ocean	13.2	7.6	21.3	26.0	31.0	0.9	461
Recreation	9.6	4.4	23.7	31.6	29.4	1.3	456
Good schools	18.3	6.0	17.9	26.6	28.6	2.5	447
Little traffic congestion	7.9	6.4	25.3	31.4	28.4	0.7	455
Health care facilities	10.1	7.0	27.9	25.4	28.3	1.3	445
Clean water in bay	10.6	6.3	25.9	26.1	26.1	5.0	444
Nice people	9.2	6.6	27.5	30.8	24.4	1.5	455
Climate/weather	11.3	6.8	27.7	28.3	24.2	1.7	459
Good public services	12.2	8.4	25.5	28.4	23.9	1.6	451
Low cost of living	18.7	10.8	32.2	20.3	14.6	3.4	444

Source: PNCERS 2000

Figure 2-7. Level of participation in recreational activities.



In deciding where they live, people guide local economies by their choices about what quality of life elements are important. Radtke (1999) states, "A comprehensive study of all 254 non-metropolitan counties in the Mountain West for three time periods, the 1970s, 1980s, and 1990-1995 found that not only was population growth driving employment growth, but that the value of amenities in driving that population growth had been increasing over time." The attractiveness of an area holds a lot of weight in these decisions and can help decide whether an area will be a place of prosperity and economic growth or a depressed economy. Radtke (1999) states, "Economic research has repeatedly demonstrated that areas of high-quality natural environments that are officially protected have been able to attract higher levels of economic activity."

Management choices for the Forest play an important role in providing amenities and environmental benefits. Forest management can have a large influence on job and income creation. According to Radtke (1999), "Measures that improve the attractiveness of an area to current and potential residents will tend to increase the level of local economic activity. Changes that cause deterioration in the local quality of life will tend to discourage the retention and attraction of economic importance." Infrastructure is essential to prevent the need for remediation and to maintain its attractiveness and ease of access for area residents. Even simple measures, such as providing road signs to keep visitors from getting lost, adds amenity value to the Forest.

Land Uses

Agricultural uses on the Forest are negligible because the steep terrain precludes growing agricultural crops. The only possible agricultural use would be Christmas tree farming, which according to the ODF does not seem economically feasible. The only domestic livestock grazing in the Forest is located on 1 acre of grassy area near Palouse Creek being leased to an adjoining rancher. There is no current production of oil, gas or minerals in the Forest. Although oil and gas drilling did occur historically, the Forest is not considered a reliable area for prospectors. As discussed previously, recreational use is concentrated within several small areas. Another potential land use is for special forest products, although no inventory has been done of all the possible products and their locations in the Forest.

The Forest is a consolidated public land holding surrounded mostly by privately owned lands (Map 2.9). The Millicoma Tree Farm, owned by Weyerhaeuser, is located near the east and south borders of the Forest. The Bureau of Land Management (BLM) administers lands with a checkerboard pattern in this region, which includes Loon Lake Recreation Area near the northeast border of the Forest. This recreation area is one of the most popular destination sites near Reedsport, averaging from 70,000 to 80,000 visitors annually. Interpretive programs are conducted each summer at the campground and there is a short hiking trail to a waterfall. Other activities include camping, picnicking, boating, swimming, and fishing. The Dean Creek Elk Viewing Area is a popular wildlife attraction located just outside of Reedsport along Highway 38. Bass fishing competitions are very popular in the Tenmile Lakes.

MANAGEMENT OF THE ELLIOTT STATE FOREST

Elliott State Forest

Management practices on the Forest have changed during the last decade. The most recent change has been the interim adoption by the Forest of stream protection criteria that are currently being implemented by State Forest Districts in northwest Oregon. All timber sales included in the 2003 Coos District *Annual Operations Plan* have been designed to meet these stream protection criteria. The management of streamside areas during the last 6 years does not lend itself to a simple checklist of criteria. Within the framework of the Forest Practices Act and the *Elliott State Forest Management Plan*, the four basin foresters tailor stream protection measures to match the unique conditions within individual timber harvest units. Nevertheless, through conversations with the basin foresters, regeneration foresters, and engineering staff, the following general measures apply (this is not an exhaustive list).

- Surveys for marbled murrelets within proposed harvest units occur each of 2 years prior to finalizing the timber sale.
- All streams within a harvest unit that could be fish-bearing (using criteria outlined in the Forest Practices Rules) are treated as fish-bearing, even if a field survey has not been conducted to confirm the presence of fish.
- All trees growing within 100 feet of a fish-bearing stream are retained. Buffers are expanded to include areas of slope instability, wetlands, and other special features. In-unit trees (green trees and a certain number of snags per acre of clearcut harvest) are often retained as extensions of streamside buffers.
- All trees growing within 50 feet of perennial streams (not considered fish bearing) are retained. These buffers also may be extended laterally to include areas of slope instability, wetlands, and other special features. These buffers are often expanded to satisfy in-unit tree requirements for clearcut harvest units.
- The Southwest Region geotechnical specialist reviews proposed harvest units to determine if unusual slope instability problems exist. If so, higher risk areas may be excluded from the harvest unit or trees may be retained on those portions of the harvest unit where slope instability is high.
- Opportunities to improve fish habitat and slope stability within nearby streams are often incorporated into timber sales. This can include adding large trees from the harvest unit to fish-bearing streams deficient in large wood or decommissioning old roads.

The annual acreage of clearcut harvest has been about 425 acres annually for the last few years. Starting in 2004 and over the next decade, this will increase to 510 acres annually. Thinning of stands, mostly in the 30- to 70-year-old age class also occurs. An average of 535 acres per year was thinned from late 1997 to early 2001.

Under the 1995 HCP for northern spotted owls, the Forest is segregated into short (80-135 years) and long (160-240 years) rotation basins. Most of the Tenmile region (84%) and the Umpqua region (75%) are designated as long rotation. Only the Elk Creek watershed is designated as long rotation in the Coos region. Past timber harvest now curtails additional harvest in the long rotation basins, putting more pressure for near-term future harvest in the

Coos region. Overall, 51,158 acres of the Forest (55%) is designated long rotation, while 45% is designated short rotation.

Surrounding Land Parcels

The two scattered tracts closest to the main block of the Forest (Table 2-10) are managed in a manner similar to the bulk of forestlands. Timber tends to be younger on these tracts and near-term timber harvest will probably occur only on the Ash Valley tract. Only the Sock Creek tract includes a fish-bearing stream.

Some of the remaining scattered tracts considered part of the Forest (Table 2-10) are no longer actively managed for timber production. The timber is older (50-95 years) on these tracts and any future timber harvest may be complicated by the presence of northern spotted owls (such as Tyee 40). Fish-bearing streams only occur on the Folley tract and the north parcel of the South Slough tract. The Lighthouse tract is in a unique setting on a hilltop near the Umpqua River lighthouse. The 47- to 65-year-old Sitka spruce stands on this tract are a noticeable landmark above Winchester Bay.

Federally Listed Species and Clean Water Act Issues

Fish and wildlife species on the Forest that are listed as threatened under the federal ESA include the northern spotted owl, marbled murrelet, and coho salmon. Spotted owls are currently managed according to the 1995 HCP; the incidental take permit under this HCP for murrelets expired in 2001 and a strategy of *take avoidance* is currently being used. The management of coho salmon habitat is currently based on the aquatic strategies incorporated into the Northwest Oregon State Forests Management Plan. These measures are similar to those used during the last 6 years on the Forest, and have a focus on retaining wide buffers along fish-bearing streams and narrower buffers other perennial and intermittent streams.

Application of the Clean Water Act by the Oregon Department of Environmental Quality (DEQ) is currently focused on the TMDL process, whereby impaired streams are addressed in a watershed context and landowners respond to any human-caused degradation of a stream in proportion to their negative influence on the stream. Parameters of concern that could apply to the Forest in any future TMDL process include sediment and nutrients (streams flowing into Tenmile Lake) and water temperature (West Fork Millicoma River Basin).

Table 2-10. Scattered tracts of land associated with the Forest.

Tract Name	Acres	Vegetation	Roads	Legal Description
Tracts included in the evaluation of the main block of the Elliott State Forest:				
Sock Creek	158	30-yr-old DF	Passable	T.23S, R.9W, sec 6
Ash Valley	136	58- to 70-yr-old DF with some alder	Passable	T.23S, R.10W, sec 24
Total	**294**			
Tracts not included in the evaluation of the main block of the Elliott State Forest:				
School Land Bay	91	mostly 22- to 25-yr-old DF with some 120-yr-old DF	Passable	T.23S, R.12W, sec 16
Folley Creek	156	mostly 50- to 60-yr-old DF with some 90-yr-old DF	Passable	T.21.S, R.7W, sec 36
Purdy Creek	36	mostly 80-yr-old hardwood and DF with some brush	No roads	T.22S, R.9W, sec 16
Lighthouse	178	47- to 65-yr-old Sitka spruce; near Umpqua River lighthouse	Impassable	T.22S, R.12W, sec 7 and T.22S, R.13W, sec 12, 13
Tyee 40	42	95-yr-old DF and white fir	Passable road?	T.25S, R.7W, sec 16
South Slough (3 parcels)	392	31- to 60-yr-old mixed conifer (DF, spruce, hemlock, cedar)	Impassable	T.26S, R.13W, sec 19, 20, 30 T.26S, R.14W, sec 36
Total	**895**			

DF = Douglas-fir

Tract Name	Fish	Wildlife
Tracts included in the evaluation of the main block of the Elliott State Forest		
Sock Creek	Includes 0.25 miles of Sock Creek; small fish-bearing stream. A road crosses the stream.	Single spotted owl within ½ mile of tract boundary.
Ash Valley	No fish-bearing streams.	
Tracts not included in the evaluation of the main block of the Elliott State Forest		
School Land Bay	No fish-bearing streams	
Folley Creek	Includes 0.3 miles of Big Tom Folley Creek; large fish-bearing stream. A road parallels the stream.	
Purdy Creek	No fish-bearing streams.	
Lighthouse	No fish-bearing streams.	
Tyee 40	No fish-bearing streams. Very steep slopes above the Umpqua River.	Pair of spotted owls within ½ mile of tract boundary.
South Slough (3 parcels)	North parcel includes 0.3 miles of Elliott Creek; small fish-bearing stream. Middle and south parcel have no fish-bearing streams.	