II. HISTORY AND INVENTORY OF CONDITIONS

Physical Characterization

LSRs R0267 and R0268 are in the Oregon and Washington Coast Ranges section of the Cascade Mixed Forest-Coniferous Forest-Alpine Meadow Province (McNab and Bailey 1994). This physiographic province is characterized by highly dissected low mountains that were shaped by debris slide processes on slopes of 20-120%. Incised valleys are distributed throughout the section. Dunes and bogs occur along the coast, with numerous headlands formed of more resistant rock. Elevation ranges from sea level to 4100 feet. Most mountain tops are below 2000 feet, though a few dominant peaks are 3000-4000 feet (i.e., Marys Peak, Grass Mountain, Prairie Peak, Roman Nose).

Soils generally developed from Cenozoic sandstones and marine volcanics. Typical soils are moderately deep and have dark, humus-rich surface hor zons. Predominant soil orders are andisols and inceptisols that are not dry for more than a quarter of a year, with mean annual soil temperatures of 0-15 $^{\circ}$C. In the coastal lowlands and hills, seasonal soil temperature differences are moderated by fog and sea breezes.

The LSRA area has a maritime climate resulting from its proximity to the Pacific Ocean and influence of the Japanese current. Cool, wet winters and relatively warm, dry summers are characteristic of the ar a. Low-pressure systems feed a stream of cool, moist air from the North Pacific Ocean onto the Oregon Coast from November through March. The moist air rises over the Coast Range and drops large amounts of precipitation. Occasionally, Arctic air meets an onshore flow, producing snowfall. In general, snow persists for only a few days except for the tops of the highest peaks.

Orographic effects are pronounced in the Oregon Coast Range. Major ridges receive substantially more precipitation than do nearby lowlands. Coastal areas average 75 to 95 inches of precipitation annually, and interior areas west of the crest receive an average of about 120 inches annually. East of the Coast Range crest, in the Willamette Valley margin, annual precipitation averages about 50 inches.

High potential evapotranspiration and low precipitation during warm, sunny summers may produce moisture deficits where soil and bedrock have low waterholding capacities. Moisture deficits are more pronounced in the southern LSR , RO267, than in RO268 because soils are generally thinner, higher in rock fragments, and bedrock tends to be only slightly permeable to impermeable. Throughout the LSRA area, stands on ridges and exposed south-facing slopes with thin, rocky soils can develop substantial plant moisture stress in late summer.

Due to the geographic variability of soil and climate attributes in the Oregon Coast Province, we have developed soil/climate zones to describe the physical environment (USDA 1995). Each zone represents a unique combination of landforms, soils, geology and

climate. These groupings of physical factors, in combination with natural disturbance processes such as fire and wind, influence the vegetation characteristics of each area. **Table 1** summarizes the differences between each soil/climate zone found in the LSRA area with regard to climate, soil physical characteristics, soil temperature, and soil moisture regimes. **Map 4** displays the delineation of these zones with respect to the LSRs on the landscape.

Aquatic Characterization

Aquatic characterization efforts in this LSRA highlight priority watersheds and sub-watersheds for restoration. A detailed assessment of the aquatic resource was not an objective of this LSRA. A large-scale assessment of aquatic resources was undertaken for most of this area in the Assessment Report - Federal Lands in and Adjacent to Oregon Coast Province (USDA 1995). Readers who are interested in aquatic characterizations at the landscape scale can refer to the information provided in the Assessment Report.

Since 1990, there have been a myriad of efforts to prioritize watersheds in the Pacific Northwest for habitat restoration and recovery of anadromous fish runs. Earliest efforts focused on watersheds with the most intact landscapes and the most fish stocks of concern (Johnson et al. 1991; Nehlsen et al. 1991; Reeves and Sedell 1992; Scientific Advisory Team 1993; Siuslaw National Forest 1993). These ultimately led to the network of key watersheds in the Northwest Forest Plan (USDA et al. 1994). Subsequent efforts focused more on details of habitat and health of the fish stocks (Nickelson et al. 1992; Oregon Chapter American Fisheries Society 1993; Nicholas 1993; Huntington et al. 1996), while most recent efforts have been broader and included the above considerations as well as many other measur ments of watershed health and risk (Daggett 1994; Bradbury et al. 1995).

Table 2 shows which watersheds and sub-watersheds in the LSR study area were identified as high priority by the above efforts. Because many of these reports are highly interrelated, and identification of a watershed as high priority in one report was in a large part due to its being identified as such in earlier efforts, any synthesis of them is highly subjective. Nevertheless, within this LSRA area, four basins identified in the most independent reports - Drift and Lobster Creeks of the Alsea, West Fork Indian Creek, and North Fork of the Smith River - appear to be the highest priority for projects that benefit anadromous fish. All are key watersheds and American Fisheries Society aquatic diversity areas and home to particularly healthy Chinook or coho salmon, or endangered Umpqua cutthroat trout. Next in priority is a group including Mill Creek, North Fork Beaver Creek, Yachats River, Cummins/Tenmile Creeks, North Fork Siuslaw River, and Five Rivers. The relationship of these watersheds to the priority treatment areas in this report will be discussed in chapter V.

Table 1: Soil Climate Zones Located Within LSRs R0267 And R0268

SOIL/ CLIMATE ZONE	CLIMATE	SOIL CHARACTERISTICS	SOIL TEMPERATURE	SOIL MOISTURE
COASTAL FOG	very high winter rainfall accompanied by high winds; fog and low clouds common	deep to very deep, moderately fine-textured soils overlying slowly to moderately permeable bedrock; high in amorphous clays--often thixotropic; high accumulation of organic matter	slight difference from summer to winter (isomesic)	high in summer (except on few very shallow soils on south slopes); fog and low clouds increase effective soil moisture in summer
CENTRAL INTERIOR	wet winters and moist summers; occasional high winds in winter	deep to very deep moderately fine-textured soils overlying slowly to moderately permeable bedrock; high biologic activity accompanied by high decomp-osition rates and moderate accumulations of soil organic matter	significant difference between summer and winter (mesic) below 3000 feet; winter temperatures range to very cold (mesic to cryic) above 3000 feet	moderate fluctuations from winter to summer; summer levels varying from very high on lower slopes to moderately dry on upper sideslopes
SOUTHERN INTERIOR	very wet winters and moist summers; occasional high winds in winter	shallow to deep, fine to medium textured soils overlying impermeable bedrock; high biologic activity accompanied by high decomposition rates and moderate to low accumulations of soil organic matter	significant differences between summer and winter (mesic) below 3000 feet; winter temperatures range to very cold (mesic to cryic) above 3000 feet	moderate to great fluctuations from winter to summer
VALLEY MARGIN	moist winters and dry summers; high winds are uncommon	shallow to deep fine textured soils overlying moderately permeable bedrock; moderately high biologic activity and moderate decomposition rates and low to moderate accumulation of soil organic matter	significant difference from summer to winter (mesic)	high fluctuations from winter to summer, with low soil moisture common in summer

Table 2. High-Priority Watersheds And Sub-Watersheds Identified By Various Authors.

Watershed Name	Key W'shed	AFS ADA	ODFW SRCE	SNF/ BLM	BRAD-BURY	DSL	Healthy Chinook	Healthy Coho	T&E Cutthroat	Chum
Mill Cr. - Yaquina R.	X		X	X						X
N.Fork Beaver Cr.	X	X	X	X						
Drift Cr. - Alsea R.	X	X	X	X	X	X	X			
Five Rivers			X	X	X	X	X			
Lobster Creek	X	X	X	X	X	X	X			
Tobe Creek				X						
Canal Creek		X	X							X
Yachats River	X	PART	PART	X						
Cummins/Tenmile	X	X		X						
Bailey Creek	X			X						
W.Fork Indian Cr.	X	X	X	X			X			
Lake Creek				X			X			
Upper Siuslaw R.				X			X			
N. Fork Siuslaw R.	X		X	X			X			
W. Fork Deadwood			X	X			X			
Whittaker Creek				X			?			
North Fork Smith R.	X	X		X			X	?	X	

Key watershed - USFS and BLM 1994.
AFS ADA - Aquatic diversity area; Oregon Chapter American Fisheries Society 1993
ODFW SRCE - OR Dept. of Fish and Wildlife source watershed; Bradbury et al. 1995
SNF - Siuslaw National Forest 1993.
BLM - Personal communication, Salem, Eugene, Coos Bay Districts, Bureau Land Management
Bradbury et al. 1995.
DSL - Daggett 1994, Oregon Division of State Land
Healthy Chinook and coho salmon - Huntington et al. 1996; ? = assessment of healthy is questionable.

Vegetative Characterization

Plant series describe forest vegetation by the dominant, or climax, tree species that would be maintained over time without disturbance (i.e., western hemlock series) (Franklin and Dyrness 1973). A series describes the general biological environment, in terms of potential natural plant communities, climate, geology, and soils. Plant series distribution provides us with a general sense of large-scale biological environments. This can be related to overall site potential.

Four plant series are present in this LSRA area. The Sitka spruce series occupies the maritime, coastal fog zone in the western most portion of these LSRs **(Map 5)** . The western hemlock series is the most dominant series present in the LSRA area, occupying 77% of the landscape **(Map 5)**. It is found in the interior soil/climate zone, associated with a range of environments. The noble fir series is limited to highest peaks of the Coast Range (Marys Peak, Grass Mountain, etc.) in the interior soil/climate zone. The grand fir series is found on the far eastern fringe of the LSRA area, associated with the margins of the Willamette Valley. Noble and grand firs series are not delineated, mapping is currently underway.

Table 3: Relationship Between Series, Sub-Series Environments, and Plant Associations Found In LSRs RO267 and RO268

SERIES	SUB-SERIES ENVIRONMENTS	UNDERSTORY INDICATOR SPECIES IN PLANT ASSOCIATIONS
Sitka Spruce*	WET	*devil's club, salmonberry
Sitka Spruce	MOIST	Oregon oxalis, swordfern, fool's huckleberry/red huckleberry
Sitka Spruce	DRY	salal, salmonberry/salal
Western Hemlock* (Douglas-fir/red alder)	WET	devil's club, salmonberry, salmonberry/vine maple
Western Hemlock (Douglas-fir/red alder) (Western hemlock/Douglas-fir/red alder) (Western hemlock/Douglas-fir)	MOIST	Oregon oxalis, swordfern, vine maple/swordfern, vine maple/salal
Western Hemlock (Douglas-fir) (Douglas-fir/Oregon white oak) (Douglas-fir/Western hemlock)	DRY	Oregon grape, Oregon grape/salal, salal, salmonberry/salal, rhododendron/Oregon grape, rhododendron/salal, rhododendron/evergreen huckleberry, rhododendron/ swordfern, evergreen huckleberry, (ocean spray/herbs, chinquapin/madrone)
Noble Fir	COLD	(vine maple/rhododendron)
Grand Fir	WET	(snowberry/swordfern)
Grand Fir	DRY	(salal-snowberry/swordfern)

*Plant Association and Management Guide, Siuslaw National Forest, Hemstrom and Logan 1986.
( ) current tree and understory species. Resource Management Plan USDI, BLM, Salem District Office, May 1995 and Resource Management Plan USDI, BLM, Eugene District Office, June 1995

Plant associations describe the dominant plant community (a combination of tree and shrub and/or herb layers) that would inhabit a site over time without disturbance (Hemstrom and Logan 1986). A plant association defines a biological environment in terms of the species composition, productivity, and response to management. Knowledge of the presence and distribution of indicator understory species further refines the biological environment, allowing us to more accurately assess site potential.

Plant associations with similar attributes have been aggregated into groups **(Map 5).** These plant association groups have been arranged into "sub-series" based on the broad environmental conditions in which they are found. This is a key stratification in identifying the range of structural and compositional ch racteristics that can be expected under natural conditions on a given site. Sub-series characterizations will be referred to throughout this assessment. **Table 3** characterizes the relationship between series, sub-series environments, and plant associations found in these LSRs.

Disturbance Processes

Historical and Current Land Uses

Settlement Patterns

The coastal and interior valleys of western Oregon have been the homeland of culturally and economically diverse American Indian societies for millennia. The Euroamerican settlement of western Oregon resulted in catastrophic population decline and displacement among the region's Indian peoples. During the mid-1850s, surviving Indians from throughout western Oregon were placed on a large, multi-tribal Indian reserve encompassing parts of the Oregon coast and Coast Range. Throughout the late-1800s, in an effort to bring tribal peoples into the "American mainstream", and to open the area to white settlers, this reserve was drastically reduced in size. Tribes living there were finally "terminated" from Federal supervision and control in the early 1950s; western Oregon's reservations were closed. A reversal of American Indian policy in the mid-1970s has led to federal re-recognition of western Oregon tribal peoples. Today, western Oregon's Indian peoples are grouped into Tribal confederations whose centers of government and small reservations are located in Coos Bay, Grand Ronde, and Siletz.

The assessment area includes areas once used by American Indian peoples as villages, fishing and shellfish gathering stations, religious sites, and cemeteries, and thus is rich in archaeological evidence and artifacts. Land ownership maps and archival data document the boundaries of the Coast Range reservation and the location of Indian Allotments. Current Tribal interest in management issues include fisheries, wildlife, water quality, special forest products, and timber.

The Oregon Coast was "discovered" by European maritime explorers in the late 1700s.

Soon thereafter, land-based explorations and the fur trade brought mountain men, fur traders, and missionaries into the Willamette Valley and Coast Range. Trading outposts in the wilderness, such as Fort Vancouver on the Columbia River, eventually attracted settlers to the fertile soils of the Willamette Valley. The Donation Land Act of 1850, and the Homestead Act of 1862, provided enough incentives for settlement that the Willamette Valley and the Coast Range were quickly populated. Large tracts of timberland, and homesteads that never "proved up", became incorporated in the National Forest System.

BLM ownership patterns in Western Oregon were created in 1866 when Congress granted to the Oregon and California Railroad Company all odd numbered sections of land 30 miles on each side of the railroad right-of-way. When the stipulations of the grant were violated, Congress passed legislation to have the lands revested to the United States government, eventually to be managed by the Bureau of Land Management.

Eventually, agriculture, logging, and commercial fishing provided the economic foundation for the development of large communities and the current way of life in the Willamette Valley, Coast Range, and the coast.

Pioneer cemeteries, historic trails and wagon roads, homestead remains, and fruit orchards are the remnants of Willamette Valley and Coast Range pioneer history, and occur throughout the assessment area. Related to these historic remains, implementation of various federal "homestead" acts (i.e., Forest Homestead Act of 1906, Western Scattered Settlers Project of 1906) required close government scrutiny of "homesteads", resulting in inspection records, inventories, and detailed maps denoting building locations, land features, and vegetation types. Thus, these records not only add insight into local pioneer and settlement history, they are an invaluable source of baseline data about the area's environment at the turn of the century.

The assessment area likely contains an abundance of historic sites dating from the mid-1850's to the 1930's. Some sites have likely been recorded during previous cultural resource inventories for timber sales and other projects. These records are housed in the Siuslaw National Forest Supervisors and Ranger District Offices and the Bureau of Land Management District Offices. These files should be consulted preparatory to any project in the assessment area. Additional compliance-level cultural resource inventories may also be required. The Siuslaw NF has developed a detailed data base concerning extant settlement records and these should be used to guide effective field inventories. These records would also provide temporal/baseline information useful in reconstructing the historic Coast Range environment. For example, Coast Range settlers logged the forest, created innumerable meadows and forest openings for buildings, gardens and pasture, planted fruit orchards and other "exotics" trees and shrubs. Settlers were responsible for many of the huge fires that swept through the Coast Range since the 1850s with many areas being repeatedly burned. While the specific impacts of these homesteads may be difficult to see today, cumulatively they are in part responsible for the current condition of the assessment area, and human land use patterns within it.

Logging
Logging operations in the assessment area began in earnest in the lat er half of the 19th century. In the Siuslaw River system, stream channels were cleared, and logs were floa ed out to sawmills or to the estuary for shipment. Most major tributaries of the Siuslaw River were splashed-dammed, and "high grade" logging of bottom areas was common.

Timber patents also played a significant role in shaping the economy of the assessment area as they enabled local mills to tap the supply of Federally owned timber. Beginning in the early 1900s, timber patents were granted by agents of the Government Land Office to timber companies, allowing a company to harvest timber from a specific tract of Federal land for a set rate.

There were a number of mills operating in the area during the first two decades of the twentieth century. The dominant commercial activity in the assessment area has been, and continues to be, timber harvesting.

Agriculture
Agriculture is limited mainly to the flatter, wider interior Coast Range valleys, and the coastal plain. Residential areas are located primarily in association with agricultural lands.

Minerals
The Siuslaw Basin is within an area considered to have moderate potential for the leaseable minerals of oil and gas. This classification is based on the indirect evidence of geologic inference.

The assessment area in general is considered to have low potential for locatable minerals.

Salable minerals in western Oregon are often located in areas where volcanic rock was deposited as dikes, sills, flows, etc. Several prospective and/or developed rock quarries are located along another large volcanic deposit crossing public and private lands. Small feeder dikes and sills of basaltic rock have also been identified, but have not been developed as salable mineral sources. The alluvium along many river bottoms is considered to have moderate potential for sand and gravel. However, at this time, none of the area within the LSRA with alluvium have been developed as a mineral material source. The location and status of existing quarries is available in GIS at each administrative unit. (Existing quarry sites impact local habitat but are not considered to have an overall effect on the integrity of LSRs.) Since quality bedrock areas are so few, expansion of quarry activities in the future is not expected to inhibit attainment of LSR objectives.

Recreation
Recreational uses include but are not limited to canoeing, kayaking, drift boating, fishing, hunting, All Terrain Vehicle (ATV) use, driving for pleasure, sightseeing, mountain biking, professional bicycle racing, water play activities, watching wildlife, and hiking along coastal trails. Recreation attracts moderate to heavy amounts of visitation throughout most of the year, focused primarily on the coastal strip. Some specific recreational uses (i.e.,

hunting, berry picking) are strictly seasonal. Refer to BLM Land Management Plans and the Siuslaw National Forest Land and Resource Management Plan for details on proposed and existing recreation in the LSRA.

Wilderness and scenery objectives tend to be compatible with late-successional reserve objectives. Old-growth areas, patches of old growth, and individual trees are valuable for scenery and Wilderness. There are remnant mature and old growth trees in many developed recreation sites within the assessment area.

The types of recreational impacts that potentially affect the ability to attain LSR objectives are mostly related to harassment of wildlife species and changes in habitat by manipulation of vegetation. For example, if All Terrain or Off Highway Vehicle use expanded into new, now relatively undisturbed areas, disturbance could affect viability of wildlife (i.e., northern spotted owl) and some plant species. Cummins Creek Wilderness Area was identified as an area of potential impact because of the intensity of human use there. In the Marys Peak area, large numbers of people near northern spotted owl nesting areas are a potential impact. Road construction and access are issues where human use of the assessment area has potential impact on attainment of late-successional reserve objectives. Impacts can range from illegal removal of live trees or snags, to dumping of waste.

Radio tower and other administrative sites (i.e., campgrounds, facilities, picnic areas, parking lots, progeny sites, utility and road right-of-ways) influence the ability to attain late-successional reserve conditions locally, because of permanent clearing of the site. However, a number of administrative sites are located either in developed areas, or on hills that are currently in a very early seral stage of development. Maintaining these early seral conditions is thought to have little impact on the overall late-successional reserve conditions (ROD, C-15,17,18).

Economic Values

The area contains substantial economic values, predominantly in the form of wood fiber or timber. Of considerably less economic significance are other forest products including firewood, decorative grasses and boughs, Christmas trees, mushrooms, mosses, bark, and burls. Anadromous fish spawning and rearing habitat, recreational facilities, and activities (campgrounds, visitor centers, etc.) contribute economic value as well.

Fire

Fire and wind are the two dominant natural disturbance processes affecting the terrestrial vegetation pattern at the large scale in this LSRA area. The frequency, severity, and size of these disturbances have greatly influenced the composition and structure of habitats across the landscape. Understanding the geographic variability of soil/climate and disturbance effects can guide expectations of spatial landscape patterns and structural landscape components. Since plant and animal species and populations have adapted to the range of historic landscape patterns, an understanding of these patterns is important in managing

LSRs.

Both physical and biological elements of the landscape affect disturbance patterns. Physical features such as landform type (relief and drainage density patterns), soil, and geologic substrates influence fire behavior patterns. Climatic features, such as precipitation, fog and east wind patterns, control fire spread and effects on vegetation composition and pattern. The distribution of sub-series environments, successional stages, and the arrangement, composition, and structure of vegetation all influence the amount and arrangement of fuel and thus fire behavior patterns.

The long-term history of fire in the entire area has not been systematically documented. Fi e disturbances in Northwest coastal zones are described as low frequency (more than 200 years between disturbances), high severity regimes (Agee 1993). Ongoing and recently completed projects in these LSRs have refined this general description. Analysis of charcoal distribution in a sediment core from Little Lake (in LSR R0268, revealed a mean fire return interval of 160-190 years from 2000 years ago to the present (Long 1995). Preliminary results from a large-scale dendrological fire history project covering approximately 340,000 acres, spanning from the coast to the valley margin, indicate that there is spatial variability in historic fire patterns over the last 500 years. Coastal and interior zones in the study area were dominated by single or two-age class stands, with fire return interval ranging from 200-300 years. Southern interior/valley margin sites had a much higher proportion of two to four age-classes, with fire return intervals ranging from 100-200 years (Impara, personal communication). This information suggests that there is large-scale geographic variability in fire regimes across the landscape. A Fire Management Plan is included in **Appendix A** to establish a fire control strategy should a fire event occur within the LSR boundary.

Native American and Euroamerican settlement of the area during the period 1850-1940 was responsible for many of the large-scale fires in that time period. Teensma et al. (1991) mapped age class distributions (inferred from various sources) at four years: 1850, 1890, 1920, and 1940. Several human-caused fires between 1850 and 1940 have changed landscape patterns; from a young/old forest in 1850 to a multi-aged landscape in 1940. The total number of age-class patches has increased from 1850 to 1940 as a result of small human-caused fires and suppression efforts on potentially large-scale events . Geographic variability is apparent in both the number and type of age-class patches within these LSRs.

Disturbance Regime Blocks

Fire history Information suggests there is spatial variability in fire effects across the LSRA. An attempt was made to map, at a landscape scale, the general geographic distribution of fire regimes in the Assessment Report of Federal Lands in and adjacent to the Oregon Coast Province (USDA 1995). The concept that fire regimes are stable temporally and spatially, and can be discreet geographic entities, are working hypotheses that will be revisited and refined as more information becomes available.

Distribution of physical and biological environments were used to map disturbance regimes across the North Coast Province. Landform types (USDA 1981) and plant series delineations were used to group geographic re s into blocks predicted to have similar fire behavior patterns. Relief patterns and climatic influences (fog, east wind) were considered in the groupings (**Map 4**).

These working boundaries were overlaid on the age-class distribution maps (Teensma et. al, 1991) to validate assumptions about the effects of physical and biological elements on disturbance processes and resultant vegetation patterns. Geographic variability in patch sizes and types was c ptured fairly well in overlaying the working boundaries on the age-class distribution maps. This supported the hypothesis that landform/topography, climate, and vegetation distribution influence disturbance processes and landscape pattern. The fire patch sizes were used to describe each block. These hypothesized disturbance regime blocks are continuing to be refined and represent *an* initial attempt to group landscapes. Watershed analysis will test our assumptions of the relationships of landscape patterns and disturbance.

Five of the eight disturbance regime blocks described in the Assessment Report (USDA 1995) are located within these LSR boundaries. Since only the very southern edge of the Central Interior --Lincoln County (Block 5) was present in a small portion of LSR 268, we grouped this block with the Central Interior --Alsea (Block 6). It will be referred to as the Central Interior -Alsea block in the following discussion. **Table 4** displays the environmental conditions that describe each of the fire disturbance regime blocks.

Wind

Wind is also a natural disturbance process within this LSRA area. Its significance is dominant in the Coastal Fog Zone. In this zone, there are frequent small disturbances. Yearly windstorms are responsible for small patches, often less than 10 acres in size, of blowdown across the Zone.

Infrequently, windstorms can cause blowdown of large (hundreds to thous nds of acres) tracts of land. Efforts to predict wind patterns and potentials for blowdown across the landscape have not been successful in the past.

Insects

The Douglas-fir beetle is indigenous to the Coast Range of Oregon. This beetle maintains its normal low-level populations by infesting trees weakened by root disease or other stress factors and in scattered windfall. After a significant disturbance event, populations will increase in down and damaged Douglas-firs to levels at which beetles, in subsequent years, will attack and kill healthy standing trees. If significant amounts of windthrow do not occur in following years, these outbreaks typically will last only 3 years with the beetles attacking and killing successively fewer trees each year (Hostetler et al. 1996).

Table 4: Disturbance Regime Blocks

DISTUR-BANCE BLOCK	LAND-FORM	SUB-SERIES ENVIRONMENT	DISTURBANCE TYPE; REGIME DESCRIPTION*	LANDSCAPE PATTERN
COASTAL FOG BLOCK	low relief, scattered headlands and hummocks same area as soil / climate zone	wet and moist *S*itka spruce dominate area	wind dominant process; operates at two scales. High-mod.frequencies of small-medium size/ and high severity. Also, storms occur with low frequency/large-giant size with high severity; fire very uncommon; low frequency/large-giant size - high severity. Native Americans and European settlers have influenced fire pattern.	heterogeneous mix of patch sizes and seral stages; earlier seral patches most frequently small to medium, resulting from small-scale wind events; large and giant patches created infrequently and move from early to late seral conditions
CENTRAL INTERIOR-ALSEA	moderate relief and high dissection	moist and wet environments of the western hemlock series dominate; wet and moist Sitka spruce found along stream corridors and in local fog zones	fire occurs at low frequencies/large-giant size/high severity	single to few large to giant patches of the same seral stage that will move through time to late seral conditions
CENTRAL INTERIOR-MARYS PEAK / ALSEA VALLEY	variable; valley fringe, moderate to high relief features, and mountain peaks	variable; noble fir occupies highest peaks; wet and dry grand fir may occupy eastern fringe; wet, moist and dry environments of the western hemlock series about equal area throughout block	fire occurs in variable regimes; heavy use by Native Americans and European settlers have influenced fire patterns	variable sized patches (medium to giant), with high variability of remnant trees within and between patches
SOUTHERN INTERIOR	moderate relief, high dissection	moist to dry environments of the western hemlock series dominate; grand fir may be located along eastern fringe	fire occurs in low to moderate frequencies/variable size/moderate to high severity	variable size (small to giant) patches, with some patches developing into late seral, and some patches experiencing more than one non-stand replacing dis urbance (variable distribution of remnant trees and stands)
VALLEY MARGIN	valley foothills of low relief, low - mod. dissection	dry western hemlock and wet and dry grand fir	fire occurs at shortest intervals; variable sizes and severities	variable pattern

***Disturbance Frequency (years)**
Low >300
Moderate 100-300
High <100

***Severity (% mortality)**
Low <30%
Moderate 30-70%
High >70%

***Size (acres)**
Small <100
Medium 100 - 1,000
Large 1,000 - 10,000
Giant >10,000

This Douglas-fir beetle-caused mortality can be benign, beneficial, or harmful, depending upon management expectations and desired forest conditions. Moderate amounts of beetle-caused tree mortality, for instance, can significantly improve habitat diversity for numerous species of vertebr te and invertebrate fauna. Conversely, large amounts of mortality can severely damage high value recreation sites, timber stands, old-growth areas, habitat conservation areas, or adjacent landowners and plantations. It is of particular significance that some of these areas depend on the number and sizes of old-growth trees to meet habitat requirements. Some of the older, less vigorous trees, weakened by disease or other factors, will be the most vulnerable to the Douglas-fir beetle. (Hostetler et al. 1996).

Disease

Laminated root disease, caused by the fungus *Phellinus weirii*, is the most commonly encountered and damaging forest disease disturbance agent in the analysis area. This fungus is a highly effective and efficient parasite that kills host trees of all sizes and ages. The fungus extensively decays roots of highly susceptible host trees and either causes windthrow or kills standing trees by destroying their ability to take up water and nutrients. Infected saplings and small poles usually die standing; larger trees are more likely to be windthrown (Hostetler 1996). *Phellinus weirii,* like other root pathogens, has co-evolved with its host through time and thus is a natural, perhaps even *a* necessary, part of many forest ecosystems. Laminated root disease spreads through forest stands by means of root contacts. It kills susceptible host trees, resulting in scattered groups of dead trees. This condition creates openings in the canopy, increases volume of down woody debris, increases species diversity in the plant community, and enhances visual quality on a landscape scale (Hostetler 1996).

Before human activities became the dominant agents of disturbance on the landscape, the distribution and spread of the fungus was most likely mediated by the fire history and pattern in an area: the fire determined the location, spread and longevity of the host trees over the landscape and thus, that of the fungus. A study in the northern Oregon Coast Range found a significant association between laminated root disease and slope position in 70 to 100-year-old Douglas-fir stands. The percentage of plots containing *P. weirii*-infected Douglas-firs was highest on ridges and decreased downslope. No relation was found, however, between laminated root disease and plant community type or aspect (Hostetler 1996). This disease moves relatively slowly through stands and is persistent for up to 50 years in large roots and stumps of trees that have been cut or killed (Hostetler 1996).

Suppression of natural fire and planting stands dominated with Douglas-fir are the human activities that have contributed the most to the potential for increasing the spread and intensification of laminated root disease in those stands where it existed prior to harvest. Because of the *extensive* amount of human disturbances in the Indian/Deadwood and Upper Five Rivers/Lobster portions of the assessment area (**Map 5**) where the concentrations of this root rot are dense, it is likely that in the future laminated root rot levels will be higher and the disease more widely distributed than in the past.

Landslides, Floods, and Earthquakes

Landslides and floods are integral to the formation of Coast Range landforms, soils, streams, and fish habitat. They introduce sediment (including gravels necessary for spawning) and large trees that act as energy dissipaters and sediment storage sites into the stream systems.

Logging and attendant road construction altered landslide rates by destabilizing steep slopes within most watersheds in the LSRA area. Instead of a single short period of intense landsliding which would have normally been associated with l rge-scale fires, repeated sliding results from moderately severe storms. Landslides from logged sites mainly introduce sediment without the large logs that control stream channel gradients and sediment load over several decades. The supplies of large trees to the stream channels have been greatly reduced or eliminated. Although no systematic studies of this effect have been conducted across the area, these activities are thought to have drastically changed stream channel shapes and function. Instead of complex step/pool profiles with multiple side channels produced by log jams, many channels in heavily logged watersheds have become simple bedrock chutes. The streams are lacking the pools and side channels necessary for quality anadromous fish habitat. As a result, during flood events there is a lack of calm water areas for the fish to rest in and many fish get swept into the lower channels or out to sea where they cannot survive.

Locally, landslides and floods influence the productivity of a site and its ability to produce vegetation. Successional stages of development and thus, attainment of LSR objectives, locally can be delayed.

Periodic earthquake activity can result in large mass failures. The relationship of earthquake activi y to slope movement has not been quantified.

Vegetative Patterns - Reference and Current Conditions

Disturbance processes, plant series and sub-series environments, and successional trends all influence the range of landscape patterns. Comparisons over time of the amount and distribution of seral stages allow us to evaluate landscape changes. Plants and animals have adapted to the range of natural conditions across the landscape. Knowledge of the range of patterns allows us to evaluate and prioritize future management direction.

Ideally, comparisons in vegetative pattern should be made at many points in time over a long period (several hundred years) to get a complete picture of the range of natural conditions. Comparisons can provide some insight into historic pattern, and allow us to put current condition in context. It is rarely possible to get specific landscape pattern information for such long time periods. We can make assumptions about historic landscape pattern based on what we know about historical disturbance regimes and management history.

Seral stage distribution was only available for two points in time. A mid-1900s seral class map was derived from a series of county-wide vegetation coverages completed between 1940 and 1956 (**MAP 7**). Although some industrial forest practices were in effect prior to the 1940s, this seral class map provides the best information available on the composition of post-fire, pre-intensive forest management vegetation pattern. Logging had been occurring on private land for about 50 years. Intensive logging on federal lands was just beginning. We are not setting the mid 1900s time period as our desired future condition but, instead, are using it in conjunction with what we know about disturbance regimes to compare against current vegetation pattern. The maps derived from other sources (Teensma et al. 1991) were too coarse of a mapping unit to use for this exercise.

Current vegetation seral stage condition was developed by combining BLM and Forest Service vegetation layers. **Appendix B** describes the process for delineating and the definitions of seral stages. With these two efforts to delineate seral stages, we can compare the effects of our forest practices on landscape patch distribution.

Because mapping standards between the mid-1900s coverage and the current vegetation coverage are different, care must be taken in interpreting exact vegetation distribution changes. However, several general trends in vegetation pattern across the landscape emerge from the above analysis (USDA 1995).

- **Patch Size:**
  Patch sizes on the landscape are reduced from reference conditions (mid 1900s) in all disturbance regimes. The largest change has occurred in the Central Interior Alsea (**Map 7**) with a shift in dominant patch size from jumbo (>10,000 acre) to medium-sized patches (100-1000 acres in size).

- **Number of Patches:**
  The number of patches across the landscape has increased for mature conditions. Numbers of patches within each disturbance regime have at least doubled. The biggest change occurs in the Central Interior Alsea disturbance block where current mature patches are six times as many as occurred in the mid-1900s.

- **Area of Mature:**
  The percentage of the disturbance regime blocks in a late seral condition has been reduced. The greatest change, based solely on federal ownership, is in the Central Interior Alsea disturbance block with a 46% reduction in late seral vegetation (78% to 42%). The smallest change is in the Central Interior Marys Peak/Alsea Valley block with a 15% reduction in late seral vegetation (60% to 51%)

LSR R0267 landscape pattern in the mid-1900s was largely that of a late seral forest, with approximately 75% of the LSR acres in that seral stage (USDA 1995). Current conditions consist of a landscape composed of approximately 46% late, with early-mid seral conditions significantly represented (**Map 8**) (**Table 5**).

The mid-1900's vegetation pattern in LSR R0268 was dominated by the late seral stages encompassing approximately 70% of the LSR acres (Assessment Report 1995). Disturbance history indicates that many of these stands generated in the 1840-50 fire period (Teensma et al. 1991). Today, the landscape is more varied, with 46% in late seral, and higher proportions of early-mid seral stands than occurred previously (**Map 8**) (**Table 5**).

SERAL STAGE	PERCENT OF LSR BY SERAL STAGE	
	RO267	**RO268**
GRASS/FORB	0%	1%
VERY EARLY <10 yrs	6%	6%
EARLY 11-24 yrs	16%	14%
EARLY 25-50 yrs	18%	15%
MID 50-80 yrs	7%	7%
LATE >80 yrs	46%	46%
HARDWOOD/MIX	6%	10%
UNTYPED	1%	1%

Table 5: Current Seral Stage of Federal lands in LSR RO267 and RO268

Loss of late seral conditions, increases in patch numbers, and decreases in patch sizes have contributed to late-successional habitat loss and fragmentation across the two LSRs . Both LSRs are affected, but LSR RO268 has a higher degree of fragmentation and loss of giant patches (USDA 1995).