Field Guide to the Forested Plant Associations of Southwestern Oregon

FIELD GUIDE TO THE FORESTED PLANT ASSOCIATIONS OF SOUTHWESTERN OREGON

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INTRODUCTION

This publication is a field guide to the classification of the plant series and plant associations on forested land in southwestern Oregon (SWO) The guide facilitates field identification of plant associations It covers the lands of the Umpqua, Rogue River, and Siskiyou National Forests, the Medford District of the Bureau of Land Management, the southern portion of the Roseburg District of the Bureau of Land Management, and areas of Curry County A more comprehensive office guide will be published subsequently This Office Guide will include more information on each plant association, for example, down woody material levels and productivity values

The classification is based on the concept of potential natural vegetation The potential natural vegetation for a site is the vegetation that would be present under climax conditions In other words, if the site were allowed to grow, undisturbed by fire, insects, diseases, flood, wind, erosion, or humans, in approximately 500 years it would theoretically reach a steady state condition in vegetative composition which would be characteristic of the site potential The climate of southwestern Oregon favors a frequent fire disturbance regime, resulting in very rare occurrences of climax vegetative conditions Most forest stands have been burned several times, are multi-aged, and in early or mid-successional stages The oldest trees are commonly less than 300 years old As a result, potential natural vegetation has been inferred using younger successional vegetation

This classification has two-levels, of which the broadest divisions are plant series and the finer divisions are plant associations Series is based on the dominant, most shade tolerant, regenerating tree species on the site This publication presents a classification for the Sitka Spruce (*Picea sitchensis*), Oregon White Oak (*Quercus garryana*), Ponderosa Pine (*Pinus ponderosa*), Tanoak (*Lithocarpus densiflora*), Douglas-fir (*Pseudotsuga menziesii*), Western Hemlock (*Tsuga heterophylla*), Western Redcedar (*Thuja plicata*), Port-Orford-Cedar (*Chamaecyparis lawsoniana*), Jeffrey Pine (*Pinus jefferyi*), White Fir (*Abies concolor*), Lodgepole Pine (*Pinus contorta*), Shasta Red Fir (*Abies magnifica shastensis*), Pacific Silver Fir (*Abies amabilis*), Western White Pine (*Pinus monticola*), and Mountain Hemlock Series (*Tsuga mertensiana*) Each series has been subdivided into plant associations In addition, in the Tanoak Series, an intermediate "subseries" class has been provided This grouping can be used when series or plant association does not provide the desired resolution

Plant associations are described primarily by the presence or absence, and abundance of plant species Environmental variables, including soil, are also used to classify, and often reflect the pattern of vegetation

Species presence and abundance result from environmental gradients Classification attempts to find plant responses to natural gradients such as aspect, slope, slope position, soil type, and moisture For example, north slopes support vegetation that differs from south slopes, so each supports different plant associations This type of natural break is easily recognized and delineated Conversely, with constant aspect, vegetation often changes from the top of the slope to the bottom, but the change is so gradual that a boundary between plant associations is difficult to delineate Boundaries between plant associations may be difficult to recognize where environmental gradients are gradual

Descriptions of plant associations, sometimes based on fewer than ten sample plots (36 percent of the associations), will not exactly match a particular site Therefore, the "best match" of a description should be used Experience in using the key and guide is helpful for proper plant association identification

DATA COLLECTION

The classification was divided, by Series, among the ecologists in this Area The lead author is shown at the beginning of each Series chapter

Analyses are based on over 2500 sample plots These sample plots provided several data sets These data sets were made up of 1) intensive plots collected by the USDA Forest Service Ecology Program, 2) plots installed as part of the Oregon State University Forestry Intensified Research (FIR) Program on Bureau of Land Management (BLM) lands, 3) plots installed by the Natural Resource Conservation Service (NRCS) throughout Curry County, and 4) other plots installed by Oregon State University researchers

Most data sets included basic vegetation (cover, dominance, etc) and environmental variables In addition to vascular species presence and abundance, site variables such as slope, aspect, elevation, and topographic position were collected at each plot

Average total vascular plant species richness (the number of species present) was calculated for each association and for each vegetation layer within each association The range of values for richness was divided into five sections and assigned very high, high, intermediate, low, and very low richness ratings These ratings have a different scale for each Series based on the total range of values Richness may be helpful in keying plant associations

Forest Service sample plot data estimated percent cover for six vegetation layers The upper tree layer included cover above 50 feet tall, the middle tree layer included cover between 12 and 50 feet tall, and the lower tree layer, included cover less than 12 feet tall High shrub cover included shrubs over three feet tall, and low shrub cover, shrubs less than three feet tall Herb cover included all herbs and grasses

Data on percent cover of vegetation, by layer, collected by FIR researchers on Bureau of Land Management lands, were stratified differently than the Forest Service data Data were stratified into five layers Tree cover was estimated for trees greater than 10 feet tall (3 meters) and less than 10 feet tall Tall shrubs were greater than 20 inches (50 centimeters) and low shrubs less than 20 inches in height Herb cover included all herbs and grasses

Vegetation data collected in the Sky Lakes Wilderness were segregated into cover classes For the analyses, the midpoint of each cover class was used The percent cover values were 1, 3, 8, 20, 40, 60, 80, and 95 Aspect codes were also collected and were converted to the midpoint of the range for analyses

Vegetation data collected by the NRCS in Curry County were collected predominantly on north aspects and were characterized by dominance classes (Anderson and Poulton 1958) Species with a dominance rating of 5 were dominant, 4, codominant, 3,

common, 4, uncommon, and 5, rare Constancy values were calculated for each species, but percent cover was not collected

Field identification *of Festuca* species was extremely difficult In southwestern Oregon, the native dryland fine-leaved fescues with gray-green or blue-tinged leaf color have been called Idaho fescue (*Festuca idahoensis*), red fescue (*Festuca rubra*), Roemer's fescue (*Festuca roemeri*), and sheep fescue (*Festuca ovina*) Field characteristics to discriminate between these species are not useable in southwestern Oregon Name(s) were attached to these fescues in order to refer to them in this guide Idaho fescue (*Festuca idahoensis*) is used as the name for all the native, dryland, fine-leaved fescues with gray-green or blue-tinged leaf color This is not a taxonomic determination (Rolle 1996, pers comm)

The tree species white fir (*Abies concolor*) and grand fir (*Abies grandis*) hybridize throughout southwestern Oregon In this field guide they were identified as white fir A more thorough explanation is provided in the White Fir Series introduction

The constancy tables in each plant association description show only the most common species for that association Full constancy tables will be provided in the office guide Due to the format and limited space in this field guide, the BLM vegetative data were stratified from five layers into the overstory-understory catagories seen in the tables This incompatablity of data may have resulted in constancy and cover values for overstory and understory species that may not reflect field conditions

Soil data were collected on Forest Service and Bureau of Land Management lands More extensive soil and geology information was summarized from a subset of plots for most plant associations, depending on soil plot data availability A combination of geology maps, exposed bedrock along road cuts, and soil pit rock fragments were used to identify parent material (type of geologic material from which the soil developed) More information in minerology and rock types is provided in "Geology of Oregon" (Orr, Orr, Baldwin 1992) Soil data were not collected on NRCS sample plots and are not available for Sky Lakes Wilderness data

Soil taxonomic classification, moisture regime, and temperature regime have been provided where possible to help identify some of the environmental factors characteristic of each plant association A xeric soil moisture regime identifies soils where winters are moist and cool, the summers are warm and dry, and the soil is dry for more than 45 days of the summer A udic moisture regime describes areas where some soil moisture is available for plant growth throughout the summer Frigid soils have a mean annual soil temperature less than eight degrees Celsius (C), mesic soils have a mean annual temperature between 8 and 15 degrees C, and isomesic soils maintain a mean annual temperature in the mesic range, but with less fluctuation throughout the year More soil taxonomy information is provided in the "Keys to Soil Taxonomy" (1996)

To ease the transition from the Draft Plant Association classification (Atzet and Wheeler 1984, Atzet and McCrimmon 1990) to the Final Plant Association classification, a list is presented at the end of each series introduction showing each draft association and listing the possible new associations into which it could fall The percentages following each new association reflect the percent of plots from the old association that made up the new association For example, the draft Western

Hemlock-Pacific Silver Fir/ Thin-leaved Huckleberry Association is described by 11 plots In the final classification, those plots were divided as follows

46 percent (5 plots) Western Hemlock-Pacific Silver Fir Association

27 percent (3 plots) Western Hemlock/Vine Maple-Pacific Rhododendron Association

18 percent (2 plots) Pacific Silver Fir-Western Hemlock/Thin-leaved Huckleberry Association

9 percent (1 plot) White Fir-Western Hemlock/Dwarf Oregongrape Plant Association

So, if a stand was classified as Western Hemlock-Pacific Silver Fir/Thin-leaved Huckleberry in the past, it is likely (46 percent chance) it will be Western Hemlock-Pacific Silver Fir under the new classification Also note, the draft plant association names use the Forest Service Region 6 codes and the final plant associations use the national codes provided in the PLANTS database (NRCS 1996) It is recommended, when possible, to reclassify the area using the new Field Guide

HOW TO USE THE KEY

There are two levels of keys, the first level is the plant series key, the second divides the plant series into plant associations. Plant series are named for the climax dominant trees of a stand At the next level, plant associations are named for the two or three consistently occurring species (of a stand) within each series

Steps in Determining Plant Associations

To determine plant series Series are based on the climax dominant tree species that is successfully regenerating on the site For example, if the overstory cover is 50 percent Douglas-fir and 10 percent western hemlock, and the understory cover is 40 percent western hemlock and 10 percent Douglas-fir, it would fall into the Western Hemlock Series, because western hemlock regeneration would be dominant If there is 49 percent Douglas-fir regeneration and 50 percent western hemlock regeneration it still falls into the Western Hemlock Series

Another characteristic to look for is the distribution of age classes by species For example, it is possible to have a stand dominated by Douglas-fir in the overstory, with no Douglas-fir regeneration, with 25 percent cover of white fir regeneration of all one age class, along with 20 percent western hemlock regeneration If the western hemlock regeneration has many age classes (i e a reverse "J" shaped curve of abundance versus age) then it is considered most successful because it has regenerated over many years, and the site would fall into the Western Hemlock Series The high cover of white fir could have been the result of different weather conditions during only one or two years, or the result of a disturbance

Select a uniform site If the area is not uniform, i e , it has both north and south slopes or it has two soil parent material types, stratify and key both areas or identify the most extensive area and key it Microsite variations, such as rocky areas or draws, may lead to incorrect identification and should be avoided

Select a representative site Select the sites for keying after viewing the entire area. If

the area is mostly pumice, key a pumice site If the area varies significantly, consider stratifying, particularly if the association responses to management are different

Make a species list. List the most abundant and common species on the site and estimate their cover ocularly by mentally dividing a fifth acre plot into quarters, eighths, etc For example, if Pacific rhododendron cover could fill about 1/4 of the plot, it averages 25 percent cover

Use the key sequentially Always start at the beginning with the series key and note that the distinctions between alternatives are given in order of importance The first sentence is the most important Always read all alternatives before choosing After a series is determined, work through the appropriate key to the plant association

Make a tentative identification After a plant association is determined, read the description to see if it fits the site Use the constancy tables to see if the characteristic species are present For example, if a species has 100 percent constancy, it should almost always be present If the constancy table lists Pacific rhododendron as having 80 percent constancy that means it should be present four out of five times Also compare the percent cover in the constancy table with the percent cover of your species list from the site Covers should be similar Another way to verify identification is to check the location to see if the association occurs in the area The association may also occur on adjacent areas or in areas with similar environmental conditions that have not been sampled If the description does not match the area, return to the first point in the key that was troublesome and take another alternative Read the description for that plant association, see which description best fits the site, and compare it with the first association

Make the final determination Choose the plant association that best reflects site conditions but remember, there will be sites that simply do not fit the key or the classification

TO KEY DISTURBED SITES

Although the Plant Association key was constructed to identify potential natural vegetation, with some adjustment, and greater uncertainty, it can be used for younger sites or those that have been heavily disturbed

Select an area to key As described previously, select uniform, representative sites

Find undisturbed or minimally disturbed vegetation Find plants that characterize the site by using islands of undisturbed vegetation when present If all areas have been disturbed, use the area with the least disturbance, such as around stumps Research in southwestern Oregon indicates that even areas that have been clearcut and burned will have about 65 percent of the original species present within two years after burning The percent cover, of course, will be lower than reported in the plant association description

Check an adjacent stand with the same site characteristics Adjacent stands can be used to check the plant association on the disturbed site Match the adjacent stand as closely as possible to the aspect, slope, parent material, soil, etc of the area being keyed

Read the association descriptions When disturbed sites are keyed, understory occurrence is most important The list of understory species, especially shrubs, should match the constancy table in the plant association description (covers may be different) Also compare the environmental description

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EXAMPLE

ASSOCIATION NAME WITH COMMON NAMES
Association name with scientific names (Latin standards from NRCS "Plants" data base)
Association name with accepted "Plants" codes (Number of plots, total and by agency

Picture of representative site

Distribution A summary of where the association is typically found, based on sample locations Each agency had a different sampling strategy Distribution was not systematic, nor was it totally random Coverage was not uniform, therefore, sites may be found at other locations

Distinguishing Characteristics This section highlights characteristics that help distinguish the association from all others Often, the differences are too subtle to be distinguished by one or a few characteristics The plant association key is the best tool for determining plant association membership

Soils Information on soils and parent material that may help determine association membership is presented

Environment Environment includes information on physical characteristics of the typical site It is usually expressed in averages for the particular plant association Average annual temperature was computed using Brad Smith's program (Deschutes National Forest, Bend Oregon) and average annual precipitation was taken from "Average Annual Precipitation, 1960-1980 in Southwest Oregon", OSU Extension EM 82 20/Nov 1982

Vegetation Composition and Structure Vegetation composition and structure are specific for each plant association. This section is based on the constancy table, but may also include additional information about environmental indications or relative occurrence

Common name	Code	Constancy	Cover	Avg Richness

Most common names and all plant codes are taken from the standardized NRCS "Plants" data base In some cases, locally accepted common names are used Life form, such as tree, shrub, herb, and grass are also established locally For example, in some areas, vine maple may be considered a tree Here it is categorized as a shrub

Constancy is the percent of the time the plant occurs in the sample for the association For example, if there are 10 samples and the plant occurs in four of them, constancy is 40 percent

Cover is an ocular estimate of projected vertical cover

Average richness is calculated by totaling the number of species in each sample by layer and dividing by the number of samples

KEY TO THE PLANT SERIES

1a	Sitka spruce (PISI) is the dominant regenerating species on the site	SITKA SPRUCE FIRST RED
1b	Sitka spruce (PISI) is absent or not dominant compared to other regenerating species on the site	2
2a	Oregon white oak (QUGA4) is the dominant regenerating species on the site	OREGON WHITE OAK FIRST BLUE
2b	Oregon white oak (QUGA4) is absent or not dominant compared to other species regenerating on the site	3
3a	Ponderosa pine (PIPO) is the dominant regenerating species on the site	PONDEROSA PINE FIRST YELLOW
3b	Ponderosa pine (PIPO) is absent or not dominant compared to other regenerating species on the site	4
4a	Tanoak (LIDE3) is the dominant regenerating species on the site	TANOAK FIRST GREEN
4b	Tanoak (LIDE3) is absent or subordinant to other regenerating species on the site	5
5a	Douglas-fir (PSME) is the dominant regenerating species on the site	DOUGLAS-FIR FIRST ORANGE
5b	Douglas-fir (PSME) is absent or subordinant to other species	6
6a	Western hemlock (TSHE) is the dominant regenerating species on the site	WESTERN HEMLOCK FIRST PURPLE
6b	Western hemlock (TSHE) absent or subordinant to other species in the understory	7
7a	Western red cedar (THPL) is the dominant regenerating species on the site	WESTERN REDCEDAR FIRST BROWN
7b	Western red cedar (THPL) absent or subordinant to other species in the understory	8
8a	Port-Orford-Cedar (CHLA) is the dominant regenerating species on the site	PORT-ORFORD-CEDAR SECOND RED
8b	Port-Orford-Cedar (CHLA) is absent or subordinant to other regenerating species on the site	9

9a	Jeffrey pine (PIJE) is the dominant regenerating species on the site	JEFFREY PINE SECOND BLUE
9b	Jeffrey pine (PIJE) is absent or subordinant to other regenerating species on the site	10
10a	White fir (ABCO) is the dominant regenerating species on the site	WHITE FIR SECOND YELLOW
10b	White fir (ABCO) absent or subordinant to other species	11
11a	Lodgepole pine (PICO) is the dominant species in the overstory and is replacing itself as evidenced by a sequence of age classes	LODGEPOLE PINE SECOND GREEN
11b	Lodgepole pine (PICO) absent or subordinant to other species in the overstory and understory	12
12a	Shasta red fir (ABMAS) is the dominant regenerating species on the site	SHASTA RED FIR SECOND ORANGE
12b	Shasta red fir (ABMAS) absent or subordinant to other species on the site	13
13a	Pacific silver fir (ABAM) is the dominant regenerating species on the site	PACIFIC SILVER FIR SECOND PURPLE
13b	Pacific silver fir (ABAM) absent or subordinant to other species in the understory	14
14a	Western white pine (PIMO3) is the dominant regenerating species on the site	WESTERN WHITE PINE SECOND BROWN
14b	Western white pine (PIMO3) is absent or subordinant to other regenerating species on the site	15
15a	Mountain hemlock (TSME) is the dominant regenerating species	MOUNTAIN HEMLOCK THIRD RED

SITKA SPRUCE SERIES

SITKA SPRUCE SERIES
Picea sitchensis
PISI

Paula R Fong

Sitka spruce extends in a narrow band along the west coast of North America from Alaska into northern California Southwestern Oregon is near the southern end of the species range Although the species extends further inland along major drainages, most of the Series can be found within one mile of the Pacific Ocean, in the wet and mild climate of the coastal plains and headlands Tanoak replaces Sitka spruce, as the potential climax species, on inland sites as marine influence wanes North of Port Orford, the Sitka Spruce Series widens and abuts the Western Hemlock Series on its eastern flank. South of Brookings, tanoak is climax on most sites now dominated by coast redwood, and the Sitka Spruce Series becomes narrow and discontinuous

Two plant associations have been identified for the Series in southwestern Oregon: Sitka Spruce/Salal-Evergreen Huckleberry and Sitka Spruce-White Fir/ Salmonberry. The Sitka Spruce/Salal-Evergreen Huckleberry Association is similar to the Sitka Spruce/Salal-Coast Association identified in the Siuslaw National Forest Plant Association and Management Guide (Hemstrom and Logan 1986), but has much less western hemlock. The Siuslaw Guide's Sitka Spruce/Salal-Coast Association may occur on sites immediately north of Port Orford

Average annual temperature is 54 degrees F and average annual precipitation is 86 inches, supplemented by fog drip. Average elevation is less than 420 feet Sample sites are located entirely on private and state-owned land in Curry County This Series is seldom found on Federal lands

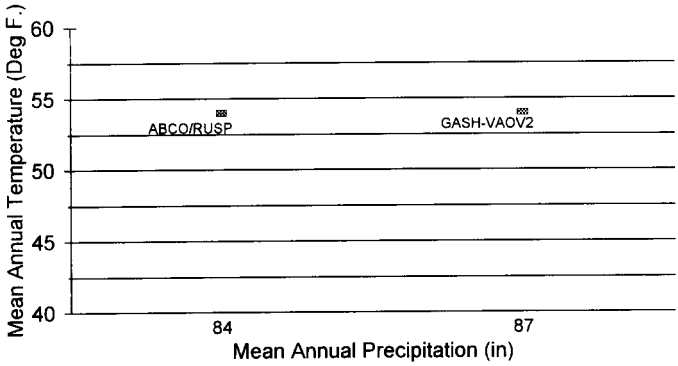
Soils tend to be deep over siltstone and sandstone parent material Most of the soils mapped in this portion of the Curry County Soil Survey (18 sites were sampled) include well developed Ultisols mixed with less developed, sandier Inceptisols Surface texture is loam with 5 to 40 percent gravel and 13 to 27 percent clay Subsurface texture is loam, sandy loam, or clay loam, with 10 to 40 percent gravel and 7 to 35 percent clay The Sitka Spruce Series occurs within the isomesic soil temperature regime, where the soil temperature does not vary significantly between summer and winter Soil moisture regime is udic

The relative environments of the plant associations are shown in the Environmental Graph on page PISI 2 Each association is plotted by average annual temperature and average annual precipitation

Sitka spruce grows in dense stands dominating the overstory, or in association with red alder, white fir, and Douglas-fir Occasionally, dense pockets of lodgepole pine (sometimes called shore pine) are interspersed among the spruce The shrub layer is often salmonberry, salal, and evergreen huckleberry Western swordfern is usually present in the herb layer Average vascular plant species richness (total number of vascular species) for the Series ranges between 18 and 23

PISI 2

Environmental Graph



Although the Series shows relatively little variation in annual precipitation, there may be a difference in soil water availability associated with soil texture Although the difference may be subtle, it is likely to influence species composition Greater cover of salal, as opposed to evergreen huckleberry, is usually associated with the drier end of the moisture gradient Stands dominated by salal with Sitka spruce by itself in the overstory tend to occur on the sandy, well-drained Inceptisols at the southern end of the sample area (Brookings area) where fog drip is less common Stands with more white fir and alder, and a significant component of salmonberry in the shrub layer, tend to be found in the soils with silt and clay loam in the subsurface, north of Cape Sebastian where fog more often occurs during the summer

KEY TO THE SITKA SPRUCE PLANT ASSOCIATIONS

1a White fir (ABCO) regeneration cover 10 percent or greater — PISI-ABCO/RUSP Page PISI 4

1b White fir (ABCO) regeneration cover absent, or less than 10 percent. — 2

2a Salmonberry (RUSP) cover 10 percent or greater — PISI-ABCO/RUSP Page PISI 4

2b. Salmonberry (RUSP) cover less than 10 percent. — 3

3a. Salal (GASH) cover 10 percent or greater. — PISI/GASH-VAOV2 Page PISI 6

3b Salal (GASH) cover less than 10 percent. — PISI-ABCO/RUSP Page PISI 4

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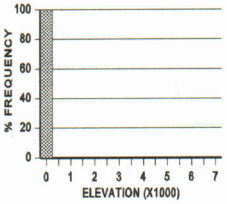
PISI 4

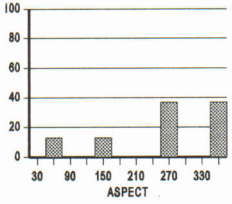
SITKA SPRUCE-WHITE FIR/SALMONBERRY
Picea sitchensis-Abies concolor/Rubus spectabilis
PISI-ABCO/RUSP (N=8; NRCS=8)

Distribution. This Association occurs on lands within one half mile of the Pacific Ocean between the Oregon-California border and Port Orford, Oregon. Most frequently this Association is found north of Cape Sebastian. The Siuslaw National Forest Plant Association Guide should be consulted for sites near Port Orford.

Distinguishing Characteristics. This Association is slightly more diverse and supports slightly more cover than the Sitka Spruce/Salal-Evergreen Huckleberry Association. The overstory usually includes white fir and red alder, as well as Sitka spruce. The shrub layer has high salmonberry cover, with evergreen huckleberry and salal commonly present. Soil textures tend to have higher moisture-holding capacity than the Sitka Spruce/Salal-Evergreen Huckleberry Association.

Soils. The dominant parent material is siltstone, with some sites underlain by sandstone. Surface rock (defined as greater than 7 centimeters in size) cover





Slope position data not available

averages16 percent, and is mostly gravel. Based on nine plots sampled, soils are deep and moderately well drained to well drained Surface texture is loam with five to 40 percent gravel and 20 to 27 percent clay. Subsurface texture is clay loam with 10 to 45 percent gravel and cobbles and 30 to 35 percent clay The soil moisture regime is probably xeric and the soil temperature regime is isomesic

Environment Elevation averages 412 feet. Slopes average 30 percent with a range of 1 to 50 percent Both associations average 54 degrees F average annual temperature, but Sitka Spruce-White Fir/Salmonberry averages 84 inches of average annual precipitation.

Vegetation Composition and Structure. Species richness for this Association averages 23 species. The overstory generally includes more white fir, Douglas-fir and red alder than the Sitka Spruce/Salal-Evergreen Huckleberry Association Western sword-fern and salmonberry dominate the herb and shrub layers respectively, with evergreen huckleberry commonly present on most sites, but at low covers. Salal, poison oak, red elderberry, and red huckleberry are also occasionally present, but at low covers.

Common name	Code	Constancy	Class**	Avg. Richness
Overstory trees				4
Sitka spruce	PISI	100	5	
White fir	ABCO	63	2	
Red alder	ALRU2	63	2	
Douglas-fir	PSME	50	3	
Understory trees				2
White fir	ABCO	75	1	
Sitka spruce	PISI	63	1	
Douglas-fir	PSME	38	1	
Shrubs				5
Salmonberry	RUSP	88	3	
Evergreen huckleberry	VAOV2	63	2	
Salal	GASH	50	2	
Western dewberry	RUVI	50	2	
Red huckleberry	VAPA	50	1	
Red elderberry	SARA2	38	2	
Herbs				11
Western sword-fern	POMU	100	4	
Mediterranean brome	BRMA2	88	2	
Iris species	IRIS	50	2	

**Cover is given in Daubenmire cover class codes (1-5)
See the Introduction

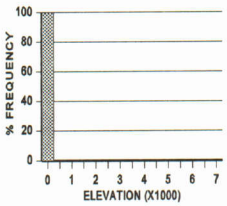
PISI 6

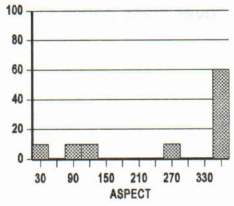
SITKA SPRUCE/SALAL-EVERGREEN HUCKLEBERRY
Picea sitchensis/Gaultheria shallon-Vaccinium ovatum
PISI/GASH-VAOV2 (N=10; NRCS=10)

Distribution. This Association occurs on lands within one half mile of the Pacific Ocean between the Oregon-California border and Port Orford, Oregon. Most frequently this Association is found south of Cape Sebastian.

Distinguishing Characteristics. This Association is slightly less diverse and supports slightly less vegetative cover than the Sitka Spruce-White Fir/Salmonberry Association. The overstory and shrub layer are dominated by Sitka spruce and salal, respectively. The soil textures are generally more well drained and have slightly less moisture-holding capacity than the Sitka Spruce-White Fir/Salmonberry Association.

Soils. The predominant parent material is sandstone. Surface rock (defined as greater than 7 centimeters in size) cover averages 3 percent, and is mostly gravel. Based on three pits sampled, soils are deep and well drained. Surface texture is





Slope position data is not available

loam with less than 5 percent gravel and 13 percent clay Subsurface texture is loam and sandy loam. with 30 to 40 percent gravel and cobbles and 7 to 13 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is isomesic

Environment Elevation averages 416 feet. Slopes average 20 percent with a range of 1 to 65 percent. This Association averages 54 degrees F and 86 inches of precipitation annually

Vegetation Composition and Structure. Species richness for this Association averages 18 species. The overstory is slightly less diverse than the Sitka Spruce-White Fir/Salmonberry Association. It is dominated by Sitka spruce, with some red alder and Douglas-fir. Salal dominates the shrub layer. Western sword-fern and evergreen huckleberry are also almost always present but with less cover than salal Salmonberry is commonly present, but with low cover.

Common name	Code	Constancy	Class**	Avg Richness
Overstory trees				3
Sitka spruce	PISI	100	5	
Red alder	ALRU2	50	1	
Douglas-fir	PSME	40		
Understory trees				3
Sitka spruce	PISI	40	2	
Tanoak	LIDE3	40	1	
Douglas-fir	PSME	30	1	
Shrubs				4
Salal	GASH	100	3	
Evergreen huckleberry	VAOV2	100	2	
Western dewberry	RUVI	80	2	
Bracken	PTAQ	60	1	
Salmonberry	RUSP	50	1	
Red huckleberry	VAPA	30	2	
Herbs				8
Western sword-fern	POMU	100	2	
Fragrant bedstraw	GATR3	40	2	
Iris species	IRIS	30	1	
Rush species	RUSH	30	2	

**Cover is recorded as Daubenmire cover class (1-5)
See the Introduction.

OREGON WHITE OAK SERIES

OREGON WHITE OAK SERIES

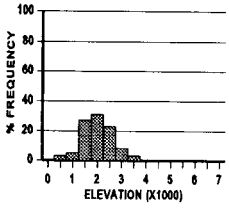
Quercus garryana
QUGA4

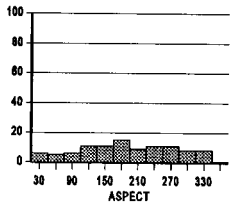
Patricia A. Martinez

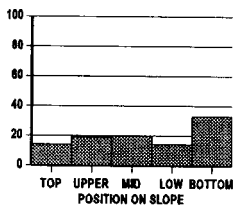
Oregon white oak occurs from central California north into Canada and is the most abundant and widely distributed oak in Oregon. Oregon white oak tends to be restricted to islands of shallow soils and hot, dry microclimates It is usually located on dry to moist, well-drained, gravelly soils, and is shade intolerant Oregon white oak produces an abundance of acorns and is a vigorous sprouter.

The Oregon White Oak Series is found along the valley floor at low elevations. The Series is discontinuous with isolated pockets on the Tiller Ranger District, Umpqua National Forest and along Bear Camp Road near Agness, Gold Beach Ranger District, Siskiyou National Forest

As shown in the graphs below, this Series ranges in elevation from 500 feet to 3300 feet, with an average elevation of 1980 feet. Although it occurs on all slope positions and aspects, it is more commonly found on southerly aspects and is slightly more common in valley bottoms



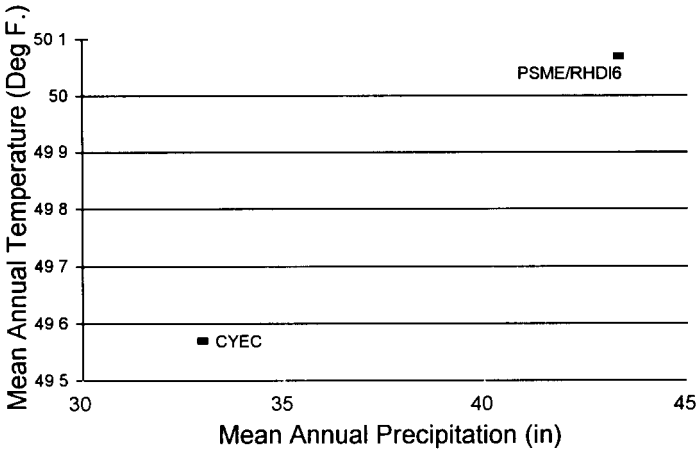




Parent material is variable, consisting of meta-volcanics, serpentine, tuffs, sandstone, mixed sediments, mixed meta-sediments with ultramafics, mixed sediments with ultramafics, mixed ultramafics, welded tuffs, basalt and andesite. Percent cover of rock ranges from 0 to 50 percent, with an average of 6 percent. Percent cover of bedrock ranges from 0 to 30 percent, with an average of 1 percent Bare ground ranges from 0 to 20 percent, with an average of 3 percent Litter ranges from 0 to 99 percent, with an average of 41 percent. Moss ranges from 0 to 35 percent, with an average of 4 percent

Based on eight plots sampled, soils are shallow to deep, and moderately well to well drained. The surface texture is silt loam or loam, with 0 to 25 percent gravel, 0 to 30 percent cobbles, and 20 to 25 percent clay The subsurface texture is silty clay loam and clay loam, with 0 to 20 percent gravel, 0 to 40 percent cobbles, 0 to 20 percent stones, and 27 to 40 percent clay The soil moisture regime is probably xeric and

the soil temperature regime is probably mesic Soils classify into the following subgroups Typic Haploxeroll, Lithic Haploxeroll, Lithic Argixeroll, Lithic Xerochrept, and Typic Xerochrept



The mean annual temperature for the Oregon White Oak Series is 50 degrees F while the mean annual precipitation ranges from 33 inches to 43 inches. The relative positions of the plant associations in the environment are shown above Each association is plotted by mean annual temperature and mean annual precipitation.

Average total species richness, based on vascular plants only, is calculated for each association. The average total species richness for the Oregon White Oak Series is 23 species Average total species richness for the Oregon White Oak-Douglas-fir/Poison Oak Association is 23 species and average total species richness for the Oregon White Oak/Hedgehog Dogtail Association is 24 species

On Bureau of Land Management sites, tree cover exceeding 10 feet tall (3 meters) averages 46 percent, while tree cover less than 10 feet tall averages 5 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 11 percent, and cover for shrubs less than 20 inches tall averages 19 percent Herb/grass cover averages 37 percent

On Forest Service sites, upper layer tree cover averages 6 percent Mid-layer tree cover averages 13 percent, while lower layer tree cover averages 10 percent High shrub cover averages 1 percent, while low shrub cover averages 4 percent Herb/grass cover is high, averaging 91 percent

Two plant associations have been identified for the Oregon White Oak Series Oregon White Oak/Hedgehog Dogtail and Oregon White Oak-Douglas-fir/Poison Oak They were described from 64 plots, 60 on Bureau of Land Management lands and 4 on Forest Service lands Oregon White Oak/Hedgehog Dogtail is drier than Oregon White Oak-Douglas-fir/Poison Oak, Douglas-fir is rarely present and poison oak is usually present, with an average cover of 5 percent. Oregon White Oak - Douglas-fir/Poison Oak is more productive than Oregon White Oak/Hedgehog Dogtail, Douglas-fir is almost always present, and poison oak has an average cover of 18 percent. Oregon White Oak/Hedgehog Dogtail has high herb cover and may have up to 18 grass species present. Hedgehog dogtail is present 85 percent of the time with an average cover of 10 percent, and bur-chervil is present 79 percent of the time with an average cover of 6 percent

The relationship of draft and final plant associations in the Oregon White Oak Series is shown below The draft association is listed, with the final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

QUGA/FRVEB (N=5)
QUGA4/CYEC (80%)
PSME-CADE27/BEPI2 (20%)

KEY TO THE OREGON WHITE OAK PLANT ASSOCIATIONS

1a Douglas-fir (PSME) present, Douglas-fir cover for both the overstory and understory combined is greater than or equal to 2 percent — QUGA4-PSME/RHDI6 Page QUGA4 4

1b Douglas-fir (PSME) absent, if present, cover for both the overstory and understory combined is less than or equal to 1 percent — QUGA4/CYEC Page QUGA4 6

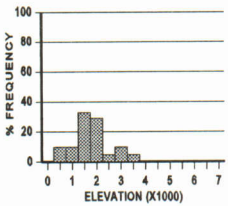
QUGA4 4

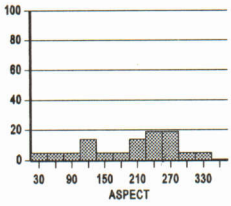
OREGON WHITE OAK-DOUGLAS-FIR/POISON OAK
Quercus garryana-Pseudotsuga menziesii/Rhus diversiloba
QUGA4-PSME/RHDI6 (N=21; BLM=21)

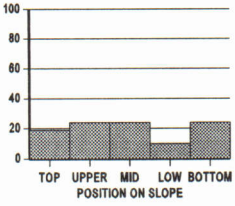
Distribution. This Association is found on the Grants Pass, Butte Falls, and Ashland Resource Areas, Medford District and the Swiftwater Resource Area, Roseburg District, Bureau of Land Management. It may also occur on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, all Ranger Districts of the Rogue River National Forest, and the Tiller and North Umpqua Ranger Districts, Umpqua National Forest.

Distinguishing Characteristics. Douglas-fir is present in the overstory and the understory and poison oak is frequent, with an average cover of 18 percent. The average annual temperature is 50 degrees F and the average annual precipitation is 43 inches, wetter than the Oregon White Oak/Hedgehog Dogtail Association.

Soils. Parent materials found in this Association are meta-volcanics, mixed meta-sediments with ultramafics, basalt, sandstone, mixed sediments with ultramafics, and







mixed ultramafics Surface gravel, rock, and bedrock covers are low, averaging less than 6 percent for each component. Based on four plots sampled, soils are moderately well drained The surface texture is loam and silt loam, with 0 to 25 percent gravel, 0 to 30 percent cobbles, and 20 to 23 percent clay. The subsurface texture is clay loam, with 0 to 20 percent gravel, 5 to 40 percent cobbles, 0 to 20 percent stones, and 27 to 40 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is probably mesic. Soils classify into the following subgroups: Lithic Haploxeroll, Lithic Xerochrept, and Typic Xerochrept.

Environment. Elevation averages 1810 feet. This Association occurs on all aspects, although it is more common on southerly aspects Slope averages 25 percent, and ranges from 3 to 65 percent. Oregon White Oak-Douglas-fir/Poison Oak can be found on all slope positions, but is slightly more common on upper to middle-third slope positions

Vegetation Composition and Structure. Total species richness averages 23 species, slightly lower than the Oregon White Oak/Hedgehog Dogtail Association The overstory and understory are both dominated by Oregon white oak with frequent occurrences of Douglas-fir. Poison oak is also frequent. Mountain sweet-root, hedgehog dogtail, and blue wildrye are common. Moss cover averages 5 percent.

Cover for trees greater than 10 feet tall (3 meters) averages 52 percent, while cover for trees less than 10 feet tall averages 3 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 14 percent, while cover for shrubs less than 20 inches tall averages 27 percent. Herb/grass cover averages 27 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				2
Oregon white oak	QUGA4	86	19	
Douglas-fir	PSME	48	13	
Ponderosa pine	PIPO	19	10	
California black oak	QUKE	14	10	
Understory trees				3
Douglas-fir	PSME	95	4	
Oregon white oak	QUGA4	90	20	
Ponderosa pine	PIPO	33	4	
Pacific madrone	ARME	24	12	
California black oak	QUKE	19	10	
Incense-cedar	CADE27	19	2	
Shrubs				3
Poison oak	RHDI6	95	18	
Baldhip rose	ROGY	57	2	
Common snowberry	SYAL	43	1	
Herbs				15
Mountain sweet-root	OSCH	71	1	
Hedgehog dogtail	CYEC	62	7	
Blue wildrye	ELGL	62	4	
Catchweed bedstraw	GAAP2	57	1	
Sierra sanicle	SAGR5	57	1	
Bur-chervil	ANSC8	48	2	

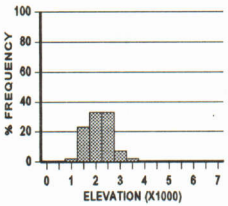
QUGA4 6

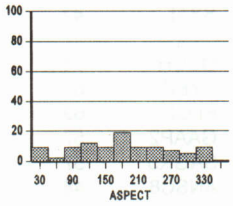
OREGON WHITE OAK/HEDGEHOG DOGTAIL
Quercus garryana/Cynosurus echinatus
QUGA4/CYEC (N=43; BLM=39, FS=4)

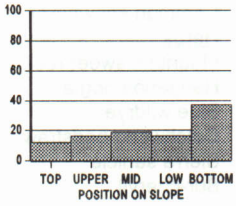
Distribution. This Association occurs on the North Umpqua and Tiller Ranger Districts, Umpqua National Forest, the Grants Pass, Ashland, and Butte Falls Resource Areas, Medford District, and the Swiftwater Resource Area, Roseburg District, Bureau of Land Management. It may also occur on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and all Districts of the Rogue River National Forest.

Distinguishing Characteristics. Douglas-fir is generally absent. This Association supports high grass species richness (approximately 18 species). Herb/grass cover is high. The average annual temperature is 50 degrees F and the average annual precipitation is 33 inches, drier than the Oregon White Oak-Douglas-fir/Poison Oak Association.

Soils. Parent material is variable, consisting of meta-volcanics, serpentine, basalt,







tuffs, sandstone, mixed-sediments, welded tuffs, and andesite. Surface gravel, rock, and bedrock covers are low, averaging less than 6 percent for each component. Based on four plots sampled, soils are shallow to moderately deep and well drained The surface texture is silt loam or loam, with 0 to 22 percent gravel, 5 to 25 percent cobbles, and 21 to 25 percent clay Subsurface textures are silty clay loams or clay loams, with 0 to 10 percent gravel, 0 to 25 percent cobbles, and 35 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is probably mesic Soils classify to the following subgroups: Typic Haploxeroll, Lithic Haploxeroll, and Lithic Argixeroll

Environment Elevation averages 2130 feet This Association is present on all aspects, but is most common on southerly aspects. Slope averages 24 percent, ranging from 0 to 65 percent Oregon White Oak/Hedgehog Dogtail occurs on all slope positions, but is most commonly found on slope bottoms and flats.

Vegetation Composition and Structure Total species richness averages 24, slightly higher than the Oregon White Oak-Douglas-fir/Poison Oak Association The overstory is dominated by Oregon white oak with occasional occurrences of ponderosa pine, California black oak, and Pacific madrone The understory is dominated by Oregon white oak, with occasional occurrences of Pacific madrone, ponderosa pine, California black oak, and birchleaf mountain-mahogany. In the shrub layer, poison oak is frequent, with an average cover of 5 percent Hedgehog dogtail and bur-chervil are frequently found in the herb layer The number of grass species present, along with their covers, are high Herbs are also plentiful, although covers for individual species are low Moss cover averages 2 percent

On Forest Service sites, upper layer tree cover averages 6 percent Mid-layer tree cover averages 13 percent while lower layer tree cover averages 10 percent High shrub cover averages 1 percent and low shrub cover averages 4 percent Herb/grass cover averages 91 percent

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 39 percent, while cover for trees less than 10 feet tall averages 6 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 8 percent, while cover for shrubs less than 20 inches tall averages 10 percent. Herb/grass cover averages 46 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				1
Oregon white oak	QUGA4	64	21	
Understory trees				2
Oregon white oak	QUGA4	95	25	
California black oak	QUKE	23	9	
Shrubs				3
Poison oak	RHDI6	85	5	
Buckbrush	CECU	51	4	
Herbs				18
Hedgehog dogtail	CYEC	85	10	
Bur-chervil	ANSC8	79	6	
Field brodiaea	BRPU8	67	1	

PONDEROSA PINE SERIES

PONDEROSA PINE SERIES

Pinus ponderosa

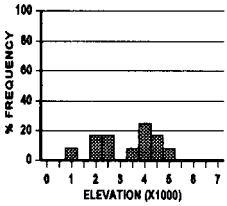
PIPO

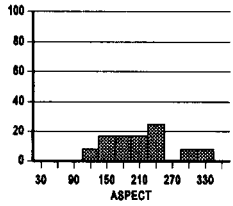
Patricia A. Martinez

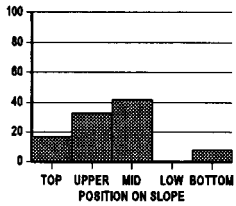
Ponderosa pine is a widely occurring species in the western United States. It is common in areas with low summer rainfall and is generally tolerant of moisture stress While ponderosa pine behaves as a fast growing, seral species on hot, dry sites with shallow, droughty soils, it is the climax species on only a few sites in the Klamath and Cascade Province in southwestern Oregon (Atzet 1992) Ponderosa pine can be found in frost pockets and on vertisols, soils with high shrink-swell characteristics. Ponderosa pine regeneration is stimulated by fire, and controlling fires restricts regeneration

The Ponderosa Pine Series is found near the valley bottom at slightly higher elevations than the Oregon White Oak Series Small pockets of this Series may occasionally be found at high elevations on south aspects with shallow, rocky soils.

As shown in the graphs below, the Series ranges in elevation from 1050 feet to 5220 feet, with an average elevation of 3310 feet. The Series occurs on all aspects and slope positions, but occurs most frequently at mid-slope positions.



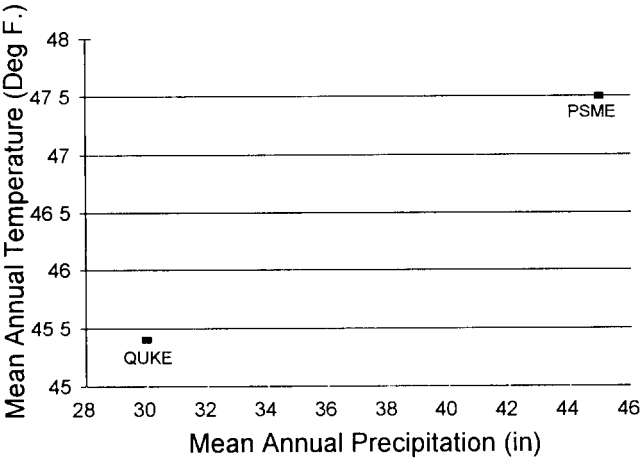




Parent material is variable, consisting of meta-volcanics, basalt, andesite, mixed ultramafics, schist, and diorite. Gravel cover averages 2 percent Rock cover ranges from 0 to 70 percent, with an average of 7 percent. Bedrock cover ranges from 0 to 45 percent, with an average of 5 percent. Bare ground ranges from 0 to 90 percent, with an average of 9 percent Soil textures are silty clay loam, loam, or silty clay. Litter ranges from 10 to 99 percent, with an average of 66 percent Moss is generally absent

The mean annual temperature for the Ponderosa Pine Series ranges from 45 degrees F to 48 degrees F and the mean annual precipitation ranges from 30 inches to 45 inches The relative positions of the plant associations in the environment are shown on page PIPO 2 Each association is plotted by mean annual temperature and mean annual precipitation.

PIPO 2



Total species richness, based on vascular plants only, is calculated for each association The average total species richness for the Ponderosa Pine Series is 21 species Total species richness for Ponderosa Pine-Douglas-fir is 23 species and total species richness for Ponderosa Pine-California Black Oak is 19 species

On Bureau of Land Management sites, tree cover exceeding 10 feet tall (3 meters) averages 60 percent, while cover for trees less than 10 feet tall averages 3 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 11 percent and cover for shrubs less than 20 inches tall averages 1 percent Herb/grass cover averages 28 percent

On Forest Service sites, upper layer tree cover averages 23 percent, as does mid-layer tree cover Lower layer tree cover averages 12 percent High shrub cover averages 24 percent, while low shrub cover averages 14 percent Herb/grass cover averages 38 percent

Two plant associations have been identified for the Ponderosa Pine Series in southwestern Oregon They were described from 12 plots, 10 on Bureau of Land Management lands and 2 on Forest Service lands The plant associations were described using Bureau of Land Management data Climax ponderosa pine rarely occurs on National Forest Service lands in southwestern Oregon

The two associations in this Series are distinguished by either the presence or absence of Douglas-fir The Ponderosa Pine-Douglas-fir Association has Douglas-fir frequently present with covers usually greater than 5 percent in the overstory and understory combined Douglas-fir is present in the Ponderosa Pine-California Black Oak Association, but covers are less than or equal to 1 percent and California black oak is present, generally with covers greater than 15 percent

The relationship of draft and final plant associations in the Ponderosa Pine Series is shown below The draft association is listed, with the final association below it, with the percentage of plots that make up the association (refer to Methods).

PIPO-PSME (N=2)
PIPO-PSME (100%)

LITERATURE CITED

Atzet, Thomas, David L Wheeler, Brad Smith, Jerry Franklin, Gregg Riegel, and Dale Thornburgh. 1992. Vegetation P. 92-113 in Hobbs, Stephan D., et al., editors. Reforestation Practices in Southwestern Oregon and Northern California. Forest Research Laboratory, Oregon State University 465 pages.

KEY TO THE PONDEROSA PINE PLANT ASSOCIATIONS

1a Douglas-fir (PSME) present with covers greater than 5 percent in the overstory and understory combined. California black oak (QUKE) usually absent

PIPO-PSME
Page PIPO 4

1b. Douglas-fir (PSME) absent If present, Douglas-fir cover is less than 5 percent in both the overstory and understory combined California black oak (QUKE) present, usually with covers greater than 15 percent.

PIPO-QUKE
Page PIPO 6

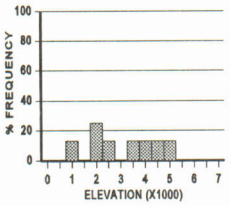
PIPO 4

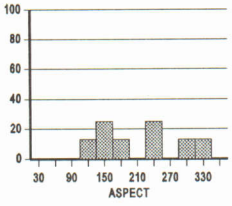
PONDEROSA PINE-DOUGLAS-FIR
Pinus ponderosa-Pseudotsuga menziesii
PIPO-PSME (N=8; BLM=6, FS=2)

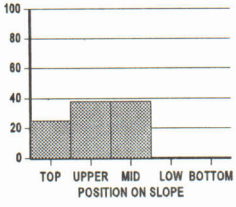
Distribution. This Association occurs on the Ashland, Butte Falls, Glendale, and Grants Pass Resource Areas, Medford District, Bureau of Land Management. It also occurs on the Applegate Ranger District and may occur on the Ashland, Butte Falls, and Prospect Ranger Districts, Rogue River National Forest and the Galice Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association is slightly warmer and wetter than the Ponderosa Pine-California Black Oak Association, averaging 48 degrees F and 45 inches of precipitation annually. Douglas-fir is frequently present with an average cover of 24 percent. California black oak was present on three out of eight plots.

Soils. Parent materials are andesite, basalt, mixed ultramafics, schist, and diorite. Surface rock (defined as greater than 7 centimeters in size) cover averages 9 percent and exposed bedrock averages 2 percent. Bare ground averages 13







percent, significantly higher than the Ponderosa Pine-California Black Oak Association. Based on three plots sampled, surface texture is loam, with 20 to 40 percent gravel and cobbles. Subsurface texture is loam, with 60 percent cobbles

Environment. Elevation averages 3050 feet. Aspect is variable, though generally not north. Slopes average 32 percent with a range of 15 to 65 percent. Slope position ranges from mid-slope to ridgetops.

Vegetation Composition and Structure Total species richness averages 23 species, slightly higher than the Ponderosa Pine-California Black Oak Association. The overstory is dominated by ponderosa pine and Douglas-fir, both with relatively low covers, 16 and 17 percent respectively The understory is dominated by ponderosa pine, with Douglas-fir frequently occurring. Incense-cedar, canyon live oak, and sugar pine commonly occur in the understory. Pacific madrone, Oregon white oak, golden chinquapin, and big-leaf maple are rarely present Poison oak is the only commonly occurring shrub Woodland tarweed and slender-tubed iris commonly occur while California fescue and woods strawberry occasionally occur. Many grasses may be present. Moss cover averages 4 percent.

On Bureau of Land Management sites, tree cover exceeding 10 feet tall (3 meters) averages 63 percent, while cover for tree species less than 10 feet tall averages 4 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 11 percent and cover for shrubs less than 20 inches tall averages 1 percent. Herb/grass cover averages 15 percent.

On Forest Service sites, upper layer tree cover averages 23 percent. Mid-layer tree cover also averages 23 percent, while lower layer tree cover averages 12 percent. High shrub cover averages 24 percent and low shrub cover averages 14 percent Herb/grass cover averages 38 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	17	
Ponderosa pine	PIPO	88	16	
Incense-cedar	CADE27	25	14	
Understory trees				5
Ponderosa pine	PIPO	100	10	
Douglas-fir	PSME	100	5	
Incense-cedar	CADE27	63	2	
Canyon live oak	QUCH2	50	16	
Sugar pine	PILA	50	3	
Pacific madrone	ARME	37	8	
Shrubs				3
Poison oak	RHDI6	50	1	
Hairy honeysuckle	LOHI2	37	1	
Baldhip rose	ROGY	37	7	
Herbs				10
Woodland tarweed	MAMA	50	1	
Slender-tubed iris	IRCH	50	1	
California fescue	FECA	38	5	

PIPO 6

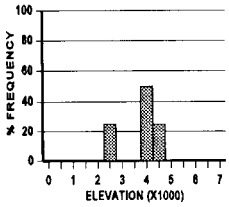
PONDEROSA PINE-CALIFORNIA BLACK OAK
Pinus ponderosa-Quercus kelloggii
PIPO-QUKE (N=4, BLM=4)

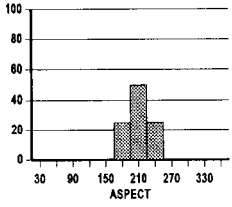
NO PICTURE AVAILABLE

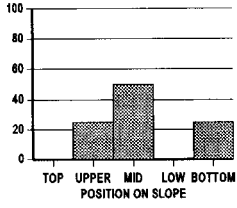
Distribution This Association occurs on the Ashland and Butte Falls Resource Areas, Medford District, Bureau of Land Management It may also occur on all Ranger Districts of the Rogue River National Forest

Distinguishing Characteristics This Association is slightly cooler and drier than the Ponderosa Pine-Douglas-fir Association, averaging 45 degrees F and 30 inches of precipitation annually Douglas-fir, when present, has covers of less than 3 percent in both the overstory and the understory California black oak is frequently present with covers usually greater than 15 percent

Soils Parent material is mostly basalt or metavolcanic materials Surface rock (defined as greater than 7 centimeters in size) cover averages 18 percent and exposed bedrock cover averages less than 1 percent Bare ground averages less







than 1 percent, considerably less than the Ponderosa Pine-Douglas-fir Association. Based on four plots sampled, soil textures are silty clay loam, loam, or silty clay Average rock fragment content is 13 percent, most of which is cobbles and stones (10 percent)

Environment Elevation averages 3820 feet This Association is generally found on south to southwest aspects Slopes average 22 percent, with a range of 0 to 45 percent Slope position ranges from bottoms to the upper one-third

Vegetation Composition and Structure Total species richness averages 19 species, slightly less than the Ponderosa Pine-Douglas-fir Association The overstory is dominated by California black oak, while the understory is dominated by ponderosa pine and California black oak California black oak cover averages 22 percent Douglas-fir is also frequently present, but with covers of less than 3 percent Deerbrush and common snowberry are common shrubs, while common vetch, woods strawberry, hedgehog dogtail, mountain sweet-root, white-flowered hawkweed, and slender-tubed iris are all frequent herbs Moss is absent

Tree cover exceeding 10 feet tall (3 meters) averages 57 percent, while cover for tree species less than 10 feet tall averages 2 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 10 percent, and cover for shrubs less than 20 inches tall is 0 percent Herb/grass cover averages 40 percent

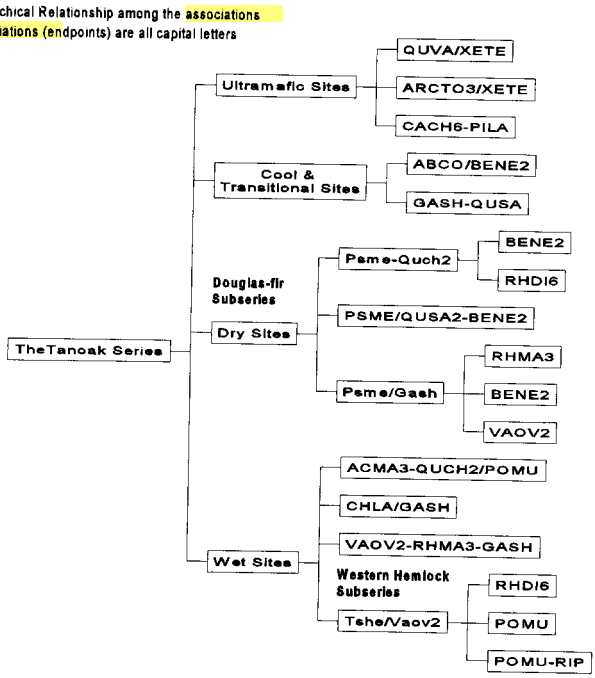
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
California black oak	QUKE	75	13	
Oregon white oak	QUGA4	25	5	
Douglas-fir	PSME	25	1	
Ponderosa pine	PIPO	25	1	
Understory trees				4
Ponderosa pine	PIPO	100	6	
California black oak	QUKE	75	22	
Douglas-fir	PSME	75	1	
Oregon white oak	QUGA4	25	2	
Western juniper	JUOC	25	1	
Pacific madrone	ARME	25	1	
Shrubs				2
Deerbrush	CEIN3	50	18	
Common snowberry	SYAL	50	1	
Herbs				20
Common vetch	VISA	100	4	
Woods strawberry	FRVEB3	75	13	
Hedgehog dogtail	CYEC	75	7	
Mountain sweet-root	OSCH	75	7	
White-flowered hawkweed	HIAL2	75	1	
Slender-tubed iris	IRCH	75	1	
Meadow fescue	FEPR	50	11	
Rough bluegrass	POTR	50	10	
Western fescue	FEOC	50	6	
Fragrant bedstraw	GATR	50	3	

TANOAK SERIES

TANOAK SERIES
Lithocarpus densiflorus
LIDE3

Thomas Atzet

Lands climax to tanoak were classified into 17 plant associations and two subseries (Their hierarchical relationship is shown in the organizational chart below) Douglas-fir and western hemlock are co-climax with tanoak on the drier and wetter sites, respectively Each condition defines a subseries (a division of the series) Tanoak is climax in the moist middle of southwestern Oregon's environmental gradient The Douglas-fir Series and the Western Hemlock Series bracket tanoak's environmental range The Tanoak-Douglas-fir-Canyon Live Oak/Dwarf Oregongrape Association represents the drier end of the gradient Tanoak-Western Hemlock/Evergreen Huckleberry/Western Sword-fern-RIP (Riparian) represents the wet end Other associations are associated with ultramafic parent material, high elevation, or specific topographic positions, particularly lower slopes, canyon bottoms or riparian zones

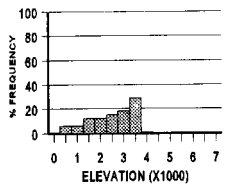


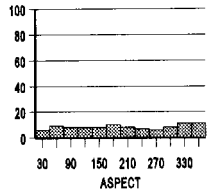
Tanoak's range is limited to southwest Oregon and northwest California Unlike many of its associates, frost, drought, and fire limit its survival and ability to compete North of Coos Bay, and at elevations above 4000 feet, frost occurs more often and later in the spring, killing or damaging tanoak To the south and inland, where marine precipitation and fog wane, drought resistant species are better adapted Fire, like frost, periodically kills or damages tanoak, forcing it to use its root reserves, and keeping it in a reduced competitive condition In the last 50 years, lack of fire has enhanced tanoak's competitive status The effects on species composition and stand structure are evident, absolute cover and relative density have increased

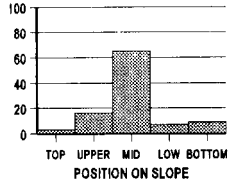
Tanoak is not climax throughout its range Its major associates and competitors, Douglas-fir, Port-Orford-cedar, western hemlock, white fir, and even Jeffrey pine dominate sites well into late successional stages and will maintain dominance, even where tanoak is abundant Observation, in southwest Oregon, suggests that within 100 years after a major disturbance, the dominant climax species has established itself After 300 years, keying to the correct series is almost assured

Tanoak is climax where frost events and drought occur less often (1) in an inland midslope elevational belt below the high elevation cold, but above cold air accumulation in the valleys (mostly 2000 to 4000 feet, see the three figures below), (2) on the coast where marine air softens severe frosts and reduces summer evapotranspirational demand, (3) in protected inland, often north facing, coves, and (4) on ultramafic sites heavily modified by precipitation or by other normal rock types

The three graphs below indicate where associations occur on the landscape Few occur above 4000 feet in elevation, about 3000 feet seems optimum Coastal associations, however, average about 1,000 feet No particular aspect is favored, but a majority of the associations can be found on midslope positions Three associations, Tanoak-Huckleberry Oak/Common Beargrass, Tanoak/Manzanita/Common Beargrass, and Tanoak-Golden Chinquapin-Sugar Pine are ssociated with ultramafic parent rock Generally deep soils are the rule Coastal associations tend to be associated with



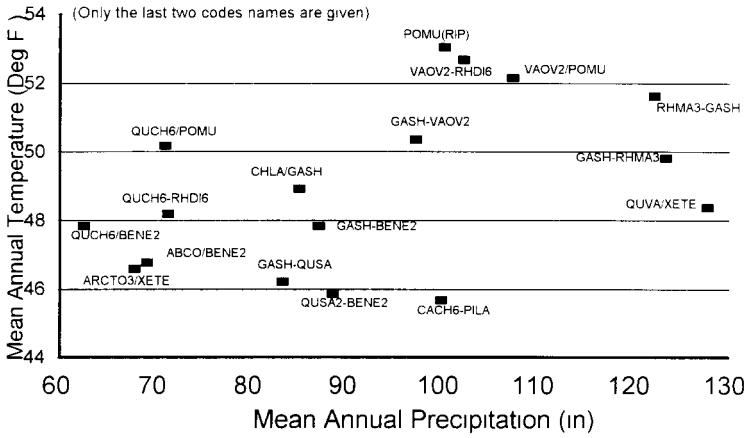




sediments since most of the area west of the coast crest is sedimentary

Relative temperature and precipitation of the plant associations are displayed in the Environmental Graph below on page LIDE3 3

Environmental Graph



The dry inland associations are associated with low precipitation and generally cooler temperatures Coastal associations appear in the upper right, representing the warm wet side of the gradient Salal, dwarf Oregongrape, evergreen huckleberry, and Pacific rhododendron commonly occur in the warmer wet associations on the coastal side of the Coast Range crest Except for evergreen huckleberry, they also occur on the east side where coastal influence modifies local climate, or where a combination of climate and topo-edaphic conditions are similar to the coastal climate

While keying it is important to pay particular attention to the relative cover of evergreen huckleberry, Pacific rhododendron, salal, and dwarf Oregongrape Each occupies a different environmental niche Note that evergreen huckleberry is associated with warm, wet plant associations It ranges from sea level to about 2500 feet in elevation and reaches maximum cover (most competitive) at about 1000 feet Salal has a greater range It occurs throughout southwestern Oregon, is less of a wet indicator, and reaches its maximum development at about 3500 feet in elevation Dwarf Oregongrape is more competitive inland, particularly at higher elevations It ranges from sea level to over 5500 feet and can attain greater than10 percent cover regardless of the elevation Pacific rhododendron is intermediate between evergreen huckleberry and salal

Three other species, golden chinquapin, Sadler oak, and canyon live oak are fairly faithful indicators Sadler oak, ranging from about 3000 to 5500 feet in elevation, usually occurs on cool to cold sites which are often rocky Canyon live oak, insensitive to elevation, but sensitive to moisture, usually occurs on warm to hot sites It is often associated with golden chinquapin when surface soil rock content is high

The association key is constructed to reflect the classification concept. It is divided (hierarchically) into associations that occur on ultramafic sites, those that occur in cold or transitional sites, those that occur on inland dry sites, and those that occur west of the Coast Range crest on wetter sites It is designed so that associations can be aggregated into subseries if association resolution is not needed Additional upward aggregation into wet and dry tanoak is also possible

Associations are part of a gradient that has been teased apart during analysis and made into associations at environmental breaks All breaks are artificial, and may be difficult to recognize in the field These concepts reflect how ecosystems exist and how they may be managed Names (particularly long in this Series), are based on the dominant species of each layer, and are designed to highlight the hierarchy, yet reflect the vegetation continuum. Where Douglas-fir is co-climax, its name is used The Western Hemlock Subseries is divided into three associations reflecting their position in the environmental gradient

When working in the southern end of the Series range, check the "Key to Tanoak Associations in Northern California" by Thomas Jimerson in Region Five A copy may be obtained by contacting the Six Rivers National Forest. The subseries and associations are similar and occasionally may describe sites more often found in California

Plant associations appear in the text in the order they appear in the key The key deals with associations related to ultamafic parent material first and moves through the associations generally from dry to wet (see the organization chart on Page LIDE3 1)

White and grand fir hybridize in southwest Oregon They are difficult to distinguish in the field and at times even with laboratory data Although coastal individuals have more grand fir morphological characteristics and inland samples appear more like white fir, we have chosen to call it all white fir, knowing there are an infinite variety of intergrades

LITERATURE CITED

Jimerson, T M 1997* A Field Guide To Tanoak Plant Associations In Northwest California USDA Forest Service, Six Rivers National Forest, Eureka, CA
(*to be published this year)

The relationship of draft and final plant associations Draft associations are underlined and final associations are listed below (Page LIDE3 5) in the order they most likely fall into the final associations This cross reference could be used to determine how sites keyed with the draft should fall into the final classification However, re-keying in the field or running existing species information through the new key is recommended

LIDE3\RHCA N = 7
LIDE3-PIMO3/QUVA/XETE (70%)
PIMO-LIDE3/QUVA/XETE (15%)
PSME/QUVA-ARNE-XETE (15%)

LIDE3-SESE2 N = 6
LIDE3/VAOV2-RHMA3-GASH (75%)
LIDE3-TSHE/VAOV2/POMU (25%)

LIDE3\UMCA N = 24
LIDE3/VAOV2-RHMA3-GASH (75%)
LIDE3-TSHE/VAOV2/POMU (15%)
LIDE3-PSME-QUCH2/RHDI6 (10%)
PSME-CACH6/BENE2 (5%)

LIDE3-CHLA N = 15
LIDE3-CHLA/GASH (33%)
LIDE3-PIMO3/QUVA/XETE (22%)
LIDE3-PSME-QUCH2/RHDI6 (22%)
LIDE3/VAOV2-RHMA3-GASH (11%)
CHLA/RHMA3-GASH (11%)

LIDE3/VAOV2-GASH N = 6
LIDE3/VAOV2-RHMA3-GASH (100%)

LIDE3/VAOV2 N = 10
LIDE3-PSME-QUCH2/RHDI6 (67%)
LIDE3/VAOV2-RHMA3-GASH (33%)

LIDE3/RHMA N = 7
LIDE3-TSHE/VAOV2/POMU (100%)

LIDE3\RHMA-VAOV2 N = 21
LIDE3/VAOV2-RHMA3-GASH (86%)
PSME/GASH-RHMA3 (14%)

LIDE3/RHMA-GASH N = 14
PSME/GASH-RHMA3 (100%)

LIDE3/GASH N = 14
LIDE3-PSME-QUCH2/RHDI6 (100%)

LIDE3/GASH-RHMA N = 10
LIDE3-PSME-QUCH2/BENE2 (20%)
LIDE3-PSME-QUCH2/RHDI6 (20%)
PSME-CACH6/BENE2 (20%)
PSME/GASH-RHMA3 (20%)

LIDE3/GASH-BENE N = 17
LIDE3-PSME-QUCH2/RHDI6 (100%)

LIDE3-ACCI N = 8
LIDE3-PSME-QUCH2/BENE2 (60%)
LIDE3-PSME-QUCH2/RHDI6 (40%)

LIDE3-ABCO-ACCI N = 11
LIDE3-PSME-QUCH2/BENE2 (60%)
LIDE3-PSME-QUCH2/RHDI6 (30%)
LIDE3-CHLA/GASH (10%)

LIDE3-ABCO N = 19
LIDE3-PSME-QUCH2/RHDI6 (92%)
LIDE3-PSME-QUCH2/BENE2 (8%)

LIDE3/BENE N = 23
LIDE3-PSME-QUCH2/RHDI6 (84%)
LIDE3-PSME-QUCH2/BENE2 (8%)
PSME-ABCO (8%)

LIDE3/BENE-RHDI N = 7
LIDE3-PSME-QUCH2/BENE2 (100%)

LIDE3-QUCH N = 14
LIDE3-PSME-QUCH2/RHDI6 (50%)
PSME-QUCH2-LIDE3 (50%)

LIDE3-QUCH/BENE N = 8
LIDE3-PSME-QUCH2/RHDI6 (50%)
LIDE3-PSME-QUCH2/BENE2 (25%)
PSME-QUCH2-LIDE3 (25%)

LIDE3-RHDI-LOHI N = 16
LIDE3-PSME-QUCH2/RHDI6 (92%)
PSME-QUKE/RHDI6 (8%)

KEY TO THE TANOAK PLANT ASSOCIATIONS

Ultramafic parent material influenced associations

1a Ultramafic parent material or soils with ultramafic influence (serpentine/peridotite), western white pine (PIMO3) greater than 10 percent cover in the overstory and understory combined — LIDE3-PIMO3/QUVA/XETE Page LIDE3 10

1b Ultramafic parent material or soils with ultramafic influence (serpentine/peridotite), manzanita (ARCTO3) species dominating the shrub layer, Jeffrey pine (PIJE) absent. — LIDE3/ARCTO3/XETE Page LIDE3 12

1c Ultramafic parent rock or soils with ultramafic influence (serpentine/peridotite), Jeffrey pine (PIJE) usually present, golden chinquapin (CACH6) cover usually greater than 30 percent — LIDE3-CACH6-PILA Page LIDE3 14

1d Not as above — 2

2a Drier sites usually east of the coastal crest at higher elevations and usually dominated by Douglas-fir (PSME) in the regeneration layer Canyon live oak (QUCH2), Pacific madrone (ARME), Golden chinquapin (CACH6), poison oak (RHDI6), hairy honeysuckle (LOHI2), and common snowberry (SYMO) usually present in some combination — *"Dry associations"* 3

2b Wetter sites usually west of the coastal crest or in inland coves on northerly aspects usually less than 2000 feet elevation Usually dominated by salal (GASH), and Pacific rhododendron (RHMA3) Western hemlock (TSHE), evergreen huckleberry (VAOV2), red alder (ALRU2), Oregon oxalis (OXOR), or western sword-fern (POMU) often present in some combination — *"Wet associations"* 6

2c A mix of moist and dry, on lower slopes or in protected canyon bottoms Big-leaf maple (ACMA3) usually present with high cover (about 30 percent) — LIDE3-ACMA3-QUCH2/POMU Page LIDE3 16

"Dry associations" including part of the *Tanoak-Douglas-fir Subseries*
(see the flow chart on Page LIDE3 Tanoak 1)

3a Sadler oak (QUSA2) cover greater than 20 percent — LIDE3-PSME/QUSA2-BENE2 Page LIDE3 18

3b Sadler oak (QUSA2) absent or cover less than 20 percent — 4

4a White fir (ABCO) frequently present in both the overstory and understory Poison oak (RHDI6) canyon live oak (QUCH2), and sugar pine (PILA) absent or less than one percent cover — LIDE3-ABCO/BENE2 Page LIDE3 20

4b White fir (ABCO) regeneration rarely present or less than five percent cover Canyon live oak (QUCH2) frequently present at greater than 10 percent cover — 5

5a Dwarf Oregongrape (BENE2) cover frequently greater than 10 percent, Douglas-fir regeneration cover less than 10 percent — LIDE3-PSME-QUCH2/BENE2 Page LIDE3 22

5b Dwarf Oregongrape (BENE2) cover frequently less than 10 percent and Douglas-fir (PSME) regeneration cover greater than 10 percent — LIDE3-PSME-QUCH2/RHDI6 Page LIDE3 24

"Wet associations" including the *Tanoak-Western hemlock Subseries*

6a Salal (GASH) dominated Usually more than three miles from the coast Sugar pine (PILA), western twinflower (LIBOL), Port-Orford-cedar (CHLA) golden chinquapin (CACH6), common prince's-pine (CHUM), or Sadler oak (QUSA2) may be present — 7

6b Evergreen huckleberry (VAOV2) dominated Usually coastal Western hemlock (TSHE), red alder (ALRU2), California-laurel (UMCA), salmonberry (RUSP), western sword-fern (POMU), or Oregon oxalis (OXOR) may be present or common — 9

6c Big-leaf maple (ACMA3) and vine maple (ACCI) dominate, often riparian or lower slope positions — LIDE3-ACMA3-QUCH2/POMU Page LIDE3 16

7a Port-Orford-cedar (CHLA) often present in the overstory and co-dominant with tanoak (LIDE3) in the understory — LIDE3-CHLA/GASH Page LIDE3 26

7b Sadler oak (QUSA2) present, usually cover greater than 30 percent — LIDE3-CACH6/GASH-QUSA2 Page LIDE3 28

7c Not as above Douglas-fir (PSME) coclimax with tanoak (LIDE3) — 8

Wetter sites of the *Tanoak-Douglas-fir Subseries* (8a, 8b, 8c) (Douglas-fir competes well with tanoak regeneration in the understory, salal (GASH) dominates the shrub layer)

8a Pacific rhododendron (RHMA3) is the most dominant secondary shrub, usually the driest sites of the three (8a, 8b 8c) — LIDE3-PSME/GASH-RHMA3 Page LIDE3 30

8b Dwarf Oregongrape (BENE2) is the most dominant secondary shrub, usually higher elevation — LIDE3-PSME/GASH-BENE2 Page LIDE3 32

8c Evergreen huckleberry (VAOV2) is the most dominant secondary shrub, moister sites of the three (8a, 8b, 8c) — LIDE3-PSME/GASH-VAOV2 Page LIDE3 34

9a Evergreen huckleberry (VAOV2) dominates the shrub layer, Pacific rhododendron (RHMA3) with greater cover than salal (GASH) Driest coastal sites Poison oak (RHDI6), hairy honeysuckle (LOHI2), or California hazel (COCOC) may be present, western hemlock (TSHE) absent, and western sword-fern (POMU) less than five percent cover. LIDE3/VAOV2-RHMA3-GASH
Page LIDE3 36

9b Western hemlock (TSHE) present and co-dominant or subdominant to tanoak (LIDE3) Wet indicators such as red alder (ALRU2), salmonberry (RUSP), western sword-fern (POMU), Pacific yew (TABR2), and Oregon oxalis (OXOR) are often present and with high covers 10

Tanoak-Western hemlock Subseries (10a, 10b, 10c)
Western hemlock (TSHE) competes with tanoak regeneration but remains subordinate or rarely co-climax The subseries is a gradient from dry (10a) to wet sites (10c)

10a Driest of the subseries Poison oak (RHDI6) present, usually with low cover LIDE3-TSHE/VAOV2-RHDI6
Page LIDE3 38

10b Moist sites, often north aspects and lower slope positions Western sword-fern (POMU) cover less than 35 percent, Oregon oxalis (OXOR) cover usually less than 5 percent LIDE3-TSHE/VAOV2/POMU
Page LIDE3 40

10c Wettest sites of the tanoak series, often riparian or adjacent to riparian sites Western hemlock (TSHE), western sword-fern (POMU), Oregon oxalis (OXOR), salmonberry (RUSP), red alder (ALRU2), and occasionally western redcedar (THPL) present Western sword-fern (POMU) cover greater than 50 percent, Oregon oxalis (OXOR) cover often greater than 20 percent LIDE3-TSHE/VAOV2/POMU-RIP
Page LIDE3 42

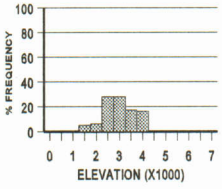
LIDE3 10

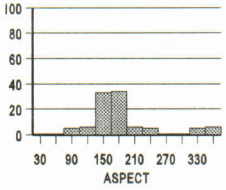
TANOAK-WESTERN WHITE PINE/HUCKLEBERRY OAK/COMMON BEARGRASS
Lithocarpus densiflorus-Pinus monticola/Quercus vaccinifolia/Xerophyllum tenax
LIDE3-PIMO3/QUVA/XETE (N=9; FS=9)

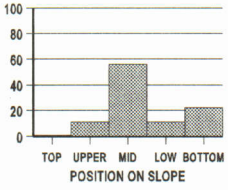
Distribution. Although this Association is found throughout the Oregon range of the Tanoak Series, it is associated with ultramafic parent material or metamorphosed rocks influenced by ultramafics. Therefore, its distribution is dependent on the distribution of the host parent material. Also, it occurs on sites that are moderated by the Oceanic influence.

Distinguishing Characteristics. Ultramafic parent material, and a preference for south aspects, distinguishes this Association from all but two others in the Series, Tanoak/Manzanita/Beargrass and Tanoak-Golden Chinquapin-Sugar Pine. However, the constant presence and high cover of huckleberry oak is unique to this Association.

Soils. Parent material is usually ultramafic or the more basic rocks such as basalt or hornblend. Soils are usually shallow. Average depth is frequently greater than 10







inches Surface rock cover averages 34 percent Eight percent of the ground surface is commonly bare and an additional four percent is usually exposed bedrock

Environment Average elevation is 2600 feet Slopes average 30 percent Average annual temperature is about 48 degrees F and average annual precipitation is about 128 inches, the highest rate for the Tanoak Series Litter cover is relatively low (67 percent) and moss only covers 3 percent of the forest floor

Vegetation Composition and Structure Total species richness, very high for the Series is 30 The Association ranges on both sides of the coastal crest and has high niche diversity Western white pine, typical on open ultramafic sites, dominates the overstory but is subordinate to tanoak as regeneration Lodgepole pine is rarely present The typical species complement on ultramafic parent material includes western white pine, huckleberry oak, coffeeberry, box-leaved silk-tassel, red huckleberry, and common beargrass Because this Association can occur near the coast and moisture modifies the nutrient imbalance, it may include species more typical of normal parent material, such as evergreen huckleberry and salal Various species of manzanita may also be present, particularly on disturbed sites Iris species are often found with common beargrass, whipplevine, and toothleaf pyrola

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Western white pine	PIMO3	89	10	
Knobcone pine	PIAT	56	13	
Understory trees				7
Tanoak	LIDE3	100	31	
Western white pine	PIMO3	100	13	
Douglas-fir	PSME	89	4	
Port-Orford-cedar	CHLA	67	7	
California-laurel	UMCA	67	7	
Shrubs				9
Red huckleberry	VAPA	100	4	
Huckleberry oak	QUVA	89	19	
Coffeeberry	RHCA	89	9	
Pinemat manzanita	ARNE	78	7	
Box-leaved silk-tassel	GABU	67	5	
Common juniper	JUCO4	67	4	
Herbs				11
Common beargrass	XETE	100	4	
Whipplevine	WHMO	78	1	
Toothleaf pyrola	PYDE	78	1	

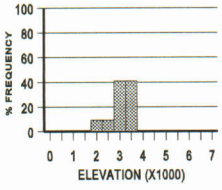
LIDE3 12

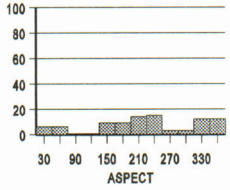
TANOAK/MANZANITA/COMMON BEARGRASS
Lithocarpus densiflorus/Arctostaphyllos/Xerophyllum tenax
LIDE3/ARCTO3/XETE (N=17; BLM=17)

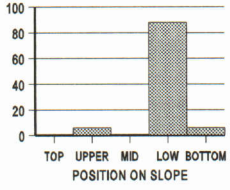
Distribution. This Association is found east of the coastal crest in the Grants Pass Resource Area, Medford District, Bureau of Land Management, and the Illinois Valley and Galice Ranger Districts, Siskiyou National Forest. It rarely occurs in the Glendale Resource Area. All other known occurrences are east of Range 11 West.

Distinguishing Characteristics. The complement of species indicates that soils, although not always ultramafic, are at the basic end of the gradient, or may be mixed with ultramafics such as serpentine, dunite, or peridotite. This Association occurs at relatively high elevations for the Series (3300 feet) and has a small elevational range. It is one of the coolest and driest tanoak associations.

Soils. Soils are often reddish and basic. Based on 17 samples, average depth is at least greater than 16 inches. Textures are silt loams and sandy loams with some sandy clay loams. Rock fragment content, mostly gravel, averages 56 percent.







Environment Variability in elevation is low About 70 percent of the sites occur between about 3000 and 3700 feet Slopes average about 40 percent Sites occur on all aspects, but slightly more often on those facing north Average annual temperature is about 47 degrees F and average annual precipitation is about 68 inches, the second lowest rate for the Series Manzanita species indicate dry sites, but they can also invade severely disturbed moist sites In this case, they indicate the site's lack of available moisture, as the precipitation rate reflects

Vegetation Composition and Structure Total species richness, very low for the Series, is 16 Site productivity is limited by the influence of basic (occasionally ultramafic) parent material and shallow soils. Douglas-fir usually dominates the overstory and ponderosa pine may also be present Its presence indicates that the ultramafic influence is weak On serpentine, a common ultramafic parent material, Jeffrey pine is almost exclusively the dominant pine The reddish soils and the occurrence of squawcarpet on nearby cutbanks is an indication of the high iron and magnesium content of the soil The shrub layer is dominated by manzanita species Manzanita species are indicative of hot, dry sites They may also be a result of repeated or intense disturbance Although many sites have been burned or disturbed, the integration of parent materials and climate support a unique complement of species in this Association Common beargrass is the most constant herb present Common prince's-pine and whipplevine are commonly present

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	37	
Ponderosa pine	PIPO	40	6	
Sugar pine	PILA	35	23	
Knobcone pine	PIAT	29	24	
Understory trees				5
Tanoak	LIDE3	100	24	
Douglas-fir	PSME	94	12	
Golden chinquapin	CACH6	82	23	
Canyon live oak	QUCH2	65	31	
Sugar pine	PILA	59	5	
Pacific madrone	ARME	53	7	
Shrubs				2
Greenleaf manzanita	ARPA6	65	20	
Whiteleaf manzanita	ARVI4	35	17	
Baldhip rose	ROGY	47	1	
Hairy honeysuckle	LOHI2	24	2	
Hairy manzanita	ARCO3	6	20	
Herbs				7
Common beargrass	XETE	71	18	
Common prince's-pine	CHUM	65	2	
Whipplevine	WHMO	53	1	
Rattlesnake-plantain	GOOB2	47	1	

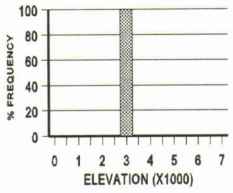
LIDE3 14

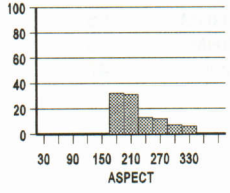
TANOAK-GOLDEN CHINQUAPIN-SUGAR PINE
Lithocarpus densiflorus-Castanopsis chrysophylla-Pinus lambertiana
LIDE3-CACH6-PILA (N=8; BLM=8)

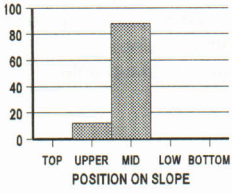
Distribution. This unusual Association is found only in the Grants Pass Resource Area, Medford District, Bureau of Land Management. It seems to be confined to Township 35 South, Range 9 West. It may be found elsewhere on high elevation, south aspects, if the soils are ultramafic or basic. Validation of its presence in other townships is welcome.

Distinguishing Characteristics. This Association has only been found in a limited area. Average elevation is 3600 feet. Sites are located between 3200 and 3800 feet. Aspects are usually south to southwest and sites are associated with mid to upper slope topographic positions. Ultramafic parent material, and associated flora, such as huckleberry oak and coffeeberry characterize the Association.

Soils. Parent material is usually a mix of granodiorite, ultramafics, and mixed volcanic. Samples occur on an *aureole* (an area where granodiorite was intruded







through serpentine) and rock types are well mixed Average depth is at least greater than 14 inches, based on nine samples Textures are sandy loams Rock fragment content averages 73 percent, most of which is cobbles and stones (41 percent)

Environment Elevation averages 3600 feet Slopes average about 37 percent Sites occur predominately on southwest aspects, but occasionally may occur on northwest aspects Average annual temperature is a cool 46 degrees F (lowest for the Series) and average annual precipitation is 100 inches

Vegetation Composition and Structure Total species richness, very low for the Series, is 14 Although this Association is limited in extent, ultramafic sites usually have a high herbaceous diversity Herbs are often ephemeral and difficult to find, particularly where soil surface moisture is quickly depleted Diversity estimates are subject to seasonal variation, and a one time sample, if taken late in the season, may be inaccurate Jeffrey pine dominates the overstory, but tanoak regeneration is much more abundant in the understory Typical ultramafic flora evenly dominates the shrub layer Dwarf Oregongrape is the least tolerant of the calcium/magnesium imbalance characteristic of ultramafic soil, and is rarely found with cover greater than 5 percent The manzanitas and bracken may also partly reflect repeated low intensity disturbance

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	89	16	
Jeffrey pine	PIJE	56	13	
Understory trees				5
Tanoak	LIDE3	89	35	
Golden chinquapin	CACH6	89	35	
Sugar pine	PILA	89	11	
Jeffrey pine	PIJE	78	2	
Douglas-fir	PSME	56	3	
Shrubs				3
Greenleaf manzanita	ARPA6	89	14	
Sadler oak	QUSA2	67	24	
Whiteleaf manzanita	ARVI4	67	22	
Huckleberry oak	QUVA	67	16	
Pinemat manzanita	ARNE	63	15	
Red huckleberry	VAPA	56	15	
Coffeeberry	RHCA	56	4	
Salal	GASH	50	26	
Dwarf Oregongrape	BENE2	38	2	
Western Azalea	RHOC	11	10	
Herbs				4
Braken	PTAQ	89	2	
Common beargrass	XETE	67	4	
Whitevien pyrola	PYPI	67	4	

LIDE3 16

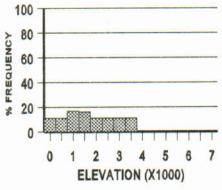
TANOAK-BIG-LEAF MAPLE-CANYON LIVE OAK/WESTERN SWORD-FERN

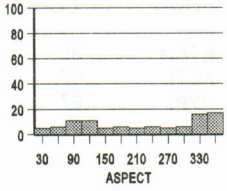
Lithocarpus densiflorus-Acer macrophyllum-Quercus chrysolepis/Polystichum munitum

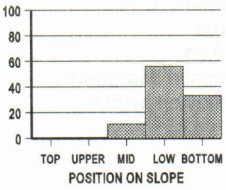
LIDE3-ACMA3-QUCH2/POMU (N=9; BLM=9)

Distribution. This Association is found east of the coastal crest (east of Range 11 West) in the Grants Pass and Glendale Resource Areas, Medford District, Bureau of Land Management, and in the Illinois Valley and Galice Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. Associated with inland sites, this Association occurs on all aspects, slightly more often on milder north and east faces, and below the upper third topographic positions. It also occurs across a wide range of elevations, from near the valley floor to over 3500 feet. The flora is a combination of "wet" and "dry" species, since it commonly occupies steep canyon walls with shallow soils or soils with high amounts of gravel (soils can dry quickly). However, these sites are protected from the wind and sun, and maintain high humidity throughout the day.







Soils Parent material can be metavolcanic, metasediment, ultramafic and sandstone Soils are usually deep Based on nine samples average soil depth is at least greater than 20 inches Textures are silt loams, or sandy loams with some clay loams and loamy sand Rock fragment content, mostly gravel (67 percent), averages 74 percent

Environment Elevation ranges from about 500 feet to over 3500 feet and averages over 1900 feet Slopes average 66 percent Sites occur on all aspects, but slightly more often on those facing north Average annual temperature is a warm 50 degrees F and average annual precipitation is only 71 inches, well into the dry end of the moisture gradient Wet species are supported by atmospheric moisture, fog, and high humidity See the Environmental Graph on page LIDE3 3

Vegetation Composition and Structure Total species richness, low for the Series, is 18 Douglas-fir dominates the overstory, but is less than half as abundant in the understory Nearly 30 percent cover of big-leaf maple is unusual for the Series Big-leaf maple is less common in the southern third of Oregon It occurs sporadically and total cover rarely exceeds 10 percent The highest density and cover of big-leaf maple occurs at 3600 feet in elevation Even at its elevational peak, average cover for the Siskiyou Mountain Province is only one percent It is most common in riparian topography, where it competes well with tanoak Oregon ash may be present, an indication of lower slope, wet soils Rather than the four most common species (evergreen huckleberry, salal, Pacific rhododendron, and dwarf Oregongrape) of the wetter sites of the Series, the shrub layer is dominated by three shrubs that characterize the drier end of the moisture gradient, hairy honeysuckle, poison oak and California hazel Western sword-fern will almost always be present, but averages less than 10 percent cover Whipplevine cover increases on drier sites Rattlesnake-plantain is ever present, as in every wooded site

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				1
Douglas-fir	PSME	100	39	
Understory trees				5
Tanoak	LIDE3	100	28	
Canyon live oak	QUCH2	100	20	
Big-leaf maple	ACMA3	89	29	
Douglas-fir	PSME	56	19	
Shrubs				2
Hairy honeysuckle	LOHI2	78	1	
California hazel	COCOC	56	9	
Poison oak	RHDI6	56	2	
Herbs				10
Western sword-fern	POMU	100	9	
Whipplevine	WHMO	78	2	
Western starflower	TRLA6	67	1	
Marbled wild ginger	ASHA	56	1	

TANOAK-DOUGLAS-FIR/SADLER OAK-DWARF OREGONGRAPE

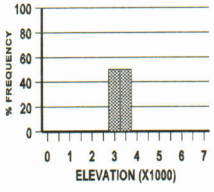
Lithocarpus densiflorus-Pseudotsuga menziesii/Quercus sadleriana-Berberis nervosa

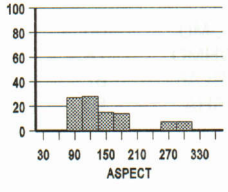
LIDE3-PSME/QUSA2-BENE2 (N=7; BLM=7)

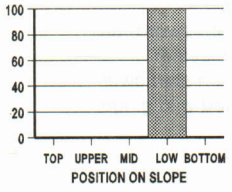
Distribution. This Association's range is limited to the northwest corner of the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may be found elsewhere in the immediate vicinity at similar elevations on similar parent material. However, it is a separate association because of its unique complement of flora and potential differences in management response.

Distinguishing Characteristics. This Association most often occurs on sandstone. Soils are shallower than other tanoak associations. Aspects are more often southerly, and sites are associated with lower slope positions. The average elevation is high (3600 feet) and lacks variability; the standard deviation is less than 300 feet. The occurrence and high cover (43 percent) of Sadler oak is its most distinguishing characteristic.

Soils. This Association occurs on sandstone where soils are usually moderately







deep Average depth is at least greater than 14 inches (pits were not dug to bedrock) Soil textures are mostly sandy loam Based on seven samples average rock fragment content is 52 percent, 50 percent is in the gravel size class

Environment Elevation averages about 3600 feet Average annual temperature is about 46 degrees F Average annual precipitation is about 87 inches, the lowest for the Series (cool and relatively dry) Slopes average 45 percent and are usually steeper than most other associations See the graph on page LIDE3 3

Vegetation Composition and Structure Total species richness is the second lowest of the Series (15) All layers lack richness The Association is not extensive and often has high surface rock content, a condition that may depress survival of shallow rooted species Although typically dominated by Douglas-fir and less so, by sugar pine, this Association may often have some early seral species, most typically knobcone pine Competition in the understory is usually high among tanoak, golden chinquapin, and Douglas-fir Canyon live oak is commonly present and sugar pine is occasional Sadler oak dominates the shrub layer, but dwarf Oregongrape is usually present Red huckleberry, a widely occurring forest species lacking indicator value in the Tanoak Series, is common Little prince's-pine and common prince's-pine are the dominant herbs They are also common and seem to lack indicator value Rattlesnake-plantain, present in almost every forest stand, is also present Oregon fairybell may be found in the spring before moisture stress limits growth and survival

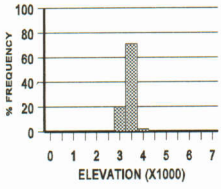
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	40	
Sugar pine	PILA	43	29	
Understory trees				4
Golden chinquapin	CACH2	100	14	
Douglas-fir	PSME	100	13	
Tanoak	LIDE3	86	15	
Canyon live oak	QUCH2	57	6	
Sugar pine	PILA	43	3	
Shrubs				3
Sadler oak	QUSA2	100	43	
Dwarf Oregongrape	BENE2	100	15	
Red huckleberry	VAPA	57	5	
Herbs				6
Common prince's-pine	CHUM	71	1	
Little prince's-pine	CHME	57	1	

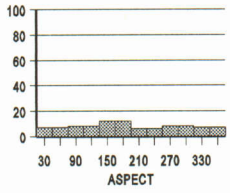
LIDE3 20

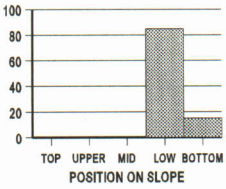
TANOAK-WHITE FIR/DWARF OREGONGRAPE
Lithocarpus densiflorus-Abies concolor/Berberis nervosa
LIDE3-ABCO/BENE2 (N=41; BLM=41)

Distribution. This Association occurs on the east side of the coastal crest (western Glendale Resource Area and eastern Galice Ranger District), mostly north of Township 37 South. It occurs less often in the Illinois Valley (southern Grants Pass Resource Area and eastern Illinois Valley Ranger District).

Distinguishing Characteristics. This Association is the driest and coolest on normal or non ultramafic parent material. White fir is occasional in the overstory. Average elevation (3300 feet) is higher than most other tanoak associations (about 85 percent of sites occur above 2700 feet). Like most other tanoak associations, however, it occurs on all aspects. It occurs on lower third and bottom topographic positions.







Soils Parent material varies from metavolcanic to metasediment, often sandstone, averaging at least 16 inches Based on 34 samples, textures are silt loams, with some silty clay loams and sandy loams

Environment Average elevation is about 3300 feet The Association occurs on all aspects. Slopes average 42 percent, but occurrence is mostly limited to the bottom and lower slope topographic positions Average annual temperature is about 47 degrees (F), and average annual precipitation is approximately 69 inches

Vegetation Composition and Structure Total species richness, low for the Series, is 20 Although the tree and shrub layer are below average, the herb layer is rich Douglas-fir dominates the overstory, white fir is occasional Douglas-fir, and tanoak, will continue to thrive but not dominate the understory. White fir regeneration, averaging 22 percent cover, indicates the cooler tanoak sites Pacific madrone, common within the Series, is an indicator of disturbance Western redcedar, Port-Orford-cedar, and incense-cedar rarely occur Dwarf Oregongrape, common throughout the Series and this Association, indicates deep soils which are common in the Series Western twinflower and western sword-fern occasionally occur

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	97	56	
White fir	ABCO*	26	25	
Incense-cedar	CADE27	20	50	
Golden chinquapin	CACH6	20	50	
Understory trees				4
Tanoak	LIDE3	97	28	
Douglas-fir	PSME	87	11	
White fir	ABCO*	46	22	
Golden chinquapin	CACH6	39	17	
Canyon live oak	QUCH2	29	9	
Shrubs				2
Dwarf Oregongrape	BENE2	92	9	
Creambush ocean-spray	HODI	53	6	
Herbs				12
Western starflower	TRLA6	70	10	
Whipplevine	WHMO	68	6	
Vanillaleaf	ACTR	51	11	

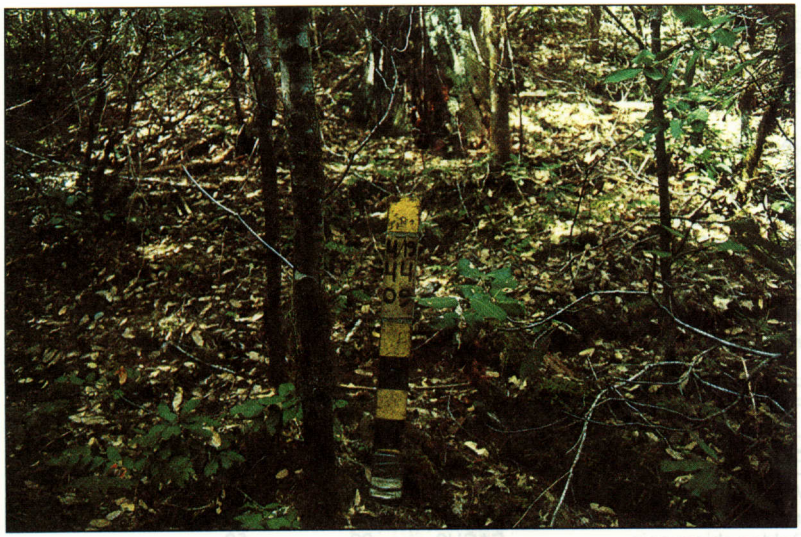
* See the discussion in the Introduction on the hybirdization of white and grand fir

LIDE3 22

TANOAK-DOUGLAS-FIR-CANYON LIVE OAK/DWARF OREGONGRAPE

Lithocarpus densiflorus-Pseudotsuga menziesii-Quercus chrysolepis/Berberis nervosa

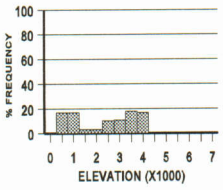
LIDE3-PSME-QUCH2/BENE2 (N=72; BLM=52, FS=20)

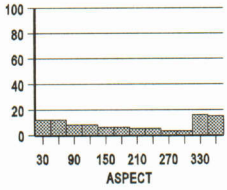


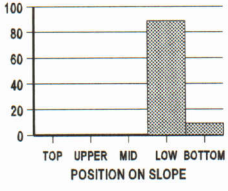
Distribution. This Association occurs on the western Glendale Resource Area, eastern Galice Ranger District, southwestern Grants Pass Resource Area and east Illinois Valley Ranger District. It is evenly distributed throughout the area, however, most sites are east of Range 11 West, east side of the coastal crest.

Distinguishing Characteristics. This Association commonly occurs on all parent materials, all aspects, and on a variety of slope positions. Its elevational range is also wide. There are no key distinguishing environmental characteristics. Species presence and relative abundance are the basis for keying this Association.

Soils. Parent material can be metavolcanic, metasediment, sandstone, andesite, basalt, greywacke and less commonly, diorite or gabbro. Based on 52 plots, soil depth averages greater than 42 inches. Textures are silt loams with some silty clay







loams and sandy loams Rock fragment content, mostly gravel averages 38 percent Surface rock cover averages 13 percent

Environment Elevation averages about 2900 feet The average is slightly higher on Bureau of Land Management lands (3100 feet) compared to Forest Service lands (2700 feet) Average annual temperature is about 48 degrees F, cool for the Series, and average annual precipitation is about 63 inches, the driest of the Series Slopes average about 49 percent, litter cover averages 88 percent and moss cover averages 17 percent See graph on page LIDE3 3

Vegetation Composition and Structure Total species richness, highest for the Series, is 35 This Association has an extensive environmental range, which helps to diversify the tree layers Sugar pine is far less abundant than Douglas-fir, but is typical in inland sites of the Series Jeffrey pine, ponderosa pine, and California black oak are rarely found, and Port-Orford-cedar is rare on the wetter, sometimes ultramafic, sites Dwarf Oregongrape, common on inland, higher elevation sites, is the most frequently occurring shrub, but may be less abundant than salal on some sites Poison oak cover is low, and it most commonly occurs on the drier sites Red huckleberry, conversely, is more common on the wetter sites Similarly, whipplevine and western twinflower represent drier and wetter sites, respectively Western sword-fern may also be present, but the inland, dry site variety usually found in this Association is not an indication of high soil moisture

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	96	57	
Sugar pine	PILA	39	18	
Tanoak	LIDE3	19	12	
Canyon live oak	QUCH2	17	6	
Big-leaf maple	ACMA3	15	8	
Understory trees				8
Douglas-fir	PSME	95	8	
Tanoak	LIDE3	85	58	
Canyon live oak	QUCH2	75	35	
Pacific madrone	ARME	60	6	
Sugar pine	PILA	50	1	
Shrubs				7
Dwarf Oregongrape	BENE2	95	14	
Red huckleberry	VAPA	55	6	
Poison oak	RHDI6	30	6	
Salal	GASH	25	23	
Herbs				19
Whipplevine	WHMO	70	3	
Western twinflower	LIBOL	70	3	

LIDE3 24

TANOAK-DOUGLAS-FIR-CANYON LIVE OAK/POISON OAK

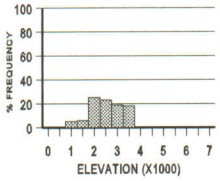
Lithocarpus densiflorus-Pseudotsuga menziesii-Quercus chrysolepis/Rhus diversiloba

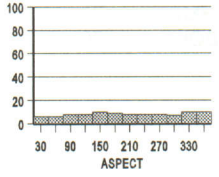
LIDE3-PSME-QUCH2/RHDI6 (N=89; FS=75, BLM=14)

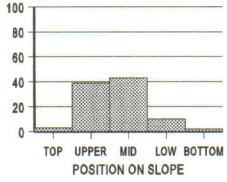
Distribution. This Association occurs on the east side of the coastal crest (western Glendale Resource Area, eastern Galice Ranger District, southwest Grants Pass Resource Area and east Illinois Valley Ranger District). It may be found closer to the coast on the Chetco and Gold Beach Ranger Districts. It most commonly occurs on the northeast Galice Ranger District and the northwest Grants Pass Resource Area.

Distinguishing Characteristics. Although this Association occurs on a variety of parent materials, slope positions and aspects, it most often occurs between 2000 and 4000 feet in elevation. It occurs on inland sites in combination with poison oak and hairy honeysuckle. It is one of the drier tanoak associations and rarely occurs in bottom positions.

Soils. This Association occurs on any parent material, including ultramafics. Surface







rock is usually high, varying from 7 percent to higher than 63 percent Based on seven samples, average depth is greater than 36 inches Surface textures are mostly loam to silty clay loam, with 20 to 90 percent gravel, cobbles and stones

Environment. Elevation averages about 2600 feet Average annual temperature is about 48 degrees F and average annual precipitation is about 71 inches This Association occurs on all aspects, but is most common on the mid to upper slopes Slopes average about 55 percent. Moss cover, typically positively related to increasing temperature and atmospheric moisture, averages only 16 percent.

Vegetation Composition and Structure. Total species richness, intermediate for the series, is 26 This Association's range is limited Thus, niche diversity may be limited, but the understory supports more species than the Series average Sugar pine rivals Douglas-fir in constancy, but not cover. The drier sites may rarely support Oregon white oak, and California-laurel may be found on the wetter sites Rarely will knobcone pine or Port-Orford-cedar be present Typically, baldhip rose is present at low cover In this Association, salal indicates the wetter sites, while California hazel and creeping snowberry are occasional to rare on the drier sites Hairy honeysuckle and poison oak, both common shrubs, are particularly faithful indicators of dry sites The strength of their indication is greatest when they co-occur Although western starflower, pathfinder, Scouler's harebell, and catchweed bedstraw are often present, they wither in early summer and may not be evident later These ephemeral species may not be evident when keying late in the Fall Whipplevine, the most common herb, however, is evident most of the year

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	52	
Sugar pine	PILA	67	7	
Understory trees				7
Tanoak	LIDE3	100	47	
Douglas-fir	PSME	96	12	
Pacific madrone	ARME	89	11	
Canyon live oak	QUCH2	87	12	
Sugar pine	PILA	72	2	
Golden chinquapin	CACH6	60	6	
Shrubs				4
Hairy honeysuckle	LOHI2	62	2	
Poisonoak	RHDI6	60	6	
Dwarf Oregongrape	BENE2	57	7	
Herbs				12
Whipplevine	WHMO	55	3	
Vanillaleaf	ACTR	56	2	

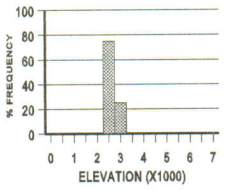
LIDE3 26

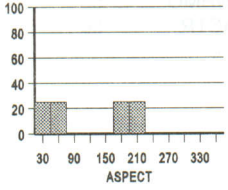
TANOAK-PORT-ORFORD-CEDAR/SALAL
Lithocarpus densiflorus-Chamaecyparis lawsoniana/Gaultheria shallon
LIDE3-CHLA/GASH (N=4; FS=4)

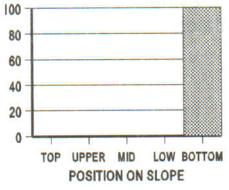
Distribution. This uncommon Association is scattered throughout the Siskiyou National Forest and possibly the Medford District, Bureau of Land Management. It is closely associated with bottoms, concavities, or streams. It occurs on the Gold Beach, Illinois Valley, and Galice Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. Although uncommon on the general landscape, this Association occurs in drainage concavities of lower slopes. It is the transition between the Port-Orford-cedar and Tanoak Series. In deeper, primary drainages, Port-Orford-cedar is usually the climax dominant. Because it occurs in protected topography, it may be found on all aspects. Several other tanoak associations contain Port-Orford-cedar, but with lower cover and constancy. The presence and relative cover of Port-Orford-cedar is the most reliable key characteristic.

Soils. Parent material is usually andesite, basalt or schist. Soil depth averages at







least 31 inches deep Surface rock and gravel average 8 percent and 19 percent respectively

Environment The average elevation is about 2400 feet Aspects may vary It is, however, exclusively a bottomland association Slope averages 29 percent with a range of 11 to 48 percent Average annual temperature is about 49 degrees F, moderate for the Series Average annual precipitation is approximately 85 inches, also moderate for the Series

Vegetation Composition and Structure Total species richness, high for the Series is 29 Although the Association is based on a few samples (N=4), it is the third most rich, possibly because it is extensively distributed Douglas-fir dominates the overstory, Port-Orford-cedar occurs in both the overstory and understory and is co-climax with tanoak Canyon live oak occurs in the driest sites Conversely, red alder occurs on disturbed, moist sites Salal, dwarf Oregongrape, evergreen huckleberry Pacific blackberry, common prince's-pine, and rattlesnake-plantain frequently occur Sedge is occasional, but abundant, where soils are commonly moist As distance to the coast decreases, bottoms are more likely to be climax to Port-Orford-cedar

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	49	
Port-Orford-cedar	CHLA	100	8	
Sugar pine	PILA	25	1	
Understory trees				8
Tanoak	LIDE3	100	51	
Port-Orford-cedar	CHLA	100	28	
Douglas-fir	PSME	100	5	
Canyon live oak	QUCH2	75	2	
Sugar pine	PILA	75	1	
Big-leaf maple	ACMA3	50	5	
Golden chinquapin	CACH6	50	4	
Pacific madrone	ARME	50	2	
Pacific dogwood	CONU4	50	2	
Shrubs				7
Salal	GASH	100	58	
Dwarf Oregongrape	BENE2	100	6	
Baldhip rose	ROGY	75	1	
Evergreen huckleberry	VAOV2	50	15	
Western azelea	RHOC	50	2	
Herbs				13
Western sword-fern	POMU	100	2	
Western starflower	TRLA6	100	1	
Western twinflower	LIBOL	75	3	

LIDE3 28

TANOAK-GOLDEN CHINQUAPIN/SALAL-SADLER OAK

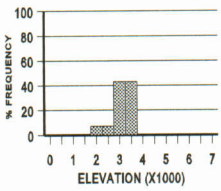
Lithocarpus densiflorus-Castanopsis chrysophylla/Gaultheria shallon-Quercus sadleriana

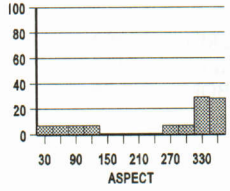
LIDE3-CACH6/GASH-QUSA2 (N=7; BLM=7)

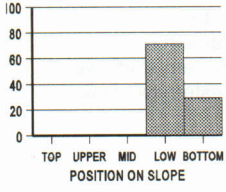
Distribution. This Association occurs within the Grants Pass Resource Area and is associated with a mix of parent materials. Relatively high in elevation for the coastal crest area, it may host ice age relics (see the office guide discussion). It occurs in Township 34 South, Range 8 West, and Township 35 South, Range 9 West but may be found in the general vicinity.

Distinguishing Characteristics. This Association, like Tanoak-Golden Chinquapin-Sugar Pine, occurs on high elevation, inland sites. Average elevation is 3300 feet. Unlike, Tanoak-Golden Chinquapin-Sugar Pine, it is associated with normal soils, avoids south aspects and is on lower slope and bottomland topographic positions. Although golden chinquapin is common to both associations, Sadler oak dominates the shrub layer of this Association.

Soils. Parent material can be granodiorite, mixed metavolcanic, intrusive volcanic,







or even ultramafic Average depth is greater than 18 inches, based on seven plots Textures are silt loam or sandy loams Rock fragment content, mostly gravel (30 percent is of gravel size), averages 38 percent

Environment Elevation averages 3300 feet Slopes average 50 percent Sites predominately occur on north aspects Average annual temperature is a cool 46 degrees F and average annual precipitation is 83 inches

Vegetation Composition and Structure Total species richness, low for the Series, is 16. Niche diversity is very low Typically, Douglas-fir and sugar pine comprise the majority of the overstory cover The understory sustains a variety of species Golden chinquapin, competitive with tanoak, often indicates rocky soils Rarely, western hemlock or Port-Orford-cedar may be present in the understory, but only on the wettest sites Sadler oak and golden chinquapin indicate a variation in the salal dominated associations Both species are usually associated with rocky sites Cover in the herb layer is usually lacking, possibly a result of rocky well drained soil

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	45	
Sugar pine	PILA	71	19	
White Fir	ABCO	29	13	
Port-Orford-cedar	CHLA	14	20	
Golden chinquapin	CACH6	14	25	
Understory trees				4
Tanoak	LIDE3	100	20	
Golden chinquapin	CACH6	86	29	
Douglas-fir	PSME	86	5	
Sugar pine	PILA	71	2	
White fir	ABCO	57	17	
Port-Orford-cedar	CHLA	29	9	
Western hemlock	TSHE	14	1	
Shrubs				4
Salal	GASH	100	72	
Sadler oak	QUSA2	100	34	
Dwarf Oregongrape	BENE2	71	9	
Pacific rhododendron	RHMA3	57	40	
Red huckleberry	VAPA	57	6	
Herbs				6
Braken	PTAQ	57	2	
Vanillaleaf	ACTR	57	1	

LIDE3 30

TANOAK-DOUGLAS-FIR/SALAL-PACIFIC RHODODENDRON

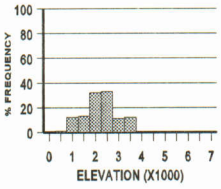
Lithocarpus densiflorus-Pseudotsuga menziesii/Gaultheria shallon-Rhododendron macrophyllum

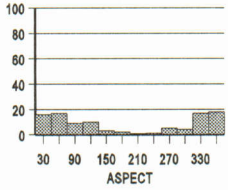
LIDE3-PSME/GASH-RHMA3 (N=80; NRCS=46, BLM=34)

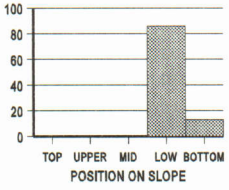
Distribution. This common Association occurs on both sides of the coastal crest. It is common throughout the western Siskiyou National Forest and the Myrtlewood Resource Area of the Coos Bay District, Bureau of Land Management. It is also commonly found east of the coastal crest, north of Township 36 South. It only rarely occurs in the Illinois Valley area.

Distinguishing Characteristics. Sites occur on both sides of the coastal crest, mostly on lower slope or bottom topographic positions. Most sites occur on sandstone. North aspects are favored, particularly on inland sites. Like other associations that straddle the crest, relative cover of species can be used to distinguish among the associations.

Soils. Sandstone is the most common parent material. However, sites can also be







ultramafic or gabbro Based on 34 samples, average soil depth is greater than 39 inches Textures are mostly sandy loam, less often silt loam and silty clay loam Average rock fragment content is 48 percent, mostly gravel (averaging 41 percent) in size

Environment Elevation averages about 2500 feet Average annual temperature is about 50 degrees F Average annual precipitation is about 123 inches, the second highest rate for the Series Slopes average 34 percent, but can be steeper, particularly on inland sites Pacific rhododendron and evergreen huckleberry are subordinate to salal, since elevation is near the high end of the Series range Evergreen huckleberry cover is highest at approximately 1000 feet in elevation

Vegetation Composition and Structure Species richness, low for the Series, is 26 Occurrence of this Association is localized, therefore, environmental variation is low Shrub and herb richness are below the Series average The overstory is the usual complement of species including golden chinquapin, sugar pine, Pacific madrone, and tanoak Rarely, white fir and western white pine may be found, particularly at the higher elevations Typically, tanoak dominates the regeneration layer Douglas-fir is a common competitor Golden chinquapin, common in this Association, often indicates rockier soils Rarely, wet site indicators such as western hemlock, western redcedar, Pacific yew, and red alder may be present at low cover Salal and Pacific rhododendron totally dominate the shrub layer Rarely, on the driest sites, poison oak or hair honeysuckle may be present Common beargrass is more abundant on the drier sites, while western sword-fern characterizes the wettest sites Braken rarely occurs, but when present, it is often abundant

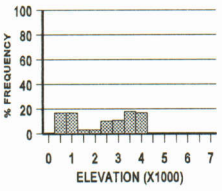
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	54	
Pacific madrone	ARME	65	5	
Understory trees				2
Tanoak	LIDE3	97	25	
Douglas-fir	PSME	79	9	
Golden chinquapin	CACH6	68	19	
Sugar pine	PILA	59	4	
Shrubs				4
Salal	GASH	100	59	
Pacific rhododendron	RHMA3	100	41	
Dwarf Oregongrape	BENE2	88	7	
Evergreen huckleberry	VAOV2	74	10	
Herbs				8
Common beargrass	XETE	35	3	
Western sword-fern	POMU	26	3	

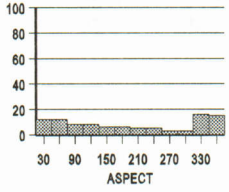
LIDE3 32

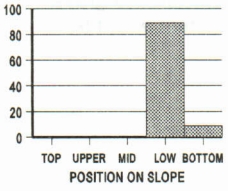
TANOAK-DOUGLAS-FIR/SALAL-DWARF OREGONGRAPE
Lithocarpus densiflorus-Pseudotsuga menziesii/Gaultheria shallon-Berberis nervosa
LIDE3-PSME/GASH-BENE2 (N=71; BLM=45, NRCS=26)

Distribution. Except for several sites just west of the coastal crest, this Association occurs mostly on the east side. Medford Bureau of Land Management District sites straddle the Grants Pass and Glendale Resource Areas. Only a few sites were found south of Township 36 South in the Grants Pass Resource Area. Most Forest Service sites are on the Gold Beach Ranger District, Siskiyou National Forest. although the Association may be found further south.

Distinguishing Characteristics. Most sites occur east of the coastal crest on lower slope or bottom positions. Soils are usually sandstone. Climate is slightly cooler and drier than the average tanoak site, thus its difficult to key in the field. Dwarf Oregongrape's consistent presence, at cover greater than 5 percent, contrasted with the relative lack of evergreen huckleberry and Pacific rhododendron, separate this association from others in the Series.







Soils Sandstone is the most common parent material Less often sites are diorite or ultramafic Based on 45 samples, average soil depth is greater than 38 inches Textures are mostly sandy loam and silt loam, less often sandy clay loam Average rock fragment content is 44 percent, mostly gravel size

Environment Elevation averages about 2800 feet, coastal sites are slightly lower Average annual temperature is about 48 degrees F Average annual precipitation is about 87 inches This combination seems to favor dwarf Oregongrape over salal, evergreen huckleberry, and Pacific rhododendron, the three most common shrubs associated with tanoak Dwarf Oregongrape, however, has a greater elevational range than any of the three It is more common on higher sites Slopes average 39 percent, but can be greater than 60 percent See the graph on page LIDE3 3

Vegetation Composition and Structure. Total species richness, high for the Series, is 26 Tree layers are richer than most other associations As usual, the overstory is dominated by Douglas-fir Golden chinquapin is found in both tree layers, while western hemlock is rarely present In addition to the species listed in the table below, the wetter site indicators, Pacific yew, red alder, and big-leaf maple may also be present Salal dominates most sites and baldhip rose is usually present (it is of limited use, however as it only indicates that you are in the woods) Evergreen huckleberry is present on the wettest sites and occasionally poison oak or hairy honeysuckle may be present (consistent indicators of the driest sites) Common beargrass and whipplevine are the more abundant herbs, but some of the more ephemeral species, such as western starflower and vanillaleaf, may also be present

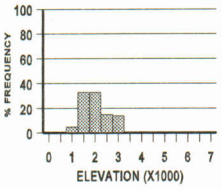
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	52	
Golden chinquapin	CACH6	58	23	
Sugar pine	PILA	54	17	
Pacific madrone	ARME	50	13	
Understory trees				5
Tanoak	LIDE3	100	40	
Douglas-fir	PSME	77	9	
Sugar pine	PILA	65	2	
Golden chinquapin	CACH6	50	20	
Shrubs				5
Dwarf Oregongrape	BENE2	100	5	
Salal	GASH	88	60	
Pacific rhododendron	RHMA3	54	7	
Evergreen huckleberry	VAOV2	42	3	
Herbs				13
Whipplevine	WHMO	50	2	
Common beargrass	XETE	42	6	

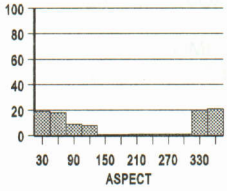
LIDE3 34

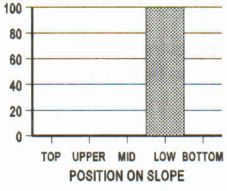
TANOAK-DOUGLAS-FIR/SALAL-EVERGREEN HUCKLEBERRY
Lithocarpus densiflorus-Pseudotsuga menziesii/Gaultheria shallon-Vaccinium ovatum
LIDE3-PSME/GASH-VAOV2 (N=41; NRCS=28, BLM=13)

Distribution. This Association straddles the coastal crest, but is mostly confined to the Glendale Resource Area and theGold Beach Ranger District. Most sites are north of Township 37 South, only a few occur further south. The most westerly known occurrence is less than a mile from the Pacific Ocean. The northern Grants Pass Resource Area is likely to support this Association.

Distinguishing Characteristics. Because most coastal associations are on sediment, geologic material is not often an effective discriminator. This Association is highly associated with the lower third slope positions and is rarely found on south aspects. Its elevational range is high for coastal associations, but low for inland sites. Climate is moderate, mostly warm and wet. Evergreen huckleberry and salal are greater in relative abundance than dwarf Oregongrape and Pacific rhododendron.







Soils Parent material is mostly metasediment and sandstone Based on 13 samples, average soil depth is greater than 52 inches Textures are mostly silt loam and sandy loam Average rock fragment content is 53 percent, mostly gravel size

Environment Elevation averages about 1750 feet and variability is low Slopes average about 45 percent Coastal sites are less steep, but highly variable Average annual temperature is 50 degrees F and average annual precipitation averages 97 inches This Association is in the warm, wet quadrant of the environmental grid See the Environmental Graph on page LIDE3 3

Vegetation Composition and Structure Total species richness, low for the Series, is 20 There are few understory species and the number of herbaceous species is low The drier sites of this Association may support canyon live oak and creambush ocean-spray, while Pacific yew, western redcedar, red alder, or salmonberry (salmonberry usually occurs on the very wettest sites) may be present at very low cover Typically, tanoak and Douglas-fir dominate the regeneration layer Canyon live oak and creambush ocean-spray, together, indicate the drier sites Pacific rhododendron is low in cover compared to other Tanoak-Douglas-fir associations dominated by salal Pacific rhododendron seems to be less competitive with evergreen huckleberry and salal closer to the coast Conversely, western sword-fern and Oregon oxalis increase in cover toward the coast They are the dominant herbs, while evergreen violet is commonly present, but averages only one percent cover

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	45	
Pacific madrone	ARME	31	11	
Understory trees				3
Tanoak	LIDE3	100	55	
Douglas-fir	PSME	85	11	
Shrubs				5
Salal	GASH	100	21	
Evergreen huckleberry	VAOV2	92	42	
Dwarf Oregongrape	BENE2	71	9	
Herbs				9
Western sword-fern	POMU	100	24	
Oregon oxalis	OXOR	64	6	
Redwood violet	VISE3	61	1	

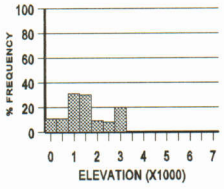
LIDE3 36

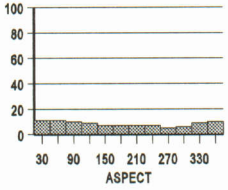
TANOAK/EVERGREEN HUCKLEBERRY-PACIFIC RHODODENDRON-SALAL
Lithocarpus densiflorus/Vaccinium ovatum-Rhododendron macrophyllum-Gaultheria shallon
LIDE3/VAOV2-RHMA3-GASH (N=36; FS=36)

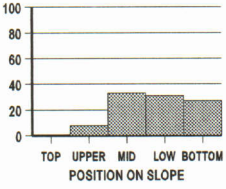
Distribution. Found entirely west of Range 11 West, this Association is confined to the Myrtlewood Resource Area, Medford District, Bureau of Land Management and Gold Beach and Chetco Ranger Districts, Siskiyou National Forest. It is not likely to occur north of Township 34 South.

Distinguishing Characteristics. Mostly associated with coastal sediments, this extensive Association occurs on all aspects and all but ridgetop slope positions. It also occurs over a wide range of elevations. The relative cover of the four most common shrubs, evergreen huckleberry, salal, Pacific rhododendron, and dwarf Oregongrape, is the most discriminating key characteristic.

Soils. Parent material is usually sedimentary, often sandstone and less often siltstone, mudstone, conglomerate or shale. Soils are moderately deep to deep. Average depth is greater than 44 inches. Surface rock cover averages10 percent.







Environment Elevation ranges from about 500 feet to over 3000 feet, and averages about 1400 feet Slopes average 38 percent Sites occur on all aspects, but slightly more often on those facing north Average annual temperature is about 52 degrees F and average annual precipitation is about 122 inches, the third highest rate for the Series Litter cover on the forest floor averages 95 percent Moss cover averages 20 percent See the Environmental Graph on page LIDE3 3

Vegetation Composition and Structure Total species richness, very low for the Series, is 17 Site domination by tanoak, evergreen huckleberry, Pacific rhododendron, and salal seem to limit herbaceous diversity Douglas-fir is the only overstory species to attain greater than 50 percent cover Diversity for the tree layer is low (richness averages one) Microsite temperature and moisture differences in the herb layer can be contrasted using western sword-fern and common beargrass as opposite extremes Braken is usually an early seral, opportunistic species invading disturbed ground Once established, however, it is persistent

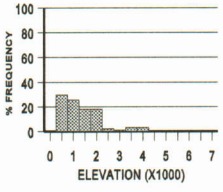
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				1
Douglas-fir	PSME	100	51	
Sugar pine	PILA	8	2	
Western hemlock	TSHE	8	1	
Port-Orford-cedar	CHLA	8	1	
Understory trees				5
Tanoak	LIDE3	100	64	
Douglas-fir	PSME	92	9	
California-laurel	UMCA	56	8	
Pacific madrone	ARME	50	3	
Pacific dogwood	CONU4	31	2	
Canyon live oak	QUCH2	28	7	
Golden chinquapin	CACH6	25	2	
Big-leaf maple	ACMA3	22	3	
Western hemlock	TSHE	17	4	
Shrubs				5
Evergreen huckleberry	VAOV2	100	50	
Pacific rhododendron	RHMA3	75	27	
Dwarf Oregongrape	BENE2	67	9	
Salal	GASH	64	29	
Baldhip rose	ROGY	33	1	
Hairy honeysuckle	LOHI2	31	1	
Red huckleberry	VAPA	25	1	
Herbs				6
Western sword-fern	POMU	83	4	
Common beargrass	XETE	64	3	
Braken	PTAQ	58	2	

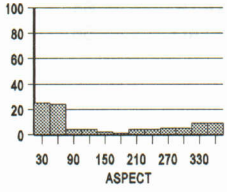
TANOAK-WESTERN HEMLOCK/EVERGREEN HUCKLEBERRY-POISON OAK
Lithocarpus densiflorus-Tsuga heterophylla/Vaccinium ovatum-Rhus diversiloba
LIDE3-TSHE/VAOV2-RHDI6 (N=39; NRCS=39)

Distribution. This widely occurring Association is found mostly west of Range 10 West, scattered inland within two miles of the Pacific Ocean (Myrtlewood Resource Area, Gold Beach, Chetco, and Powers Ranger District. Its most eastern extent is up the Rogue River canyon. Only rare disjunct occurrences can be found in the eastern Glendale Resource Area.

Distinguishing Characteristics. This is the driest of the coastal associations. It is relatively low in elevation and tends to occur more often on north than south aspects. Although low in cover, poison oak and hairy honeysuckle are important discriminators, since together they are faithful indicators of soils that can develop severe moisture stress.

Soils. Soil data are not available.





Slope position data are not available.

Environment Elevation averages about 950 feet and variability is high Slopes average about 32 percent Average annual temperature is 53 degrees F and average annual precipitation averages 102 inches This Association is one of the three warm, moist associations of the Western Hemlock Subseries

Vegetation Composition and Structure Total species richness, high for the Series, is 28 This Association's range is extensive, environments vary, and only the understory tree layer is below the average Series richness California-laurel and Pacific madrone indicate opposing ends of the moisture gradient, but they also can be effective pioneers, thus unreliable as environmental indicators Oregon white oak, although rare (one percent cover), consistently indicates hot, dry environments The understory regeneration is dominated by tanoak, but western hemlock is the next most shade tolerant tree species present Because western hemlock's presence, although uncommon, indicates the transition from the Tanoak to the Western Hemlock Series, western hemlock was included in the Association name Additionally, as indicated by the complement of vegetation, the Association belongs to the Western Hemlock Subseries California-laurel is common and canyon live oak is occasional Poison oak is the most consistent indicator of the drier sites of the Association, but evergreen huckleberry is more dominant and occurs more often As the driest of the Tanoak-western hemlock Subseries (a division of the Series). this Association supports hairy honeysuckle and California hazel The most frequently occurring herbs are low in cover (western sword-fern, bearded fescue and evergreen violet) Oregon oxalis and whipplevine can be used to indicate contrasts in local site moisture availability

Common name	Code	Constancy	Class*	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	5	
Pacific madrone	ARME	54	1	
California-laurel	UMCA	51	2	
Understory trees				4
Tanoak	LIDE3	100	3	
California-laurel	UMCA	64	2	
Douglas-fir	PSME	56	2	
Canyon live oak	QUCH2	46	1	
Western hemlock	TSHE	10	2	
Shrubs				6
Evergreen huckleberry	VAOV2	90	4	
Hairy honeysuckle	LOHI2	85	2	
California hazel	COCOC	79	2	
Poison oak	RHDI6	69	2	
Herbs				14
Western sword-fern	POMU	100	3	
Bearded fescue	FESU	72	2	
Redwood violet	VISE3	67	2	
Western starflower	TRLA6	67	2	

*Cover classes range from 1-5, 5 being the dominant class

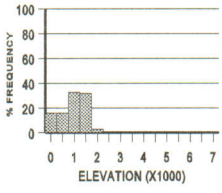
LIDE3 40

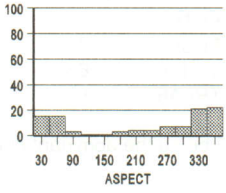
TANOAK-WESTERN HEMLOCK/EVERGREEN HUCKLEBERRY/WESTERN SWORDFERN
Lithocarpus densiflorus-Tsuga heterophylla/Vaccinium ovatum/Polystichum munitum
LIDE3-TSHE/VAOV2/POMU (N=37; NRCS=28, FS=9)

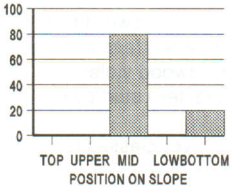
Distribution. This widely occurring Association is found mostly west of the coastal crest (Myrtlewood Resource Area, Gold Beach, Chetco, and Powers Ranger Districts). Like other coastal associations, it can be found within the Rogue River corridor further east, where the coastal influence is funneled up canyon. It may be occasionally found east of the crest only in areas where summer fog is common.

Distinguishing Characteristics. Parent material is typically coastal sediments. Sites are usually on mid-slope topographic positions and elevation is usually less than 1500 feet. This Association is often found on northerly aspects and less in the southeast quadrant. This Association is one of the three warm, moist associations of the Western Hemlock Subseries.

Soils. Parent material is mostly sediment, (sandstone and siltstone), and rarely







granite Soil depth averages greater than 50 inches Average surface rock cover is 11 percent Average gravel cover is 28 percent

Environment Elevation averages 1100 feet and variability is low Slopes average 40 percent, but range from 15 to 95 percent Average annual temperature is 52 degrees F and average annual precipitation averages 107 inches Moss cover averages 30 percent over a dense litter cover of greater than 90 percent Western hemlock and western sword-fern cover indicate that high humidity and fog are common See the Environmental Graph on page LIDE3 3

Vegetation Composition and Structure Total species richness, low for the series, is 22 The tree layers are slightly below average in species richness The presence of western hemlock indicates the cooler, more uniform temperatures of the coast Western hemlock's presence, along with the complement of wet site indicators, is also an indication that the Association belongs to the Western Hemlock Subseries Inland, drier sites support higher cover of madrone and Douglas-fir regeneration Typically, evergreen huckleberry becomes increasingly abundant with increasing coastal influence Red alder and California-laurel also become more abundant as site moisture becomes more abundant These indicators can be contrasted with the cover of poison oak and hairy honeysuckle Western sword-fern dominates the herb layer Along with Oregon oxalis, it is present throughout the year Western starflower, fragrant bedstraw and vanillaleaf, all ephemeral, may be difficult to find during late summer (another reason why herbs are not often used as key species)

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				1
Douglas-fir	PSME	100	46	
Pacific madrone	ARME	57	2	
Western hemlock	TSHE	33	5	
Understory trees				5
Tanoak	LIDE3	100	55	
Douglas-fir	PSME	78	2	
Western hemlock	TSHE	67	6	
Shrubs				6
Evergreen huckleberry	VAOV2	100	48	
Pacific rhododendron	RHMA3	78	14	
Dwarf Oregongrape	BENE2	78	2	
Salal	GASH	56	3	
Red huckleberry	VAPA	56	1	
Herbs				10
Western sword-fern	POMU	100	37	
Western starflower	TRLA2	89	1	
Oregon oxalis	OXOR	67	4	
Bracken	PTAQ	67	1	
White Trillium	TROV2	56	1	

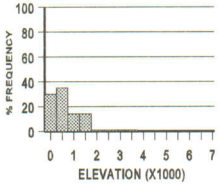
LIDE3 42

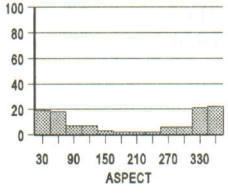
TANOAK-WESTERN HEMLOCK/EVERGREEN HUCKLEBERRY/WESTERN SWORD-FERN *(RIP)*
Lithocarpus densiflorus-Tsuga heterophylla/Vaccinium ovatum/Polystichum munitum (Rip)
LIDE3-TSHE/VAOV2/POMU-RIP (N=43; NRCS=40, FS=3)

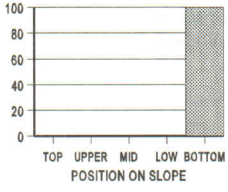
Distribution. This widely occurring Association occurs almost entirely west of Range12 West (Myrtlewood Resource Area, Gold Beach, Chetco, and Powers Ranger Districts). It is more common in the northern townships. It is not likely to be found inland.

Distinguishing Characteristics. This Association is mostly coastal, but a few sites may be found immediately west of the crest on lower concavities along the Rogue River canyon. The most frequently occurring parent material is sandstone. Most sites occur below 1500 feet in elevation and on bottom positions. Although south facing slopes occasionally support this complement of species, it is more highly associated with north aspects. It is a member of the Western Hemlock Subseries.

Soils. Parent material is frequently sandstone, and rarely mixed metamorphic. Soil depth averages greater than 37 inches. Surface rock cover averages 33 percent,







2 percent in the gravel size class

Environment The average elevation is about 1000 feet, the lowest average for the Series Slopes average 36 percent Average annual temperature is 53 degrees F and average annual precipitation is 100 inches Exposed surface rock, often colluvial, is common in these riparian systems, moss cover is usually greater than 50 percent These sites are often protected from wind and radiation by topography, and a complement of wet species, associated with the Western Hemlock Subseries, is usually present

Vegetation Composition and Structure Total species richness, intermediate for the Series, is 23 All layers are near average Series richness Western hemlock and California-laurel indicate the coastal influence Tanoak dominates the regeneration layer Western hemlock will continue to be a part of the species complement through all successional stages (Western Hemlock Subseries) Big-leaf maple commonly occurs on these riparian sites Rarely, white fir (grand fir mix), red alder, western redcedar, Port-Orford-cedar, and California-laurel are present Occasionally, salmonberry occurs on the wettest coastal sites, but evergreen huckleberry, red huckleberry and Pacific rhododendron dominate As with other associations in the Tanoak-Western Hemlock Subseries, western sword-fern is the dominant herb and Oregon oxalis cover is high

Common name	Code	Constancy	Cover*	Avg Richness
Overstory trees				5
Douglas-fir	PSME	100	37	
Western hemlock	TSHE	67	6	
California-laurel	UMCA	53	<10	
Understory trees				4
Tanoak	LIDE3	97	25	
Western hemlock	TSHE	67	6	
Big-leaf maple	ACMA3	53	<10	
Shrubs				5
Evergreen huckleberry	VAOV2	95	~30+	
Red huckleberry	VAPA	63	10	
Pacific rhododendron	RHMA3	55	<20	
Dwarf Oregongrape	BENE2	55	7	
Herbs				10
Western sword-fern	POMU	100	52	
Redwoods violet	VISE3	75	~1	
Oregon oxalis	OXOR	65	20	
Western starflower	TRLA6	55	1	

*The Natural Resource Conservation Service estimated species dominance Cover values were estimated by using a combination of dominance values and cover values estimated on Forest Service Ecology Program plots

DOUGLAS-FIR SERIES

DOUGLAS-FIR SERIES

Pseudotsuga menziesii

PSME

Patricia A Martinez
Thomas Atzet

The latitudinal range of Douglas-fir is the greatest of any commercial conifer of western North America Nearly pure stands of Douglas-fir continue south from their northern limit on Vancouver Island through western Washington, Oregon, and the Klamath and Coast Ranges of northern California as far south as the Santa Cruz Mountains

Douglas-fir behaves as a drought tolerant pioneer, with moderate tolerance to shade It is best described as a generalist Douglas-fir occurs in all series and at elevations ranging from sea level to 5600 feet. Rather than any particular parent material, soil depth, or aspect, Douglas-fir regeneration is associated with recently disturbed ground. Overstory presence of Douglas-fir indicates disturbance, while presence and dominance in the understory can indicate hot, dry conditions characteristic of the Series Ponderosa pine and incense-cedar are the only major conifers with greater tolerance to drought (Minore 1979) Douglas-fir reproduces well in temperatures near 80 degrees F (Cleary and Waring 1969) and survives in less than two percent of full sunlight for at least several decades (Atzet and Waring 1970) Douglas-fir is not known, however, for its frost tolerance Except for the isolated occurrences of climax stands of Oregon white oak and ponderosa pine, the Series occurs in the hottest, driest forest environments in southwestern Oregon

Douglas-fir grows under a wide variety of climatic conditions Douglas-fir typically dominates the overstory in early, mid, and late seral successional stages in Temperate and Mediterranean ecosystems throughout the Pacific Northwest The coastal region of the Pacific Northwest has a maritime climate characterized by mild, wet winters and cool, relatively dry summers, a long frost-free season, and narrow diurnal fluctuations of temperature Precipitation, mostly in the form of rain, is concentrated in the winter months Climate in the Cascade range tends to be more severe, colder, shorter frost-free period, and more snow (Hermann and Lavender 1990)

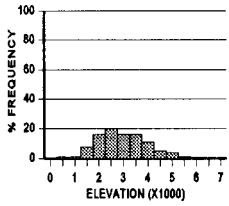
On most Temperate sites, Douglas-fir is succeeded by more shade tolerant species in the late stages of succession, and rarely attains climax status In the southern extreme of the Temperate Zone, where it mixes with Mediterranean ecosystems, isolated stands, potentially climax to Douglas-fir, become increasingly common These stands are usually associated with shallow, skeletal soils on south aspects This localized hot, dry microclimate gives Douglas-fir a competitive advantage. This advantage is similar to the advantage it has immediately after disturbance, when sites are exposed to radiation, night-time re-radiation, extreme heat and cold, and desiccating winds

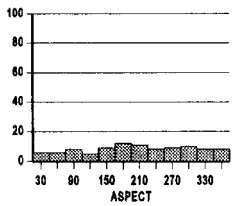
Because Mediterranean ecosystems are hotter, drier, and have more clear days and nights (temperature extremes not dampened by cloud cover or high humidity) than

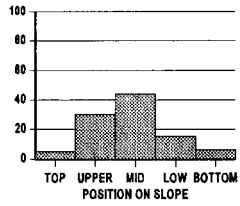
PSME 2

Temperate systems, Douglas-fir has the potential to attain climax status (is the climax dominant) on a wide variety of soil conditions across the landscape Yet, the Series distribution is not totally associated with a particular elevational band or continuum, like the White Fir Series Instead, the Douglas-fir Series can be found on the hotter, drier sites at high elevations or on the coastal side of the Coastal Crest mixed with the Western Hemlock or Tanoak Series

As shown in the graphs below, the Douglas-fir Series covers a wide elevational band, from 180 feet to 5620 feet with an average elevation of 2830 feet It occurs on all aspects Although this Series occurs on all slope positions, it is more commonly found on upper and middle-third slope positions



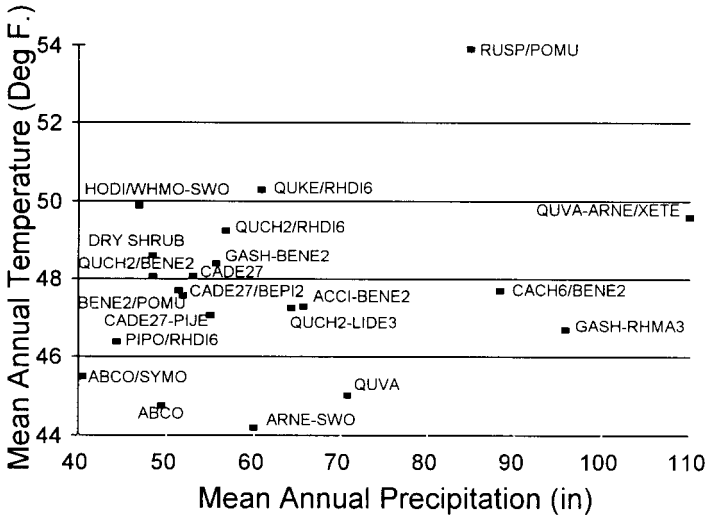




Parent material is variable, consisting of basalt, andesite, sandstone, mudstone, siltstone, shale, serpentine, peridotite, or other ultramafic materials, metavolcanic materials, granodiorite, diorite, mixed metamorphic materials, sedimentary materials, schist, greywacke, welded tuff, amphibolite, granite, gabbro, pumice, rhyolite, tephra, ash, breccia, and chert Gravel cover ranges from 4 to 29 percent, with an average of 14 percent Rock cover ranges from 1 to 42 percent, with an average of 10 percent. Bedrock cover ranges from 0 to 10 percent, with an average of 2 percent Litter ranges from 47 to 98 percent, with an average of 78 percent, while bare ground ranges from 0 to 12 percent, with an average of 3 percent Moss cover ranges from 2 to 29 percent, with an average of 12 percent

Based on 298 plots sampled, soils are shallow to deep Surface texture is clay loam, loam, silty clay loam, sandy clay loam, silt loam, sandy loam, silty clay, loamy sand, and clay. Average rock fragment content is 44 percent, most of which is gravel (average of 34 percent)

The mean annual temperature for the Douglas-fir Series ranges from 44 degrees F to 54 degrees F and the mean annual precipitation ranges from 40 inches to 121 inches The relative positions of the plant associations in the environment are shown on page PSME 3 Each association is plotted by mean annual temperature and mean annual precipitation



Average species richness, based on vascular plants only, is calculated for each association The average richness for the Douglas-fir Series ranges between 19 and 58 species per association Richness is rated as very low, 19 to 26 species, low, 27 to 34 species, intermediate, 35 to 42 species, high, 43 to 50 species, and very high, anything greater than 51 species

The overstory is dominated by Douglas-fir Many other species, conifer and hardwoods alike, will be found in the overstory The understory is dominated by Douglas-fir, with common occurrences of Pacific madrone Canyon live oak, incense-cedar, and sugar pine occur occasionally As in the overstory, many other species, conifers and hardwoods alike, may be present Common shrubs include baldhip rose, dwarf Oregongrape, poison oak, creambush ocean-spray, California hazel, hairy honeysuckle, Pacific blackberry, salal, and creeping snowberry Common herbs include white-flowered hawkweed, western starflower, rattlesnake-plantain, whipplevine, western sword-fern, pathfinder, snow-queen, braken, mountain sweet-root, vanillaleaf, slender-tubed iris, Scouler's harebell, common beargrass, and western twinflower

For Forest Service sites, upper layer tree cover ranges from 48 to 75 percent, with an average of 62 percent Mid-layer tree cover ranges from 27 to 52 percent, with an average of 41 percent while lower layer tree cover ranges from 16 to 56 percent, with an average of 29 percent High shrub cover ranges from 2 to 58 percent, with an average of 18 percent, while low shrub cover ranges from 8 to 71 percent, and averages 30 percent Herb cover ranges between 7 and 66 percent, and averages 27 percent Low, intermediate, and high canopy covers are defined as the lower, middle, and upper thirds of the total range of average covers for each layer

PSME 4

For Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) ranges from 54 to 78 percent, and averages 71 percent, while cover for trees less than 10 feet tall ranges from 5 to 26 percent, and averages 11 percent Cover for shrubs greater than 20 inches tall (50 centimeters) ranges from 3 to 44 percent, and averages 20 percent, and cover for shrubs less than 20 inches tall ranges from 7 to 58 percent, and averages 29 percent. Herb cover ranges from 6 to 44 percent, and averages 18 percent

Twenty-one plant associations have been classified for the Douglas-fir Series in southwestern Oregon. They were described from 601 plots, 245 from Forest Service data, 337 from Bureau of Land Management data, and 19 from Natural Resources Conservation Service data. There may be some additional types on the Illinois Valley, Galice, and Chetco Ranger Districts of the Siskiyou National Forest not covered in this guide If the southwestern Oregon key fails to work in these areas, try the Douglas-fir key in the guide "A Field Guide to the Tanoak and Douglas-fir Plant Associations in Northwestern California" (R5-ECOL-TP-009) by Thomas M Jimerson, et. al 1996

The relationship of draft and final plant associations in the Douglas-fir Series is shown below. The draft associations are listed, with the final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

PSME-PIJE (N=7)
PSME-CADE27-PIJE (71%)
LIDE3-PIMO3/QUVA/XETE (14%)
PIMO3-LIDE3/QUVA/XETE (14%)

PSME-PIPO (N=1)
ABCO-PSME/ROGY (100%)

PSME-QUSA (N=2)
PSME-ABCO (100%)

PSME-BENE (N=11)
PSME-QUCH2/BENE2 (55%)
PSME-QUCH2/RHDI6 (27%)
PSME-ABCO/SYMO (9%)
PSME-CACH6/BENE2 (9%)

PSME/DEPAUPERATE (N=2)
PSME-PIPO/RHDI6 (50%)
PSME/ARNE-SWO (50%)

PSME/BENE/POMU (N=8)
PSME-ABCO (50%)
PSME/ARNE-SWO (25%)
PSME/ACCI-BENE2 (13%)
PSME/GASH-BENE2 (13%)

PSME/GASH/POMU (N=19)
PSME/GASH-BENE2 (42%)
ABCO/RHMA3-BENE2/LIBOL (11%)
ABCO/GASH-BENE2 (11%)
PSME-CACH6/BENE2 (11%)
PSME/ACCI-BENE2 (11%)
PSME/GASH-RHMA3 (11%)
ABCO/BENE2 (5%)

PSME/RHDI (N=8)
PSME-QUCH2/RHDI6 (38%)
PSME-QUKE/RHDI6 (38%)
PSME-PIPO/RHDI6 (13%)
PSME-QUCH2-LIDE3 (13%)

PSME/RHDI-BEPI (N=16)
PSME-PIPO/RHDI6 (44%)
PSME-QUCH2/RHDI6 (31%)
PSME-ABCO/SYMO (13%)
PSME-CADE27/BEPI2 (6%)
PSME-PIPO/RHDI6 (6%)

PSME/RHMA (N=18)
PSME/GASH-RHMA3 (67%)
PSME-CACH6/BENE2 (11%)
CHLA/RHMA3-GASH (11%)
LIDE3/VAOV2-RHMA3-GASH (6%)
PSME-ABCO (6%)

PSME-ABCO-PIPO (N=13)
ABCO-PSME/ROGY (23%)
PSME-CADE27/BEPI2 (23%)
ABCO-CADE27/TRLA2 (15%)
PSME-ABCO/SYMO (15%)
PSME-PIPO/RHDI6 (15%)
PSME-QUCH2-LIDE3 (8%)

PSME-ABCO (N=4)
PSME-ABCO/SYMO (100%)

PSME-ABCO/BENE (N=6)
PSME-CACH6/BENE2 (50%)
PSME-ABCO (33%)
PSME-QUCH2-LIDE3 (17%)

PSME-ABCO/HQDI (N=18)
PSME-ABCO/SYMO (28%)
PSME-CADE27/BEPI2 (17%)
PSME-ABCO (17%)
ABCO-PSME/ROGY (11%)
PSME-QUCH2/BENE2 (11%)
ABCO/BENE2/LIBOL (6%)
PSME-QUCH2/RHDI6 (6%)
PSME/ARNE-SWO (6%)

PSME-LIDE3 (N=4)
LIDE3-PSME-QUCH2/RHDI6 (25%)
PSME-PIPO/RHDI6 (25%)
PSME-QUCH2-LIDE3 (25%)
PSME/ACCI-BENE2 (25%)

PSME-LIDE3/RHDI6 (N=17)
PSME-QUCH2/RHDI6 (35%)
PSME-QUKE/RHDI6 (29%)
LIDE3-PSME-QUCH2/RHDI6 (18%)
PSME-QUCH2-LIDE3 (18%)

PSME-LIDE3-PILA (N=9)
PSME-QUCH2-LIDE3 (56%)
PSME-QUKE/RHDI6 (22%)
PSME-ABCO/SYMO (11%)
PSME-CACH6/BENE2 (11%)

PSME-LIDE3-QUCH (N=8)
PSME-QUCH2/RHDI6 (50%)
LIDE3-PSME-QUCH2/RHDI6 (13%)
PSME-ABCO (13%)
PSME-CADE27-PIJE (13%)
PSME-QUCH2/BENE2 (13%)

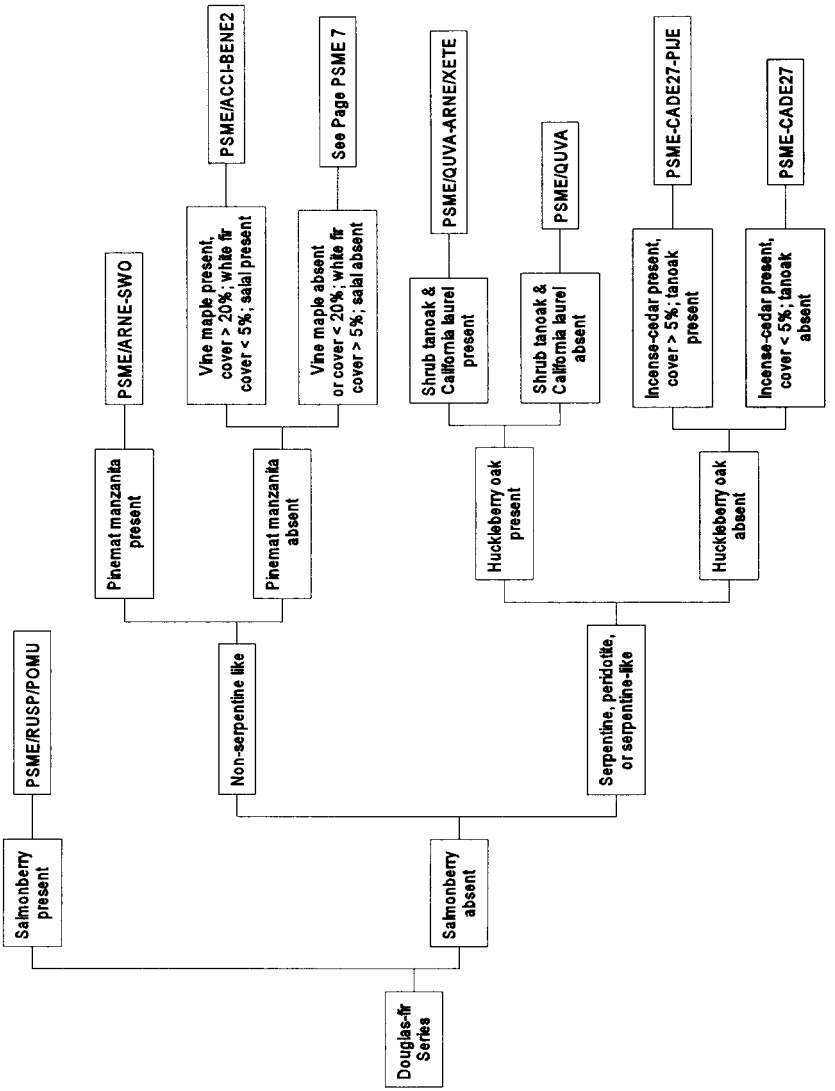
PSME-LIDE3/GASH (N=6)
PSME-QUCH2-LIDE3 (33%)
LIDE3-TSHE/VAOV2/POMU-RIP (17%)
PSME-ABCO (17%)
PSME-CACH6/BENE2 (17%)
PSME/ACCI-BENE2 (17%)

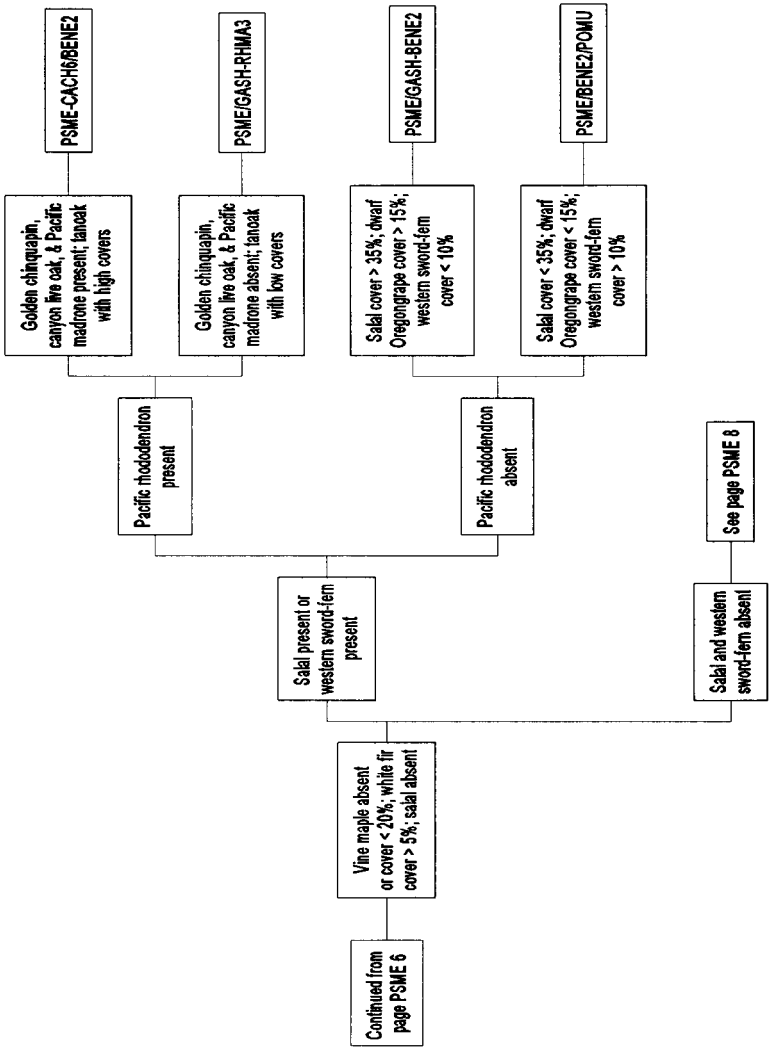
PSME/RHDI/CYGR (N=4)
PSME-CADE27/BEPI2 (50%)
PSME-ABCO/SYMO (25%)
PSME-PIPO/RHDI6 (25%)

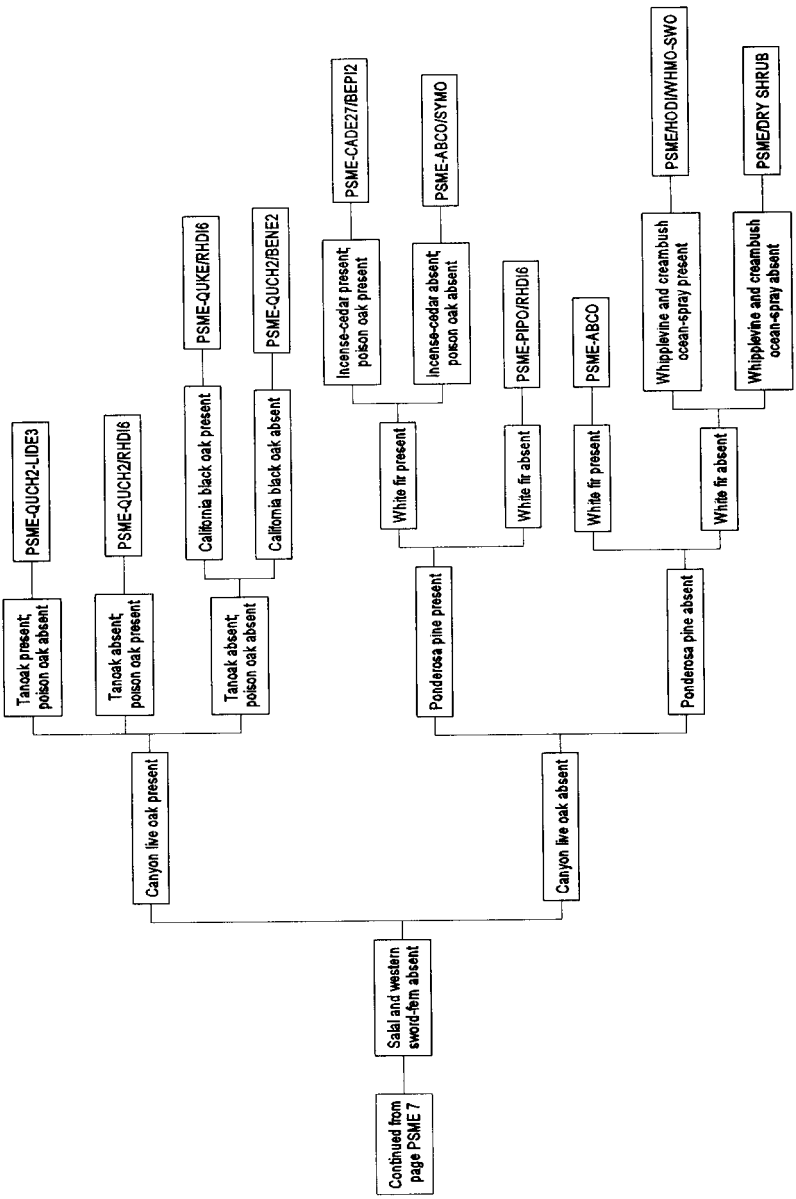
PSME/RHDI/PTAQ (N=15)
PSME/GASH-BENE2 (47%)
PSME-CADE27/BEPI2 (40%)
PSME-PIPO/RHDI6 (7%)
PSME-QUCH2/BENE2 (7%)

PSME 6

The flowchart below and on the following pages shows a graphical presentation of the classification and the relationship between associations. It is not intended to be used as the plant association key




Continued from page PSME 6
Vine maple absent or cover < 20%; white fir cover > 5%; salal absent
Salal present or western sword-fern present
Salal and western sword-fern absent
See page PSME 8
Pacific rhododendron present
Pacific rhododendron absent
Golden chinquapin, canyon live oak, & Pacific madrone present; tanoak with high covers
Golden chinquapin, canyon live oak, & Pacific madrone absent; tanoak with low covers
Salal cover > 35%; dwarf Oregongrape cover > 15%; western sword-fern cover < 10%
Salal cover < 35%; dwarf Oregongrape cover < 15%; western sword-fern cover > 10%
PSME-CACH6/BENE2
PSME/GASH-RHMA3
PSME/GASH-BENE2
PSME/BENE2/POMU


Continued from page PSME 7
Salal and western sword-fern absent
Canyon live oak present
Canyon live oak absent
Tanoak present; poison oak absent
Tanoak absent; poison oak present
Tanoak absent; poison oak absent
Ponderosa pine present
Ponderosa pine absent
PSME-QUCH2-LIDE3
PSME-QUCH2/RHDI6
California black oak present
California black oak absent
PSME-QUKE/RHDI6
PSME-QUCH2/BENE2
White fir present
White fir absent
White fir present
White fir absent
Incense-cedar present; poison oak present
Incense-cedar absent; poison oak absent
PSME-PIPO/RHDI6
PSME-ABCO
Whipplevine and creambush ocean-spray present
Whipplevine and creambush ocean-spray absent
PSME-CADE27/BEPI2
PSME-ABCO/SYMO
PSME/HODI/WHMO-SWO
PSME/DRY SHRUB

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Jimerson, Thomas M , et al 1996 A Field Guide to the Tanoak and Douglas-fir Plant Associations in Northwestern California R5-ECOL-TP-009 USDA Forest Service, Pacific Southwest Region

Minore, Don 1979 Comparative autecological characteristics of northwestern tree species - a literature review USDA Forest Service General Technical Report PNW-87 Pacific Forest and Range Experiment Station, Portland, Oregon 72 pages

KEY TO THE DOUGLAS-FIR PLANT ASSOCIATIONS

1a	Salmonberry (RUSP) present	PSME/RUSP/POMU Page PSME 14
1b	Salmonberry (RUSP) absent	2
2a	Parent material is serpentine, peridotite, or of serpentine character Supports a complement of species normally found on serpentine	3
2b	Non-serpentine like	6
3a	Huckleberry oak (QUVA) usually present	4
3b	Huckleberry oak (QUVA) usually absent	5
4a	Shrub form of tanoak (LIDEE) and California laurel (UMCA) present	PSME/QUVA-ARNE/XETE Page PSME 16
4b	Shrub form of tanoak (LIDEE) and/or California laurel (UMCA) absent	PSME/QUVA Page PSME 18
5a	Incense-cedar (CADE27) present in the overstory and/or understory, with combined covers of greater than 5 percent Tanoak (LIDE3) usually present Grass cover, if present, is low	PSME-CADE27-PIJE Page PSME 20
5b	Incense-cedar (CADE27) present in the overstory and/or understory, with combined covers of less than 5 percent. Tanoak (LIDE3) absent Grasses present, with grass cover greater than 30 percent	PSME-CADE27 Page PSME 22
6a	Pinemat manzanita (ARNE) present	PSME/ARNE-SWO Page PSME 24
6b	Pinemat manzanita (ARNE) absent	7
7a	Vine maple (ACCI) present, covers greater than 20 percent Salal (GASH) present White fir (ABCO) cover in the overstory and/or understory is less than 5 percent, combined	PSME/ACCI-BENE2 Page PSME 26
7b	Vine maple (ACCI) absent, if present, covers less than 20 percent Salal (GASH) absent White fir (ABCO) covers in the overstory and/or understory are greater than 5 percent, combined	8

8a Salal (GASH) usually present with covers usually greater than 10 percent, or western sword-fern (POMU) usually present with covers usually greater than 5 percent 9

8b Salal (GASH) usually absent, if present, covers usually less than 10 percent. Western sword-fern (POMU) usually absent, if present, covers less than 5 percent 12

9a Pacific rhododendron (RHMA3) usually present 10

9b Pacific rhododendron (RHMA3) usually absent 11

10a. Golden chinquapin (CACH6), canyon live oak (QUCH2), and Pacific madrone (ARME) usually more consistently present, and tanoak (LIDE3) usually with higher covers, than dicotomy 10b Pacific rhododendron (RHMA3) cover usually less than 20 percent Salal (GASH) constancy 69 percent, average cover 35 percent, Pacific rhododendron (RHMA3) constancy 50 percent, average cover 16 percent, common beargrass (XETE) constancy 75 percent, average cover 2 percent PSME-CACH6/BENE2
Page PSME 28

10b Golden chinquapin (CACH6), canyon live oak (QUCH2), and Pacific madrone (ARME) usually less consistently present, and tanoak (LIDE3) usually with lower covers, than dicotomy 10a Pacific rhododendron (RHMA3) cover usually greater than 20 percent Salal (GASH) constancy 100 percent, average cover 56 percent, Pacific rhododendron (RHMA3) constancy 100 percent, average cover 53 percent, common beargrass (XETE) constancy 95 percent, average cover 6 percent PSME/GASH-RHMA3
Page PSME 30

11a Salal (GASH) cover greater than 35 percent Dwarf Oregongrape (BENE2) cover greater than 15 percent Western sword-fern (POMU) cover less than 10 percent PSME/GASH-BENE2
Page PSME 32

11b Salal (GASH) cover less than 35 percent Dwarf Oregongrape (BENE2) cover less than 15 percent Western sword-fern (POMU) cover greater than 10 percent PSME/BENE2/POMU
Page PSME 34

PSME 12

12a Canyon live oak (QUCH2) present, with covers usually greater than 5 percent — 13

12b Canyon live oak (QUCH2) absent, if present, covers usually less than 5 percent — 15

13a Tanoak (LIDE3) present, with covers usually greater than 5 percent Poison oak (RHDI6) usually absent — PSME-QUCH2-LIDE3 Page PSME 36

13b Tanoak (LIDE3) usually absent Poison oak (RHDI6) usually present, with covers usually greater than 5 percent — PSME-QUCH2/RHDI6 Page PSME 38

13c Tanoak (LIDE3) usually absent Poison oak (RHDI6) usually absent, if present, covers are less than 5 percent — 14

14a California black oak (QUKE) present. — PSME-QUKE/RHDI6 Page PSME 40

14b. California black oak (QUKE) absent — PSME-QUCH2/BENE2 Page PSME 42

15a. Ponderosa pine (PIPO) present in the overstory and/or understory with combined covers of usually greater than 10 percent — 16

15b. Ponderosa pine (PIPO) absent, if present in the overstory and/or understory, combined covers are usually less than 10 percent — 18

16a White fir (ABCO) present — 17

16b. White fir (ABCO) rarely present, if present, covers are very low — PSME-PIPO/RHDI6 Page PSME 44

17a. Incense-cedar (CADE27) present in the overstory and/or understory, combined covers usually greater than 5 percent Poison oak (RHDI6) usually present, with covers greater than 2 percent — PSME-CADE27/BEPI2 Page PSME 46

17b. Incense-cedar (CADE27) usually absent, if present, covers are low Poison oak (RHDI6) usually absent — PSME-ABCO/SYMO Page PSME 48

18a White fir (ABCO) present — PSME-ABCO
Page PSME 50

18b. White fir (ABCO) absent — 19

19a. Whipplevine (WHMO) usually present, covers greater than 10 percent Creambush oceanspray (HODI) usually present, covers greater than 10 percent — PSME/HODI/WHMO-SWO
Page PSME 52

19b. Whipplevine (WHMO) usually absent, if present, covers less than 10 percent Creambush oceanspray (HODI) usually absent; if present, covers less than 5 percent — PSME/DRY SHRUB
Page PSME 54

PSME 14

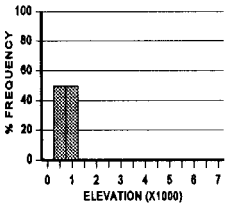
DOUGLAS-FIR/SALMONBERRY/WESTERN SWORD-FERN
Pseudotsuga menziesii/Rubus spectabilis/Polystichum munitum
PSME/RUSP/POMU (N=6, NRCS=6)

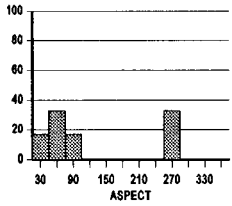
NO PICTURE AVAILABLE

Distribution This Association is coastal and is found primarily in Curry County It may be found on the Gold Beach, Chetco, and Powers Ranger Districts, Siskiyou National Forest, and on adjacent Bureau of Land Management lands

Distinguishing Characteristics This Association is moist, as suggested by the presence of salmonberry, red alder, and Sitka spruce Tanoak is also frequently present This is the warmest Douglas-fir Association

Soils No soils data are available





No slope position data available.

Environment Elevation averages 520 feet Aspects are northerly, however, sampling was biased towards northern aspects Slope averages 24 percent and ranges from 1 to 50 percent

Vegetation Composition and Structure Total species richness is low for the Series, averaging 27 species. The overstory is dominated by Douglas-fir and red alder Sitka spruce and tanoak are common Understory species frequently found include Douglas-fir and tanoak Port-Orford-cedar is found occasionally. Salmonberry is frequently found in the shrub layer, while evergreen huckleberry, red huckleberry, creambush ocean-spray, salal, and red elderberry are all common Frequent herbs include western sword-fern, redwoods violet, braken, and iris Nettle-leaf horse-mint, Oregon oxalis, fragrant bedstraw, white inside-out-flower, foxglove, Oregon bigroot, and bearded fescue are common All herbs, with the exception of western sword-fern, have low covers

Common name	Code	Constancy	Class**	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	3	
Red alder	ALRU2	83	2	
Sitka spruce	PISI	50	3	
Tanoak	LIDE3	50	3	
Understory trees				3
Douglas-fir	PSME	100	2	
Tanoak	LIDE3	83	1	
Port-Orford-cedar	CHLA	33	1	
Shrubs				6
Salmonberry	RUSP	100	2	
Evergreen huckleberry	VAOV2	67	2	
Red huckleberry	VAPA	67	2	
Creambush ocean-spray	HODI	67	1	
Salal	GASH	50	3	
Red elderberry	SARA2	50	2	
Herbs				14
Western sword-fern	POMU	100	4	
Redwoods violet	VISE3	83	2	
Braken	PTAQ	83	1	
Iris spp	IRIS	83	1	
Nettle-leaf horse-mint	AGUR	67	1	
Oregon oxalis	OXOR	50	2	
Fragrant bedstraw	GATR3	50	2	
White inside-out-flower	VAHE	50	2	
Foxglove	DIPU	50	2	
Oregon bigroot	MAOR3	50	1	
Bearded fescue	FESU	50	1	

** Cover is given in Daubenmire dominance class codes

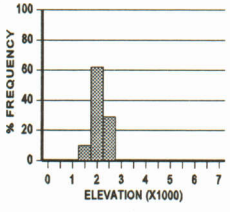
PSME 16

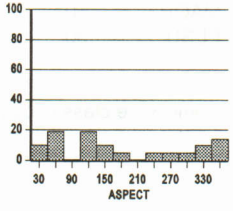
DOUGLAS-FIR/HUCKLEBERRY OAK-PINEMAT MANZANITA/COMMON BEARGRASS
Pseudotsuga menziesii/Quercus vaccinifolia-Arctostaphylos nevadensis/Xerophyllum tenax
PSME/QUVA-ARNE/XETE (N=21; FS=21)

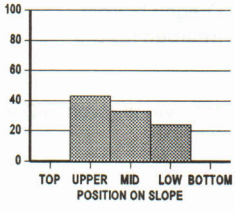
Distribution. This Association occurs on the Chetco Ranger District, Siskiyou National Forest. Twenty of the 21 plots occurred in the Lemmingsworth Gulch Research Natural Area, but this Association may also occur elsewhere.

Distinguishing Characteristics. This Association is coastal and is the only Douglas-fir Association that occurs exclusively on serpentine and peridotite parent materials. This Association is similar to the Douglas-fir/Pinemat Manzanita Association, except huckleberry oak is present in this Association, generally with high covers. This is the wettest Douglas-fir Association.

Soils. Parent material is serpentine (80 percent constancy) and peridotite (20 percent constancy). Surface gravel cover averages 20 percent and surface rock cover averages 42 percent. Exposed bedrock averages 1 percent. Bare ground averages 4 percent, while litter averages 64 percent.







Environment Elevation averages 2110 feet Aspects vary Slope averages 45 percent and ranges from 26 to 64 percent Slope position ranges from the lower one-third to the upper one-third

Vegetation Composition and Structure Total species richness is very high for the Series, averaging 57 species The overstory is dominated by Douglas-fir Knobcone pine, western white pine, and Jeffrey pine are common, all with low covers. The understory is dominated by Douglas-fir and California-laurel Douglas-fir covers are low, while California-laurel covers are high, generally greater than 10 percent Tanoak (shrub form), huckleberry oak, pinemat manzanita, coffeeberry, red huckleberry, dwarf ceanothus, box-leaved silk-tassel, and baldhip rose are frequent shrubs In the herb/grass layer, common beargrass, sedge, slender-tubed iris, obscure bedstraw, Oregon trillium, Howell's biscuit-root, common yarrow, yellow inside-out-flower, leafy erigeron, toothleaf pyrola, few-fruited biscuit-root, rock fern, nodding arnica, variable morning-glory, and whipplevine are all frequent, most with low covers Moss cover averages 5 percent

Upper layer tree cover has the lowest cover of the Series, averaging 1 percent. Mid-layer tree cover is also low, averaging 27 percent, while lower layer tree cover is high, averaging 56 percent High shrub cover is low for the Series, averaging 12 percent, while low shrub cover is intermediate, averaging 34 percent Herb/grass cover is also intermediate, averaging 38 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	22	
Knobcone pine	PIAT	62	8	
Western white pine	PIMO3	62	2	
Jeffrey pine	PIJE	52	2	
Understory trees				6
Douglas-fir	PSME	100	4	
California-laurel	UMCA	95	11	
Knobcone pine	PIAT	67	2	
Western white pine	PIMO3	67	1	
Jeffrey pine	PIJE	48	1	
Shrubs				9
Pinemat manzanita	ARNE	100	7	
Coffeeberry	RHCA	100	6	
Huckleberry oak	QUVA	95	25	
Tanoak (shrub form)	LIDEE	95	25	
Red huckleberry	VAPA	95	8	
Dwarf ceanothus	CEPU	95	2	
Box-leaved silk-tassel	GABU2	90	2	
Herbs				36
Common beargrass	XETE	100	7	
Sedge species	CAREX	95	3	
Slender-tubed iris	IRCH	95	2	
Obscure bedstraw	GAAM2	90	1	
Oregon trillium	TRRI2	90	1	
Yellow inside-out-flower	VACH2	86	4	

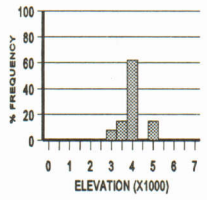
PSME 18

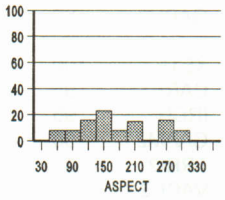
DOUGLAS-FIR/HUCKLEBERRY OAK
Pseudotsuga menziesii/Quercus vaccinifolia
PSME/QUVA (N=13; BLM=13)

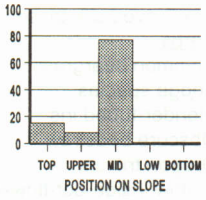
Distribution. This Association is scattered east of the Coast Range crest on dry sites. It occurs on the Grants Pass and Glendale Resource Areas, Medford District, Bureau of Land Management and is common on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. There may be occasional occurrences on the west half of the Butte Falls Resource Area, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association only occurs in the Siskiyous east of the coastal crest and does not occur in the Cascades. The presence of huckleberry oak and ultramafic parent materials indicate poor sites, but they are not preemptive key characteristics. The occasional presence of Sadler oak and/or knobcone pine may help key to this Association.

Soils. Parent material varies from sandstone, mixed sediment, and mixed







metavolcanic to ultramafic Based on 13 samples, soils average at least 12 inches deep Textures are mostly sandy loam, silt loam, and silty clay loam Average rock fragment content is 62 percent Most fragments (49 percent) are of gravel size

Environment. Elevation ranges from about 3000 feet to over 5000 feet The average is 3900 feet This Association occurs equally on all aspects, but usually occupies midslope topographic positions Slopes average about 32 percent Average annual temperature is about 45 degrees F (cool for the Series) and average annual precipitation is about 71 inches Approximately 4 percent of the forest floor is exposed bedrock, 53 percent is covered with litter, 12 percent is bare ground, and 2 percent is covered with moss

Vegetation Composition and Structure Total species richness, very low for the Series, is 22 The herb layer particularly lacks richness, hosting an average of eight species Cover greater than 10 feet (3 meters) tall, usually trees, averages 54 percent Tree cover less than 10 feet tall averages 12 percent, tall shrubs, greater than 20 inches (50 centimeters) tall, average 43 percent cover, low shrubs, less than 20 inches tall, average 31 percent cover, herb cover averages 7 percent When sugar pine occurs in the overstory it can be an indication of early growing season water availability, however, only dwarf Oregongrape in the shrub layer supports such an interpretation Dwarf Oregongrape covers are too low, however, to add more surity Knobcone pine, golden chinquapin, and the two manzanita species often indicate disturbance, usually fire On sites with ultramafic rocks, huckleberry oak and common beargrass are often present with relatively high cover

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	92	26	
Sugar pine	PILA	23	27	
Understory trees				4
Douglas-fir	PSME	100	12	
Knobcone pine	PIAT	54	13	
Incense-cedar	CADE27	40	7	
Golden chinquapin	CACH6	31	25	
Sugar pine	PILA	23	5	
Shrubs				8
Huckleberry oak	QUVA	85	39	
Greenleaf manzanita	ARPA6	77	15	
Dwarf Oregongrape	BENE2	62	2	
Baldhip rose	ROGY	54	1	
Sadler oak	QUSA2	15	16	
Hairy manzanita	ARCO3	15	15	
Herbs				8
Common princes's-pine	CHUM	62	2	
White-flowered hawkweed	HIAL2	62	1	
Common beargrass	XETE	54	5	

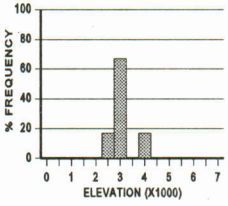
PSME 20

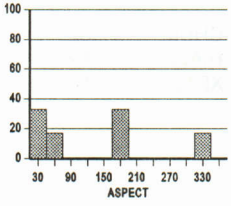
DOUGLAS-FIR-INCENSE-CEDAR-JEFFREY PINE
Pseudotsuga menziesii-Calocedrus decurrens-Pinus jeffreyi
PSME-CADE27-PIJE (N=6; FS=6)

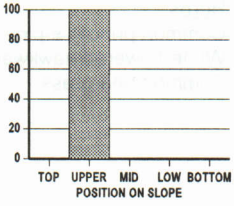
Distribution. This Association occurs on the Illinois Valley Ranger District, Siskiyou National Forest and the Diamond Lake Ranger District, Umpqua National Forest. It may also occur on adjacent districts of both Forests, along with adjacent lands of the Bureau of Land Management.

Distinguishing Characteristics. This Association is generally found on serpentine and peridotite. Jeffrey pine and incense-cedar are frequent. Douglas-fir-Incense-cedar-Jeffrey Pine is one of the drier, cooler associations. This Association is found mainly on upper slope positions.

Soils. Parent material is serpentine and peridotite, with some ash and granite. Average surface rock cover is 13 percent, with 11 percent gravel and 3 percent bare ground exposure. Soils are generally shallow to moderately deep, with an average depth of 21 inches.







Environment Elevation averages 3080 feet Aspects are most frequently northeast and south Slope averages 48 percent and ranges between 33 and 60 percent This Association is generally found on upper third slope positions

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 31 species. The overstory is dominated by Douglas-fir, Jeffrey pine, and incense-cedar. Sugar pine rarely occurs. The understory is dominated by Douglas-fir and incense-cedar Tanoak and canyon live oak are frequent, while Jeffrey pine, Pacific madrone, and sugar pine are common White fir will occasionally be found Baldhip rose is a frequent shrub, while poison oak, hairy honeysuckle, and Piper's Oregongrape are common. White-flowered hawkweed and slender-tubed iris are frequent herbs, while whipplevine, imbricate sword-fern, rattlesnake-plantain, slender bittercress, common yarrow, California harebell, and western starflower are common herbs. Moss cover averages 19 percent.

Upper layer tree cover is low, averaging 53 percent Mid-layer tree cover is high for the Series, averaging 47 percent, and lower layer tree cover is intermediate, averaging 36 percent. High and low shrub covers are both low for the Series, averaging 2 and 20 percent, respectively Herb/grass cover is high for the Series, averaging 66 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	24	
Jeffrey pine	PIJE	100	12	
Incense-cedar	CADE27	83	6	
Sugar pine	PILA	33	3	
Understory trees				6
Douglas-fir	PSME	100	31	
Incense-cedar	CADE27	100	16	
Tanoak	LIDE3	83	5	
Canyon live oak	QUCH2	83	4	
Jeffrey pine	PIJE	67	11	
Pacific madrone	ARME	50	16	
Sugar pine	PILA	50	3	
Shrubs				7
Baldhip rose	ROGY	83	1	
Poison oak	RHDI6	50	4	
Hairy honeysuckle	LOHI2	50	2	
Piper's Oregongrape	BEPI2	50	1	
Herbs				15
White-flowered hawkweed	HIAL2	100	1	
Slender-tubed iris	IRCH	83	1	
Whipplevine	WHMO	67	8	
Imbricate sword-fern	POMUI3	67	5	
Rattlesnake-plantain	GOOB2	67	1	
Slender bittercress	CAPUP	50	4	
Common yarrow	ACMI2	50	2	

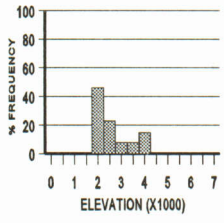
PSME 22

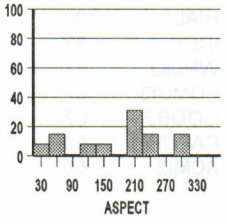
DOUGLAS-FIR-INCENSE-CEDAR
Pseudotsuga menziesii/Calocedrus decurrens
PSME-CADE27 (N=13; BLM=13)

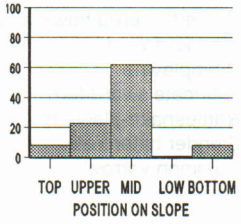
Distribution. This Association is scattered east of the Coast Range crest on dry sites. It occurs on the Grants Pass and Glendale Resource Areas, Medford District, Bureau of Land Management, and on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association is not likely to occur in the Cascades or west of the Coast Range crest. It is highly associated with, but not exclusively found on, ultramafic parent material. Soils are usually shallow and rocky. Jeffrey pine and rock fern, highly reliable indicators of ultramafics, are important key species for distinguishing this Association from others in the Series.

Soils. Parent material is generally ultramafic, mostly serpentine, or metavolcanic material. Based on 13 samples, soil depth averages at least 16 inches. Textures







are mostly silty clay loam, silt loam, or clay loam Average rock fragment content is 36 percent Most fragments (24 percent) are of gravel size

Environment Elevation ranges from about 2000 to over 4000 feet The average is 2700 feet and frequency lessens at higher elevations The mode, however, at only 2000 feet, indicates the distribution is not normal This Association occurs on all aspects, but most often faces south Douglas-fir-Incense-cedar occurs from midslopes to ridgetops, but rarely occupies bottomland positions Slopes average about 45 percent. Average annual temperature is about 48 degrees F and average annual precipitation is about 53 inches Approximately 2 percent of the forest floor is exposed bedrock, 50 percent is covered with litter, 6 percent is bare ground, and 8 percent is covered with moss

Vegetation Composition and Structure Total species richness, very low for the Series, is 20. The shrub layer, particularly depauperate, averages only three species Cover greater than 10 feet (3 meters) tall, usually trees, averages 58 percent Tree cover less than 10 feet tall averages 7 percent Tall shrubs, greater than 20 inches (50 centimeters) tall, average 10 percent cover, low shrubs, less than 20 inches tall, average 7 percent cover Herb cover averages 44 percent, high for drier sites of the Series Jeffrey pine is a prominent species in both the overstory and understory Together with rock fern, Jeffrey pine is almost a sure indication of ultramafic soils Incense-cedar tolerates ultramafics well, but it also tolerates every other parent material type Canyon live oak and the lack of shrubs and herbs are likely an indication of both a dry environment and the nutrient imbalance associated with ultramafics Grasses survive and grow well on most imbalanced sites Fescue is commonly found associated with ultramafic parent material

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Jeffrey pine	PIJE	62	24	
Incense-cedar	CADE27	46	23	
Douglas-fir	PSME	46	23	
Understory trees				4
Incense-cedar	CADE27	92	14	
Douglas-fir	PSME	77	13	
Jeffrey pine	PIJE	56	7	
Canyon live oak	QUCH2	23	11	
Pacific madrone	ARME	23	10	
Shrubs				3
Wedgeleaf ceanothus	CECU	23	19	
Herbs				12
Rock fern	ASDE6	54	1	
Fescue	FESTU	38	35	
Western sword-fern	POMU	31	25	

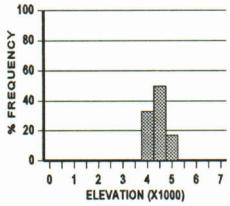
PSME 24

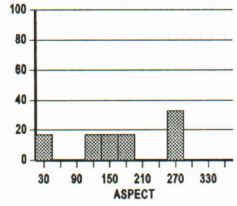
DOUGLAS-FIR/PINEMAT MANZANITA-SWO
Pseudotsuga menziesii/Arctostaphylos nevadensis
PSME/ARNE-SWO (N=6; FS=6)

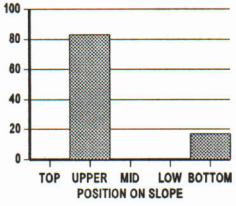
Distribution. This Association occurs on the Applegate and Prospect Ranger Districts, Rogue River National Forest, the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and the Tiller and North Umpqua Ranger Districts, Umpqua National Forest. Douglas-fir/Pinemat Manzanita-SWO may also occur on adjacent lands of the Bureau of Land Management.

Distinguishing Characteristics. This is a high elevation association, averaging 4270 feet. This Association is similar to Douglas-fir/Huckleberry Oak-Pinemat Manzanita/ Common Beargrass except huckleberry oak is rarely present and parent material is not ultramafic. This is the coolest Association of the Series.

Soils. Parent material is highly variable. Plots occur on rhyolite, pumice, gabbro, schist, and metavolcanic materials. Average surface rock cover is 16 percent, with 18 percent gravel. Soils are generally moderately deep, but can be shallow or deep,







with an average depth of greater than 36 inches Based on two plots sampled, surface textures are loam and sandy loam, with 15 percent cobbles and up to 60 percent gravel Subsurface textures are silty clay loam and clay, with 60 to 90 percent cobbles

Environment Elevation averages 4270 feet. This Association occurs on all aspects Slope averages 33 percent and ranges from 3 to 57 percent. Douglas-fir/Pinemat Manzanita-SWO is mostly found on upper one-third slope positions, and will occasionally occur on benches and narrow flats

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 28 species The overstory is dominated by Douglas-fir, with incense-cedar, sugar pine, and western white pine common The understory is dominated by Douglas-fir, with incense-cedar, white fir, golden chinquapin, western white pine, and sugar pine common, most with low covers. Pinemat manzanita and baldhip rose are frequent shrubs, while dwarf Oregongrape and western serviceberry are common. Common prince's-pine frequently occurs in the herb/grass layer while common beargrass, whipplevine, western sword-fern, and whitevein pyrola commonly occur. All have low covers Moss cover averages 5 percent.

Upper layer tree cover is low for the Series, averaging 48 percent Mid-layer tree cover is high, averaging 51 percent while lower layer tree cover is intermediate, averaging 37 percent. High shrub and low shrub covers are also intermediate for the Series, averaging 34 and 44 percent, respectively Herb/grass cover is low, with an average of 13 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	83	38	
Incense-cedar	CADE3	50	13	
Sugar pine	PILA	50	5	
Western white pine	PIMO3	50	5	
White fir	ABCO	33	2	
Understory trees				6
Douglas-fir	PSME	100	29	
Incense-cedar	CADE27	67	13	
White fir	ABCO	67	2	
Golden chinquapin	CACH6	50	13	
Western white pine	PIMO3	50	3	
Sugar pine	PILA	50	3	
Shrubs				9
Pinemat manzanita	ARNE	100	7	
Baldhip rose	ROGY	83	1	
Dwarf Oregongrape	BENE2	67	3	
Western serviceberry	AMAL2	50	2	
Huckleberry oak	QUVA	33	78	
Herbs				10
Common prince's-pine	CHUM	83	4	
Common beargrass	XETE	67	6	
Whipplevine	WHMO	67	2	

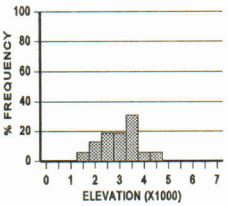
PSME 26

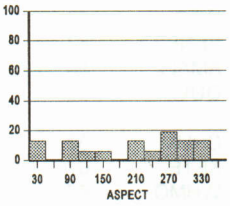
DOUGLAS-FIR/VINE MAPLE-DWARF OREGONGRAPE
Pseudotsuga menziesii/Acer circinatum-Berberis nervosa
PSME/ACCI-BENE2 (N=16; FS=16)

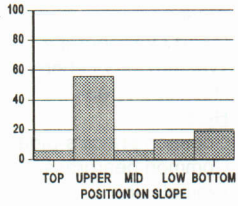
Distribution. This Association occurs on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest and all Districts of the Umpqua National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This is one of the cooler, drier Douglas-fir associations. It is the only association where vine maple is consistently present.

Soils. Parent material is highly variable. Plots occur on andesite, basalt, diorite, welded tuff, pumice, and metavolcanic bedrock. Soils are moderately deep to deep, with an average depth of greater than 37 inches. Average surface rock cover is 11 percent, with 19 percent gravel and 3 percent bare ground. Based on one plot sampled, surface and subsurface textures are loam with little to no gravel or cobbles, and a few boulders.







Environment Elevation averages 3030 feet No one aspect dominates over another Slope averages 43 percent and ranges between 0 and 80 percent This Association may be found on any slope position

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 41 species The overstory is dominated by Douglas-fir Sugar pine, incense-cedar, white fir, and westen hemlock are occasionally found The understory is dominated by Douglas-fir Pacific yew and western hemlock are frequently found. Golden chinquapin and incense-cedar are common Vine maple, dwarf Oregongrape, red huckleberry, baldhip rose, and Pacific blackberry are frequently found shrubs Vine maple covers are high, averaging 43 percent and dwarf Oregongrape covers are generally greater than 10 percent Western sword-fern, vanillaleaf, whipplevine, white trillium, western twinflower, common prince's-pine, western starflower, snow-queen, round-leaved violet, Oregon fairybell, white-flowered hawkweed, and rattlesnake-plantain are frequently found, all with low covers Moss cover averages 19 percent

Upper layer tree cover is high for the Series, averaging 68 percent Mid-layer and lower layer tree covers are intermediate, averaging 43 and 42 percent, respectively High shrub, low shrub, and herb/grass covers are also intermediate for the Series, averaging 34, 49, and 30 percent, respectively

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	58	
Sugar pine	PILA	38	6	
Incense-cedar	CADE27	38	1	
White fir	ABCO	31	3	
Western hemlock	TSHE	25	4	
Understory trees				8
Douglas-fir	PSME	100	13	
Pacific yew	TABR2	81	8	
Western hemlock	TSHE	75	5	
Incense-cedar	CADE27	69	6	
Golden chinquapin	CACH6	63	7	
Big-leaf maple	ACMA	44	16	
Shrubs				11
Vine maple	ACCI	100	43	
Dwarf Oregongrape	BENE2	100	14	
Red huckleberry	VAPA	75	3	
Baldhip rose	ROGY	75	2	
Pacific blackberry	RUUR	75	2	
Herbs				19
Western sword-fern	POMU	94	5	
Vanillaleaf	ACTR	81	5	
Whipplevine	WHMO	81	2	
White trillium	TROV2	81	1	
Western twinflower	LIBOL	75	5	
Common prince's-pine	CHUM	75	2	

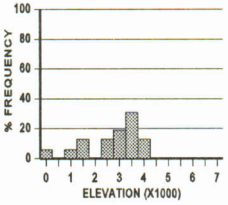
PSME 28

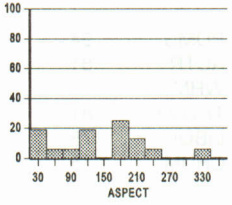
DOUGLAS-FIR-GOLDEN CHINQUAPIN/DWARF OREGONGRAPE
Pseudotsuga menziesii-Castanopsis chrysophylla/Berberis nervosa
PSME-CACH6/BENE2 (N=16; FS=16)

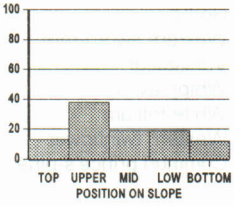
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest, all ranger districts of the Siskiyou National Forest, and the Tiller and North Umpqua Ranger Districts, Umpqua National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This is one of the lower elevation Douglas-fir associations. Golden chinquapin, a rocky site indicator, is common, generally with covers greater than 15 percent. This Association is moist and cool.

Soils. Parent material is mostly sandstone, pumice, or andesite, with some breccia and mudstone. Average surface rock cover is 3 percent, with 19 percent gravel. Soils are generally deep but can be shallow, with an average depth of greater than







32 inches Based on two plots sampled, surface texture is loam with 90 percent stones or cobbles. Subsurface texture is loam with 95 percent stones

Environment Elevation averages 2910 feet Aspects vary, though tend not to be northwest. Slope averages 35 percent and ranges from 7 to 67 percent This Association may be found on any slope position.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 28 species. The overstory is dominated by Douglas-fir and sugar pine. The understory is dominated by Douglas-fir and golden chinquapin, both with covers generally greater than 15 percent. Tanoak, Pacific madrone, canyon live oak, white fir, and sugar pine are common associates. Western hemlock, incense-cedar, Pacific yew, and Pacific dogwood are common. Dwarf Oregongrape, baldhip rose, and red huckleberry are frequent shrubs, while salal, Pacific blackberry, Pacific rhododendron, and vine maple are common Rattlesnake-plantain and common beargrass are frequently occurring herbs, while common prince's-pine, western twinflower, and braken are common Moss cover averages 11 percent

Upper layer tree cover is high, averaging 71 percent Mid-layer tree cover is intermediate for the Series, averaging 36 percent, while lower layer tree cover is low, averaging 27 percent High shrub and low shrub covers are intermediate for the Series, averaging 28 and 47 percent, respectively Herb/grass cover is low, averaging 16 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				2
Douglas-fir	PSME	100	54	
Sugar pine	PILA	75	10	
Understory trees				7
Douglas-fir	PSME	100	18	
Golden chinquapin	CACH6	69	19	
Tanoak	LIDE3	63	11	
Pacific madrone	ARME	56	6	
Canyon live oak	QUCH2	56	5	
White fir	ABCO	56	4	
Sugar pine	PILA	56	3	
Shrubs				9
Dwarf Oregongrape	BENE2	94	6	
Baldhip rose	ROGY	88	2	
Red huckleberry	VAPA	81	3	
Salal	GASH	69	35	
Pacific blackberry	RUUR	63	1	
Pacific rhododendron	RHMA3	50	16	
Herbs				10
Rattlesnake-plantain	GOOB2	81	1	
Common beargrass	XETE	75	2	
Common prince's-pine	CHUM	69	2	
Western twinflower	LIBOL	50	7	
Braken	PTAQ	50	1	
Western sword-fern	POMU	44	6	

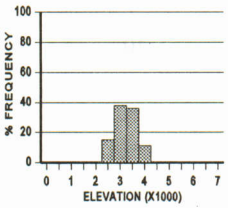
PSME 30

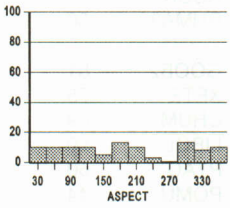
DOUGLAS-FIR/SALAL-PACIFIC RHODODENDRON
Pseudotsuga menziesii/Gaultheria shallon-Rhododendron macrophyllum
PSME/GASH-RHMA3 (N=53; FS=21, BLM=19, NRCS=13)

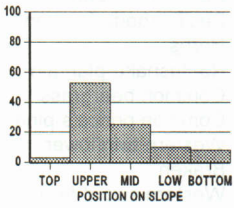
Distribution. This Association occurs on all districts of the Siskiyou National Forest and the Tiller and North Umpqua Ranger Districts, Umpqua National Forest. It also occurs on the Grants Pass and Glendale Resource Areas, Medford District, and the South River Resource Area, Roseburg District, Bureau of Land Management, and in Curry County.

Distinguishing Characteristics. This Association is the second wettest of the Series, averaging 96 inches of precipitation annually. Salal and Pacific rhododendron both frequently occur with high covers (average 61 and 39 percent, respectively). Dwarf Oregongrape and common beargrass also frequently occur.

Soils. Parent material is mostly sandstone, pumice, or andesite, with some mudstone, breccia, mixed metamorphic materials, diorite, and serpentine. Based on 19 samples, soil textures are mostly silt loam or sandy loam. Average rock fragment







content is 37 percent, most of which is gravel (average 30 percent)

Environment Elevation averages 3230 feet Aspects vary Slope averages 35 percent and ranges from 9 to 80 percent This Association occurs on all slope positions Average annual precipitation is 96 inches and average annual temperature is 47 degrees F

Vegetation Composition and Structure Total species richness is very low for the Series, averaging 20 species The overstory is dominated by Douglas-fir The understory is dominated by Douglas-fir and golden chinquapin Golden chinquapin cover averages 18 percent Tanoak is common Frequent shrubs include salal, Pacific rhododendron, and dwarf Oregongrape Pacific rhododendron and salal both have high covers, averaging 39 and 61 percent, respectively Common beargrass and braken frequently occur, and rattlesnake-plantain is common Moss cover averages 6 percent

On Forest Service sites, upper layer tree cover is high, averaging 68 percent Mid-layer and lower layer tree covers are low, averaging 30 and 25 percent, respectively High shrub and low shrub covers are high, averaging 58 and 71 percent, respectively This Association has the highest shrub covers of the Series Herb/ grass cover is low, with an average of 10 percent

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 75 percent, while cover for trees less than 10 feet tall averages 11 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 36 percent, and cover for shrubs less than 20 inches tall averages 58 percent Herb/ grass cover averages 6 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	98	52	
Understory trees				5
Douglas-fir	PSME	100	20	
Golden chinquapin	CACH6	68	18	
Tanoak	LIDE3	55	10	
Sugar pine	PILA	48	2	
Canyon live oak	QUCH2	45	6	
Shrubs				7
Salal	GASH	100	61	
Pacific rhododendron	RHMA3	83	39	
Dwarf Oregongrape	BENE2	83	6	
Baldhip rose	ROGY	55	2	
Red huckleberry	VAPA	48	2	
Pacific blackberry	RUUR	45	1	
Herbs				7
Common beargrass	XETE	88	7	
Braken	PTAQ	75	2	
Rattlesnake-plantain	GOOB2	58	1	
Common prince's-pine	CHUM	38	2	

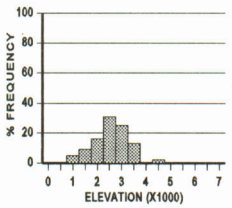
PSME 32

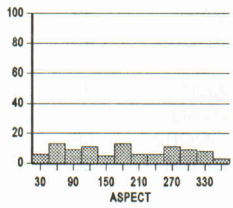
DOUGLAS-FIR/SALAL-DWARF OREGONGRAPE
Pseudotsuga menziesii/Gaultheria shallon-Berberis nervosa
PSME/GASH-BENE2 (N=64; BLM=47, FS=17)

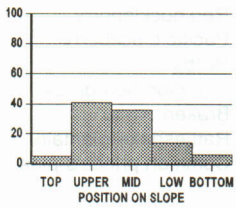
Distribution. This Association occurs on all districts of the Umpqua National Forest, and all Resource Areas, Medford and Roseburg Districts, Bureau of Land Management.

Distinguishing Characteristics. This Association is one of the drier, cooler plant associations of the Douglas-fir Series. Pacific rhododendron is rarely present. Salal is frequently found, with high covers.

Soils. Parent material is variable, with occurrences of mudstone, sandstone, andesite, diorite, basalt, granite, rhyolite, tephra, and ash. Average surface rock cover is 6 percent, with 16 percent gravel. Based on 47 plots sampled, soil textures are mostly loam and sandy loam, with some silt loam, sandy clay loam, silty clay loam, and silty clay. Average rock fragment content is 35 percent, most of which is gravel (average 30 percent).







Environment Elevation averages 2550 feet Aspects vary Slope averages 43 percent and ranges from 2 to 80 percent This Association may be found on all slope positions

Vegetation Composition and Structure Total species richness is low for the Series, averaging 33 species The overstory is dominated by Douglas-fir, with incense-cedar and sugar pine commonly occurring The understory is dominated by Douglas-fir Incense-cedar, golden chinquapin, and Pacific madrone are common, while white fir, Pacific dogwood, bigleaf-maple, and sugar pine are occasionally found. Salal, dwarf Oregongrape, and baldhip rose are frequently found in the shrub layer Salal and dwarf Oregongrape may have high covers, salal averaging 43 percent, while dwarf Oregongrape averages 7 percent. Creambush ocean-spray, Pacific blackberry, and creeping snowberry are common In the herb/grass layer, whipplevine, western sword-fern, and western starflower are frequent, while pathfinder, vanillaleaf, and western twinflower are common All have relatively low covers Moss cover averages 12 percent

On Forest Service sites, upper layer tree cover is high for the Series, averaging 71 percent Mid-layer tree cover is intermediate for the Series, averaging 40 percent, while lower layer tree cover is low, averaging 16 percent. High shrub cover is low, averaging 21 percent, and low shrub cover is intermediate, averaging 47 percent Herb/grass cover is also intermediate for the Series, averaging 32 percent

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 73 percent, while cover for trees less than 10 feet tall averages 5 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 16 percent, and cover averages 58 percent for shrubs less than 20 inches tall Herb/grass cover averages 12 percent

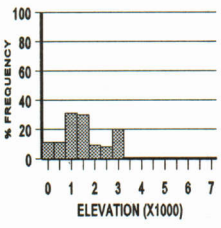
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	97	58	
Understory trees				5
Douglas-fir	PSME	100	24	
Incense-cedar	CADE27	56	6	
Golden chinquapin	CACH6	53	5	
Pacific madrone	ARME	50	4	
White fir	ABCO	42	5	
Pacific dogwood	CONU4	41	4	
Shrubs				10
Salal	GASH	97	43	
Dwarf Oregongrape	BENE2	95	7	
Baldhip rose	ROGY	80	2	
Creambush ocean-spray	HODI	72	7	
Herbs				16
Whipplevine	WHMO	84	4	
Western sword-fern	POMU	80	7	
Western starflower	TRLA6	80	1	
Pathfinder	ADBI	73	2	
Western twinflower	LIBOL	66	3	

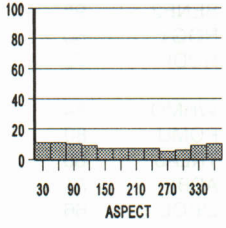
PSME 34

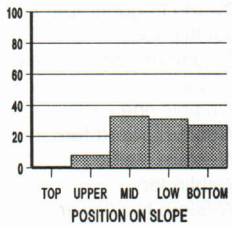
DOUGLAS-FIR/DWARF OREGONGRAPE/WESTERN SWORD-FERN
Pseudotsuga menziesii/Berberis nervosa/Polystichum munitum
PSME/BENE2/POMU (N=37; BLM=37)

Distribution. This Association is scattered east of the Coast Range crest on dry sites. It occurs within the Glendale Resource Area, Medford District, Bureau of Land Management and on the Galice Ranger District, Siskiyou National Forest. This Association may also occur on the Illinois Valley Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association is difficult to distinguish from other Douglas-fir associations. Douglas-fir associations have a consistently similar complement of vegetation, since the environmental range of the Series is narrow. Except for the occasional presence of Pacific yew and dwarf Oregongrape indicating more moist sites, using relative cover provides the best discrimination among the associations. Douglas-fir/Dwarf Oregongrape/Western Sword-fern only occurs in the Siskiyous east of the coastal crest and is not likely to be found in the Cascades. It occurs on all aspects, but rarely above 3300 feet in elevation or on ridgetops.







Soils Parent material varies among sandstone, mudstone, serpentine and peridotite Soil depth averages at least 14 inches Textures are mostly sandy loam, loam, or clay loam Average rock fragment content is 41 percent Most fragments (29 percent) are of gravel size

Environment Elevation ranges from about 1000 feet to about 3500 feet The average is 2700 feet The mode, slightly less, is about 2500 feet This Association occurs on all aspects, but less often on south faces This Association is normally distributed on all slope positions, with midslopes as the definitive mode Slopes average about 46 percent Average annual temperature is about 48 degrees F and average annual precipitation is about 51 inches Approximately 4 percent of the forest floor is exposed bedrock, 50 percent is covered with litter, 6 percent is bare ground, and 8 percent is covered with moss

Vegetation Composition and Structure Total species richness, low for the Series, is 29 The range for all layers is 16 to 48 species Cover greater than 10 feet (3 meters) tall, usually trees, averages 74 percent Tree cover less than 10 feet tall averages 11 percent, tall shrubs, greater than 20 inches (50 centimeters) tall, average 19 percent cover, low shrubs, less than 20 inches tall, average 35 percent cover, herb cover averages 22 percent Douglas-fir and incense-cedar dominate the overstory, but because of their wide ecological amplitude do not specifically indicate site environment Pacific madrone, with low cover and constancy, indicates the site is cool for the Series Pacific yew and salal indicate cooler sites Covers of species usually related to hotter, warmer sites (creambush ocean-spray and less so, California hazel) are relatively low in cover Except for whipplevine, usually associated with warmer sites, vanillaleaf, western twinflower, western starflower, and pathfinder support the interpretation that this is one of the more mild associations of the Series

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	95	37	
Incense-cedar	CADE27	41	8	
Understory trees				4
Douglas-fir	PSME	100	16	
Incense-cedar	CADE27	57	16	
Pacific madrone	ARME	51	7	
Canyon live oak	QUCH2	43	8	
Pacific yew	TABR2	30	14	
Shrubs				8
Dwarf Oregongrape	BENE2	95	17	
Creambush ocean-spray	HODI	84	6	
Baldhip rose	ROGY	84	2	
Salal	GASH	62	30	
California hazel	COCOC	54	5	
Herbs				12
Western sword-fern	POMU	92	12	
Whipplevine	WHMO	84	4	
Western starflower	TRLA6	70	1	
Snow-queen	SYRE	70	1	

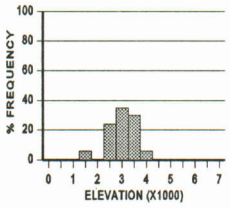
PSME 36

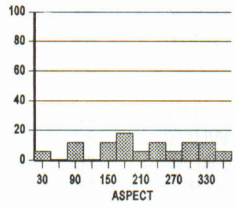
DOUGLAS-FIR-CANYON LIVE OAK-TANOAK
Pseudotsuga menziesii-Quercus chrysolepis-Lithocarpus densiflora
PSME-QUCH2-LIDE3 (N=17; FS=17)

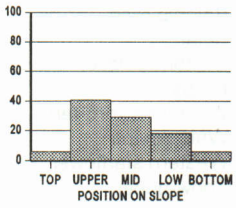
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association is similar to Douglas-fir-Golden Chinquapin/Dwarf Oregongrape, except this Association is drier, has more canyon live oak, tanoak, and poison oak, and less golden chinquapin and dwarf Oregongrape.

Soils. Parent material is mostly mudstone or basalt, with some sandstone, chert, schist, and diorite. Average surface rock cover is 10 percent, with 20 percent gravel and 5 percent exposed bare ground. Soils are generally shallow to moderately deep, but can be deep. Average depth to bedrock is greater than 27 inches.







Environment Elevation averages 3030 feet Aspects vary. Slopes average 49 percent and range between 15 and 85 percent This Association may be present on all slope positions

Vegetation Composition and Structure Total species richness is low for the Series, averaging 28 species The overstory is dominated by Douglas-fir with sugar pine occurring frequently The understory is dominated by Douglas-fir and canyon live oak, both with relatively high covers Pacific madrone, tanoak, and sugar pine are also frequent Tanoak cover is generally greater than 10 percent. Golden chinquapin is common Baldhip rose is the only frequently occurring shrub Poison oak, dwarf Oregongrape, and hairy honeysuckle are common Rattlesnake-plantain is the only frequently occurring herb, while western starflower, common prince's-pine, white-flowered hawkweed, braken, and little prince's-pine are common Imbricate sword-fern, vanillaleaf, and ground-cone are occasionally found All shrubs and herbs have low covers Moss cover averages 18 percent

Upper layer tree cover is low for the Series, averaging 55 percent. Mid-layer and lower layer tree covers are intermediate for the Series, averaging 42 and 41 percent, respectively High shrub and low shrub covers are low, averaging 4 and 12 percent, respectively. Herb/grass cover is also low for the Series, averaging 7 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	34	
Sugar pine	PILA	94	7	
Ponderosa pine	PIPO	41	4	
Understory trees				7
Douglas-fir	PSME	100	29	
Canyon live oak	QUCH2	100	23	
Pacific madrone	ARME	94	9	
Tanoak	LIDE3	88	17	
Sugar pine	PILA	82	2	
Golden chinquapin	CACH6	65	8	
Incense-cedar	CADE27	35	5	
Shrubs				7
Baldhip rose	ROGY	82	1	
Poison oak	RHDI6	65	9	
Dwarf Oregongrape	BENE2	53	3	
Hairy honeysuckle	LOHI2	53	1	
Herbs				10
Rattlesnake-plantain	GOOB2	88	1	
Western starflower	TRLA6	65	1	
Common prince's-pine	CHUM	59	2	
White-flowered hawkweed	HIAL2	59	1	
Braken	PTAQ	53	2	
Little prince's-pine	CHME	53	1	
Imbricate sword-fern	POMUI3	47	1	
Vanillaleaf	ACTR	41	2	
Ground-cone	BOST2	41	1	

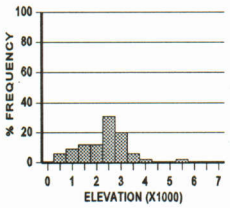
PSME 38

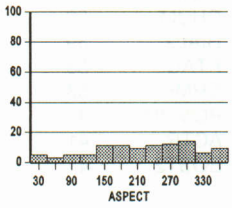
DOUGLAS-FIR-CANYON LIVE OAK/POISON OAK
Pseudotsuga menziesii-Quercus chrysolepis/Rhus diversiloba
PSME-QUCH2/RHDI6 (N=65; BLM=39, FS=26)

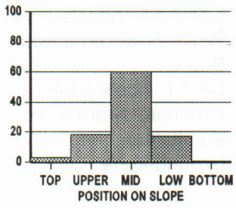
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest and the Galice, Gold Beach, and Illinois Valley Ranger Districts, and possibly the Chetco Ranger District, Siskiyou National Forest. It also occurs on all Resource Areas, Medford District and the South River Resource Area, Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. This is one of the warmer, drier associations of the Douglas-fir Series. Canyon live oak and poison oak are frequently present, with high covers. Both indicate rocky, dry conditions.

Soils. Parent material is highly variable. Plots occur on sandstone, andesite, mudstone, schist, granite, and gabbro, with some plots underlain by metavolcanics, mixed sedimentary, or ultramafic materials. Based on 39 plots sampled, soil textures are mostly sandy loam, with some silt loam, loam, silty clay loam, or loamy sand.







Average rock fragment content is 69 percent, most of which is gravel (average 50 percent)

Environment Elevation averages 2280 feet Aspects vary Slope averages 62 percent and ranges between 10 and 110 percent This Association may occur on all slope positions, but most frequently occurs mid-slope Average annual precipitation is 57 inches and average annual temperature is 49 degrees F

Vegetation Composition and Structure Total species richness is very low for the Series, averaging 26 species The overstory is dominated by Douglas-fir The understory is dominated by Douglas-fir and canyon live oak, with Pacific madrone commonly occurring Frequently occurring shrubs include poison oak and hairy honeysuckle; poison oak with high covers and hairy honeysuckle with low covers Baldhip rose is common White-flowered hawkweed, western sword-fern, and western starflower are commonly occurring herbs Moss cover averages 23 percent

On Forest Service sites, upper layer tree cover is low for the Series, averaging 49 percent, while mid-layer tree cover is high, averaging 52 percent Lower layer tree cover is intermediate, averaging 31 percent High shrub cover is low for the Series, averaging 10 percent, and low shrub cover is intermediate, averaging 31 percent Herb/grass cover is low for the Series, averaging 27 percent

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 74 percent, while cover for trees less than 10 feet tall averages 26 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 12 percent and cover for shrubs less than 20 inches tall averages 14 percent Herb/ grass cover averages 12 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	91	44	
Understory trees				5
Douglas-fir	PSME	100	20	
Canyon live oak	QUCH2	99	37	
Pacific madrone	ARME	71	13	
California black oak	QUKE	42	6	
Tanoak	LIDE3	40	7	
Sugar pine	PILA	40	3	
Shrubs				7
Poison oak	RHDI6	89	15	
Hairy honeysuckle	LOHI2	75	4	
Baldhip rose	ROGY	63	2	
California hazel	COCOC	45	5	
Creeping snowberry	SYMO	42	2	
Herbs				12
White-flowered hawkweed	HIAL	71	1	
Western sword-fern	POMU	60	4	
Western starflower	TRLA6	52	1	
Oregon fairybell	DIHOO	45	1	
Mountain sweet-root	OSCH	25	2	

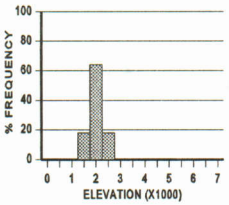
PSME 40

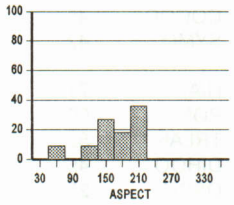
DOUGLAS-FIR-CALIFORNIA BLACK OAK/POISON OAK
Pseudotsuga menziesii-Quercus kelloggii/Rhus diversiloba
PSME-QUKE/RHDI6 (N=11; FS=11)

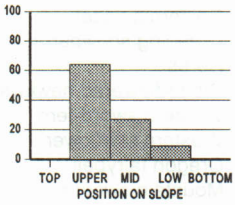
Distribution. This Association occurs on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This is a dry, warm Association, the warmest of the Douglas-fir dry associations, and is one of the lowest in elevation. California black oak and poison oak, both dry site indicators, are frequently found.

Soils. Parent material is mostly mudstone, sandstone, and siltstone, with tephra and metavolcanics occurring occasionally. Average surface rock cover is less than 1 percent, with 4 percent each of gravel and bare ground exposure. Soils are generally moderately deep, but can be shallow or deep, with an average depth of 32 inches. Based on one plot sampled, surface texture is loam with 40 percent gravel. Subsurface texture is silty clay loam with 40 to 60 percent cobbles and stones.







Environment Average elevation is 2000 feet This Association is generally found on southerly aspects Slope averages 39 percent and ranges between 20 and 57 percent Slope position ranges from the lower one-third to the upper one-third of the slope.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 25 species. The overstory is dominated by Douglas-fir and sugar pine. The understory is dominated by Douglas-fir, California black oak, and Pacific madrone Sugar pine, tanoak, and canyon live oak are all frequent. Ponderosa pine is common. Poison oak and baldhip rose are frequent shrubs, while hairy honeysuckle is common Scouler's harebell, white-flowered hawkweed, slender-tubed iris, braken, and rattlesnake-plantain are common All shrubs and herbs have low cover values. Moss cover averages 7 percent

Upper layer and mid-layer tree covers are intermediate for the Series, averaging 60 and 44 percent, respectively. Lower layer tree cover is low, averaging 28 percent. High shrub and low shrub covers are low for the Series, averaging 5 and 8 percent, respectively. Herb/shrub cover is also low for the Series, averaging 15 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	32	
Sugar pine	PILA	100	13	
Ponderosa pine	PIPO	73	9	
Understory trees				7
Douglas-fir	PSME	100	40	
California black oak	QUKE	100	16	
Pacific madrone	ARME	100	12	
Sugar pine	PILA	100	5	
Tanoak	LIDE3	91	5	
Canyon live oak	QUCH2	82	7	
Ponderosa pine	PIPO	55	2	
Incense-cedar	CADE27	36	6	
Shrubs				5
Poison oak	RHDI6	100	6	
Baldhip rose	ROGY	82	2	
Hairy honeysuckle	LOHI2	73	2	
Creeping snowberry	SYMO	45	1	
Herbs				10
Scouler's harebell	CASC7	73	1	
White-flowered hawkweed	HIAL2	64	2	
Slender-tubed iris	IRCH	64	1	
Braken	PTAQ	64	1	
Rattlesnake-plantain	GOOB2	55	1	
Mountain sweet-root	OSCH	45	1	
Woodland tarweed	MAMA	45	1	

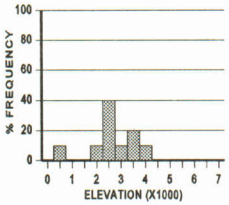
PSME 42

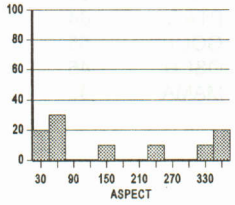
DOUGLAS-FIR-CANYON LIVE OAK/DWARF OREGONGRAPE
Pseudotsuga menziesii-Quercus chrysolepis/Berberis nervosa
PSME-QUCH2/BENE2 (N=10; FS=10)

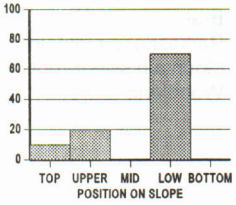
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest, the Tiller Ranger District, Umpqua National Forest, and the Gold Beach Ranger District, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association is one of the cooler, drier associations in the Douglas-fir Series. Ponderosa pine and sugar pine are very rarely found.

Soils. Parent material is mostly schist and andesite, with some diorite, greywacke, and welded tuff. Average surface rock cover is 3 percent, with 10 percent gravel. Soils are generally deep but may be moderately deep, with an average depth of greater than 32 inches.







Environment Elevation averages 2610 feet Aspects vary, though, in general, tend to be northerly Slope averages 56 percent and ranges from 18 to 70 percent Slope position ranges from ridetops to the lower one-third of the slope Generally, however, this Association is found on the lower one-third of the slope

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 41 species The overstory is dominated by Douglas-fir. The understory is dominated by Douglas-fir and Pacific madrone Canyon live oak and big-leaf maple are frequent, while California black oak and white fir are common Dwarf Oregongrape, creambush ocean-spray, creeping snowberry, and poison oak are frequent shrubs, generally with covers greater than 5 percent Hairy honeysuckle, baldhip rose, and Piper's Oregongrape are also frequent shrubs, but generally have covers less than 5 percent Western serviceberry, California hazel, thimbleberry, and common snowberry are common Frequent herbs include western sword-fern, western starflower, rattlesnake-plantain, and pathfinder, all with low covers Moss cover averages 22 percent

Upper layer tree cover is intermediate for the Series, averaging 64 percent Mid-layer tree cover is also intermediate, averaging 40 percent, while lower layer tree cover is low, averaging 17 percent High shrub cover is low for the Series, averaging 18 percent, while low shrub cover is intermediate, averaging 40 percent Herb/grass cover is also intermediate, averaging 35 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	100	57	
Understory trees				7
Douglas-fir	PSME	100	22	
Pacific madrone	ARME	100	21	
Canyon live oak	QUCH2	100	6	
Big-leaf maple	ACMA3	80	6	
California black oak	QUKE	70	3	
White fir	ABCO	50	3	
Shrubs				12
Dwarf Oregongrape	BENE2	90	19	
Creambush ocean-spray	HODI	90	8	
Creeping snowberry	SYMO	90	7	
Hairy honeysuckle	LOHI2	90	4	
Baldhip rose	ROGY	90	3	
Poison oak	RHDI6	80	10	
Piper's Oregongrape	BEPI2	80	2	
Herbs				21
Western sword-fern	POMU	90	6	
Western starflower	TRLA6	90	3	
Rattlesnake-plantain	GOOB2	90	2	
Pathfinder	ADBI	80	3	
Oregon fairybell	DIHOO	70	2	
Whipplevine	WHMO	60	8	

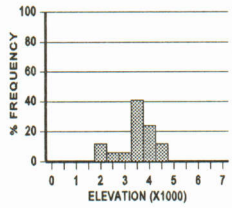
PSME 44

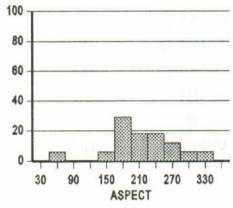
DOUGLAS-FIR-PONDEROSA PINE/POISON OAK
Pseudotsuga menziesii-Pinus ponderosa/Rhus diversiloba
PSME-PIPO/RHDI6 (N=17; FS=17)

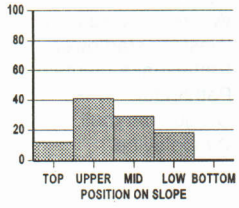
Distribution. This Association occurs on the Applegate and Ashland Ranger Districts, Rogue River National Forest, the Chetco Ranger District, Siskiyou National Forest, and the Tiller Ranger District, Umpqua National Forest. It may also occur on adjacent Bureau of Land Mangement lands.

Distinguishing Characteristics. This is one of the drier, cooler Douglas-fir associations. Ponderosa pine, California black oak, and poison oak, all dry site indicators, are usually present.

Soils. Parent material is mostly granite, gabbro or schist. Average surface rock cover is 7 percent, with 8 percent gravel. Soils are moderately deep to deep, with an average depth of greater than 39 inches. Based on one plot sampled, surface texture is loam with 45 percent gravel. Subsurface texture is sand with 65 to 85 percent gravel and cobbles.







Environment Elevation averages 3450 feet Aspects vary, though tend not to be northeast Slope averages 47 percent and ranges from 22 to 80 percent Slope position ranges from the lower one-third of the slope up to ridgetops

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 38 species. The overstory is dominated by Douglas-fir and ponderosa pine. Sugar pine is common. The understory is dominated by Douglas-fir Pacific madrone, ponderosa pine, and California black oak are frequent. Sugar pine is common Poison oak and Piper's Oregongrape are frequent shrubs, while creeping snowberry, deerbrush, western serviceberry, creambush ocean-spray, and hairy honeysuckle are common. Woodland tarweed, white-flowered hawkweed, and spreading dogbane are frequently occurring herbs, while woods strawberry, slender-tubed iris, mountain sweet-root, and American vetch are common Moss cover averages 3 percent.

Upper layer tree cover is low for the Series, averaging 49 percent Mid-layer tree cover is intermediate, averaging 40 percent, while lower layer tree cover is low, averaging 22 percent High shrub and low shrub covers are low for the Series, averaging 8 and 11 percent, respectively. Herb/grass cover is intermediate, averaging 35 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	26	
Ponderosa pine	PIPO	94	18	
Sugar pine	PILA	65	5	
Understory trees				6
Douglas-fir	PSME	100	22	
Pacific madrone	ARME	94	9	
Ponderosa pine	PIPO	82	5	
California black oak	QUKE	76	8	
Sugar pine	PILA	71	2	
Incense-cedar	CADE27	47	3	
Shrubs				7
Poison oak	RHDI6	76	5	
Piper's Oregongrape	BEPI2	76	2	
Creeping snowberry	SYMO	71	2	
Deerbrush	CEIN3	65	4	
Western serviceberry	AMAL2	59	1	
Creambush ocean-spray	HODI	53	1	
Hairy honeysuckle	LOHI2	53	1	
Herbs				22
Woodland tarweed	MAMA	88	1	
White-flowered hawkweed	HIAL2	88	1	
Spreading dogbane	APAN2	88	1	
Woods strawberry	FRVEB3	65	3	
Slender-tubed iris	IRCH	65	1	
Mountain sweet-root	OSCH	59	1	

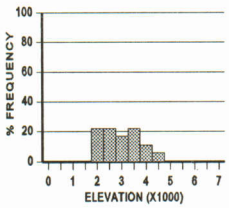
PSME 46

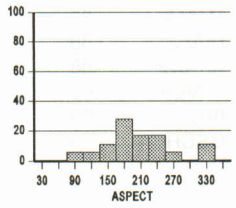
DOUGLAS-FIR-INCENSE-CEDAR/PIPER'S OREGONGRAPE
Pseudotsuga menziesii-Calocedrus decurrens/Berberis piperiana
PSME-CADE27/BEPI2 (N=18; FS=18)

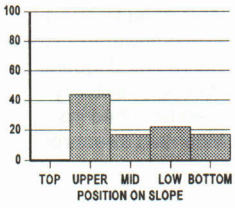
Distribution. This Association occurs on the Applegate, Ashland, and Prospect Ranger Districts, Rogue River National Forest, and the Tiller and North Umpqua Ranger Districts, Umpqua National Forest. It may also occur on the Butte Falls Ranger District, Rogue River National Forest and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This is a drier, cooler Douglas-fir association. White fir is frequently present, but with relatively low covers. Piper's Oregongrape and poison oak, dry site indicators, are also frequently present.

Soils. Parent material is mostly schist, welded tuff, and basalt, with some andesite, diorite, and amphibolite. Average surface rock cover is 8 percent, with 8 percent gravel. Soils are generally deep, but may be moderately deep, with an average depth of greater than 40 inches.







Environment Elevation averages 3000 feet Aspects vary Slope averages 35 percent and ranges between 12 and 62 percent Slope position ranges from the upper one-third of the slope down to the lower one-third of the slope This Association may also occur on benches and narrow flats

Vegetation Composition and Structure Total species richness is high for the Series, averaging 44 percent The overstory is dominated by Douglas-fir and ponderosa pine, with sugar pine and incense-cedar common associates Douglas-fir dominates the understory. Incense-cedar, white fir, and Pacific madrone frequently occur, generally with covers greater than 5 percent Sugar pine is common Frequently occurring shrubs include Piper's Oregongrape, baldhip rose, poison oak, creeping snowberry, and Pacific blackberry All have low covers except poison oak, which averages 12 percent cover Pathfinder, slender-tubed iris, rattlesnake-plantain, woods strawberry, white-flowered hawkweed, western starflower, and western sword-fern are all frequent herbs All generally have low cover values Moss cover averages 11 percent.

Upper layer tree cover is intermediate for the Series, averaging 64 percent Mid-layer tree cover is high, averaging 50 percent, while lower layer tree cover is low, averaging 21 percent Both high shrub and low shrub covers are low for the Series, averaging 10 and 28 percent, respectively Herb/grass cover is intermediate, averaging 35 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	35	
Ponderosa pine	PIPO	83	15	
Sugar pine	PILA	67	7	
Incense-cedar	CADE27	50	18	
Understory trees				7
Douglas-fir	PSME	100	33	
Incense-cedar	CADE27	94	9	
White fir	ABCO	89	5	
Pacific madrone	ARME	78	12	
Sugar pine	PILA	67	2	
Shrubs				10
Piper's Oregongrape	BEPI2	94	3	
Baldhip rose	ROGY	89	2	
Poison oak	RHDI6	83	12	
Creeping snowberry	SYMO	83	5	
Pacific blackberry	RUUR	78	3	
Herbs				24
Pathfinder	ADBI	94	2	
Slender-tubed iris	IRCH	94	1	
Rattlesnake-plantain	GOOB2	94	1	
Woods strawberry	FRVEB3	89	2	
White-flowered hawkweed	HIAL2	89	2	
Western starflower	TRLA6	83	2	

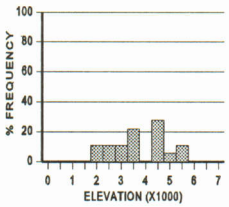
PSME 48

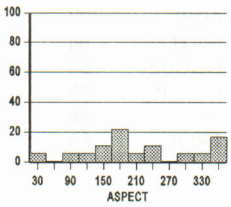
DOUGLAS-FIR-WHITE FIR/CREEPING SNOWBERRY
Pseudotsuga menziesii-Abies concolor/Symphoricarpos mollis
PSME-ABCO/SYMO (N=18; FS=18)

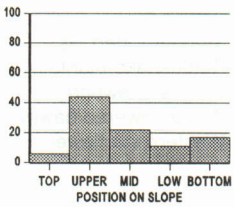
Distribution. This Association occurs on the Applegate and Ashland Ranger Districts, Rogue River National Forest and the Galice Ranger District, Siskiyou National Forest. It may also occur on the Illinois Valley Ranger District, Siskiyou National Forest and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This is the driest Douglas-fir Association. It is also one of the coolest. White fir is frequently present, indicating a more productive site. Western sword-fern is generally absent.

Soils. Parent material is mostly schist, andesite, basalt, and granite. Soils are moderately deep to deep, with an average depth of greater than 40 inches. Average surface rock cover is 4 percent, with 6 percent gravel.







Environment Elevation averages 3730 feet This Association occurs on all aspects. Slopes average 38 percent and range from 3 to 76 percent This Association may occur on any slope position

Vegetation Composition and Structure Total species richness is low for the Series, averaging 33 species The overstory is dominated by Douglas-fir and ponderosa pine. The understory is dominated by Douglas-fir. White fir is frequent, while California black oak and Pacific madrone are common Frequent shrubs include creeping snowberry, baldhip rose, and Piper's Oregongrape Creambush ocean-spray and western snowberry are common All have very low covers Western starflower and white-flowered hawkweed are frequently occurring herbs, while Scouler's harebell, rattlesnake-plantain, mountain sweet-root, woods strawberry, pathfinder, catchweed bedstraw, and snowqueen are common All also have very low covers Moss cover averages 1 percent

Upper layer tree cover is high for the Series, averaging 71 percent. Mid-layer tree cover is intermediate, averaging 41 percent Lower layer tree cover, high and low shrub cover, and herb/grass cover are all low for the Series, averaging 18, 11, 16, and 19 percent, respectively

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	39	
Ponderosa pine	PIPO	100	18	
White fir	ABCO	39	2	
Sugar pine	PILA	33	9	
Understory trees				5
Douglas-fir	PSME	100	23	
White fir	ABCO	72	6	
Pacific madrone	ARME	56	16	
California black oak	QUKE	56	3	
Ponderosa pine	PIPO	39	2	
Canyon live oak	QUCH2	33	3	
Pacific dogwood	CONU4	33	2	
Shrubs				8
Creeping snowberry	SYMO	89	5	
Baldhip rose	ROGY	83	1	
Piper's Oregongrape	BEPI2	78	2	
Creambush ocean-spray	HODI	72	3	
Herbs				17
Western starflower	TRLA6	83	1	
White-flowered hawkweed	HIAL2	78	1	
Scouler's harebell	CASC7	72	1	
Rattlesnake-plantain	GOOB2	72	1	
Mountain sweet-root	OSCH	61	1	
Woods strawberry	FRVEB3	61	1	

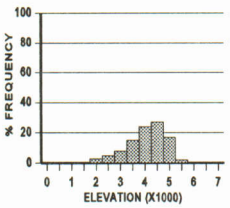
PSME 50

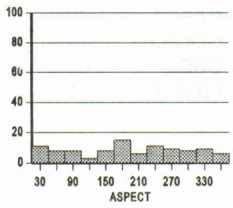
DOUGLAS-FIR-WHITE FIR
Pseudotsuga menziesii-Abies concolor
PSME-ABCO (N=66; BLM=41, FS=25)

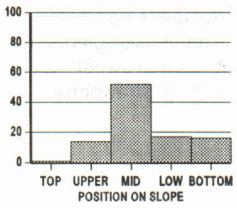
Distribution. This Association occurs on the Applegate, Ashland, Prospect, and probably Butte Falls Ranger Districts, Rogue River National Forest, the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and all Districts of the Umpqua National Forest. It also occurs on the South River Resource Area, Roseburg District, the Klamath Falls Resource Area, Lakeview District, and all Resource Areas, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association is characterized by the frequent presence of white fir in both the overstory and the understory. Dwarf Oregongrape is also frequently found. This is one of the higher elevation, cooler Douglas-fir associations. The presence of white fir and sugar pine indicate more productive sites. This Association is probably transitional to the White Fir Series.

Soils. Parent material is mostly basalt, andesite, and granodiorite, with some gabbro







schist, and sandstone Soils are mostly deep, but can be shallow, with an average depth of greater than 38 inches Based on 40 plots sampled, soil textures are mostly sandy loam, with some silt loam, loam, and clay loam Average rock fragment content is 37 percent, most of which is gravel (average 24 percent) Average surface rock cover is 7 percent, with 10 percent gravel

Environment Elevation averages 4040 feet Aspects vary. Slope averages 35 percent and ranges from 0 to 80 percent This Association occurs on all slope positions Average annual temperature is 45 degrees F and average annual precipitation is 49 inches

Vegetation Composition and Structure Total species richness is low for the Series, averaging 32 species The overstory is dominated by Douglas-fir, with white fir common. The understory is dominated by Douglas-fir with frequent occurrences of white fir Dwarf Oregongrape frequently occurs in the shrub layer, while baldhip rose and creeping snowberry are common Pacific blackberry and creambush ocean-spray are occasionally found Western twinflower, common prince's-pine, white-flowered hawkweed, pathfinder, and Oregon fairybell are all commonly found Moss cover averages 8 percent

On Forest Service sites, upper layer tree cover is high for the Series, averaging 75 percent, while mid-layer tree cover is low, averaging 35 percent Lower layer tree cover is also low for the Series, averaging 17 percent High shrub and low shrub covers are both low for the Series, averaging 13 and 27 percent, respectively Herb/grass cover is intermediate, averaging 30 percent

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 76 percent, while cover for trees less than 10 feet tall averages 12 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 3 percent, and cover for shrubs less than 20 inches tall averages 13 percent Herb/grass cover averages 19 percent

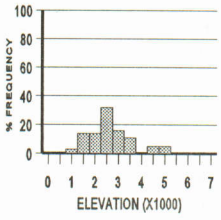
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	51	
White fir	ABCO	56	12	
Understory trees				5
Douglas-fir	PSME	100	16	
White fir	ABCO	94	19	
Incense-cedar	CADE27	44	6	
Golden chinquapin	CACH6	39	6	
Shrubs				8
Dwarf Oregongrape	BENE2	77	8	
Baldhip rose	ROGY	73	2	
Creeping snowberry	SYMO	59	2	
Creambush ocean-spray	HODI	42	5	
Herbs				16
Western starflower	TRLA6	74	1	
Common prince's-pine	CHUM	62	4	
White-flowered hawkweed	HIAL2	67	1	

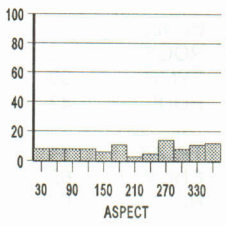
PSME 52

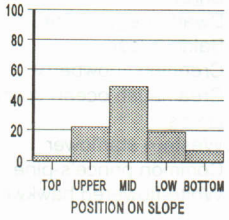
DOUGLAS-FIR/CREAMBUSH OCEAN-SPRAY/WHIPPLEVINE-SWO
Pseudotsuga menziesii/Holodiscus discolor/Whipplea modesta
PSME/HODI/WHMO-SWO (N=42; BLM=42)

Distribution. This Association is scattered east of the Coast Range crest on dry sites. It occurs within the Grants Pass and Glendale Resource Areas, Medford District, Bureau of Land Management, and is common on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. There may be occasional occurrences within the Butte Falls Resource Area, Medford District, Bureau of Land Management, and the Applegate Ranger District, Rogue River National Forest.

Distinguishing Characteristics. This Association occurs in the Siskiyous east of the coastal crest and possibly in the Cascades. Except for Pacific dogwood and big-leaf maple, the complement of species is characteristic of the dry side of the environmental gradient. Poison oak and whipplevine, at covers greater than 10 percent, are fairly faithful indicators of drier sites.







Soils Parent material is generally mixed sediment or metavolcanic Based on 41 samples, soil depth averages at least 15 inches Textures are mostly loam and less often clay loam, silt loam, or sandy loam Average rock fragment content is 41 percent Most fragments (33 percent) are of gravel size

Environment. Elevation ranges from about 500 to 3500 feet The average is 2000 feet with a peaked distribution around the mean This Association occurs equally on all aspects, but overwhelmingly occupies midslope topographic positions Rarely does it occur on ridgetops or bottomland topographic positions. Slopes average about 58 percent. Average annual temperature is about 50 degrees F and average annual precipitation is about 47 inches Approximately 1 percent of the forest floor is exposed bedrock, 57 percent is covered with litter, 3 percent is bare ground, and 16 percent is covered with moss

Vegetation Composition and Structure. Total species richness, low for the Series, is 32 The average number of species in all layers ranges from 27 to 41. Cover greater than 10 feet (3 meters) tall, usually trees, averages 74 percent Tree cover less than 10 feet tall averages 8 percent, tall shrubs, greater than 20 inches (50 centimeters) tall, average 28 percent cover, low shrubs, less than 20 inches tall, average 30 percent cover, herb cover averages 8 percent. Douglas-fir dominates the overstory and understory layers. Both big-leaf maple and Pacific dogwood are notable as indicators of high atmospheric moisture usually associated with bottom slope positions. Canyon live oak, on the other hand, would be expected to occupy the upper slope positions The shrub layer is dominated by dry site indicators (poison oak, hairy honeysuckle, creambush ocean-spray, and California hazel) Dwarf Oregongrape is the only contradictory indicator It is found with higher cover on the sites with deeper soils The herb/grass layer is also dominated by a dry site indicator, whipplevine Although there are some herbs more commonly found on more moist sites, they are comparatively low in cover

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	95	41	
Pacific madrone	ARME	40	11	
Understory trees				4
Douglas-fir	PSME	98	17	
Canyon live oak	QUCH2	55	10	
Pacific dogwood	CONU4	52	21	
Pacific madrone	ARME	50	9	
Big-leaf maple	ACMA3	29	21	
Shrubs				8
Poison oak	RHDI6	90	9	
Baldhip rose	ROGY	88	1	
California hazel	COCOC	86	13	
Creambush ocean-spray	HODI	74	17	
Dwarf Oregongrape	BENE2	67	9	
Hairy honeysuckle	LOHI2	67	7	
Herbs				17
Whipplevine	WHMO	88	17	
Western Sword-fern	POMU	81	5	

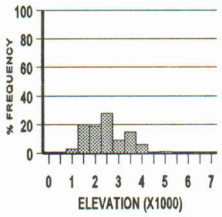
PSME 54

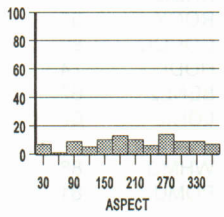
DOUGLAS-FIR/DRY SHRUB
Pseudotsuga menziesii/Dry shrub
PSME/DRY SHRUB (N=86; BLM=86)

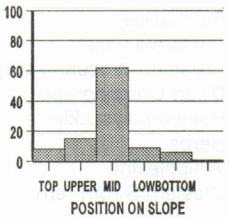
Distribution. This Association is scattered east of the Coast Range crest on dry sites. It occurs within the Grants Pass and Glendale Resource Areas, Medford District, Bureau of Land Management, and less often within the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and the Applegate Ranger District, Rogue River National Forest. There may be occasional occurrences in the west half of the Butte Falls Resource Area, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association only occurs in the Siskiyous east of the coastal crest and is not likely to occur in the Cascades. The presence of several dry shrubs (none have achieved dominance) is indicative of the hot, dry environment. Poison oak may have slightly more cover, but the overall combination of shrubs is better used to key to the associations.

Soils. Parent material varies from sandstone, mudstone, siltstone, shale, and mixed







metavolcanics to basalt Based on 40 samples, soil depth averages at least 15 inches Textures are mostly sandy clay loam, silt loam, sandy loam, or silty clay loam Average rock fragment content is 42 percent Most fragments (42 percent) are of gravel size

Environment Elevation ranges from about 1000 feet to over 4000 feet The average, somewhat normally distributed, is 2500 feet This Association occurs on all aspects, but slightly more often in the southwest quadrant It occurs on all slope positions, but usually occupies midslopes Slopes average about 43 percent Average annual temperature is about 49 degrees F and average annual precipitation is about 48 inches Approximately 1 percent of the forest floor is exposed bedrock, 58 percent is covered with litter, 7 percent is bare ground, and 14 percent is covered with moss

Vegetation Composition and Structure Total species richness, very low for the Series, is 26 The shrub layer, slightly depauperate, averages six species Seven to 43 is the range for all layers of the Association Cover greater than 10 feet (3 meters) tall, usually trees, averages 78 percent Tree cover less than 10 feet tall, averages 8 percent, tall shrubs, greater than 20 inches (50 centimeters) tall, average 9 percent cover, low shrubs, less than 20 inches tall, average 13 percent cover, herb cover averages 18 percent Madrone and sugar pine in a Douglas-fir dominated canopy are an indication that soils can be relatively deep Both require high amounts of spring soil moisture They may be contradicted as indicators by canyon live oak and California black oak in the understory In this Series the complement of species alone is not enough to assess site environment Interpretations must be balanced by considering relative cover and microsite differences As the number and cover of dry site indicators increases, their indicator reliability increases The shrub layer for example, is a complement of dry indicators, all low in cover, but equal in value White-flowered hawkweed and whipplevine support indications of dry microsites

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	97	43	
Sugar pine	PILA	14	13	
Understory trees				4
Douglas-fir	PSME	99	25	
Pacific madrone	ARME	58	12	
Canyon live oak	QUCH2	43	11	
California black oak	QUKE	27	8	
Shrubs				6
Poison oak	RHDI6	72	6	
Creeping snowberry	SYMO	69	5	
Baldhip rose	ROGY	67	2	
Hairy honeysuckle	LOHI2	64	3	
California hazel	COCOC	60	5	
Herbs				14
White-flowered hawkweed	HIAL2	77	1	
Western sword-fern	POMU	58	1	
Whipplevine	WHMO	52	5	

WESTERN HEMLOCK SERIES

WESTERN HEMLOCK SERIES

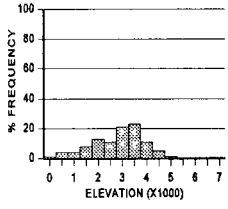
Tsuga heterophylla

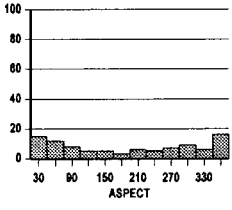
TSHE

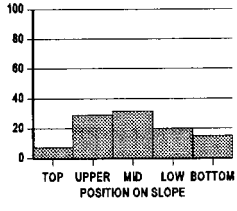
Diane E White

Southwestern Oregon is the southern end of the range of the Western Hemlock Series In the Cascade Mountains, this Series is abundant on the Cottage Grove and North Umpqua Ranger Districts and adjacent Bureau of Land Management lands. It extends south through the Umpqua National Forest to the Butte Falls Ranger District of the Rogue River National Forest. It is likely limited by dry conditions and is replaced by the White Fir Series to the south. In the Coast Range, the Western Hemlock Series extends south into the Gold Beach Ranger District of the Siskiyou National Forest and adjacent lands, and is replaced by the Tanoak Series where temperatures are warmer. The Douglas-fir Series occurs on hotter, drier sites, and the Pacific Silver Fir and Shasta Red Fir Series occur at higher elevations on cooler sites

The Series covers a wide elevational band, though the average is approximately 3000 feet It occurs on many types of soils All aspects except south are well represented, and upper, middle, lower and valley bottom slope positions are more common than ridge tops The Series includes highly productive lands, and has a high plant species diversity





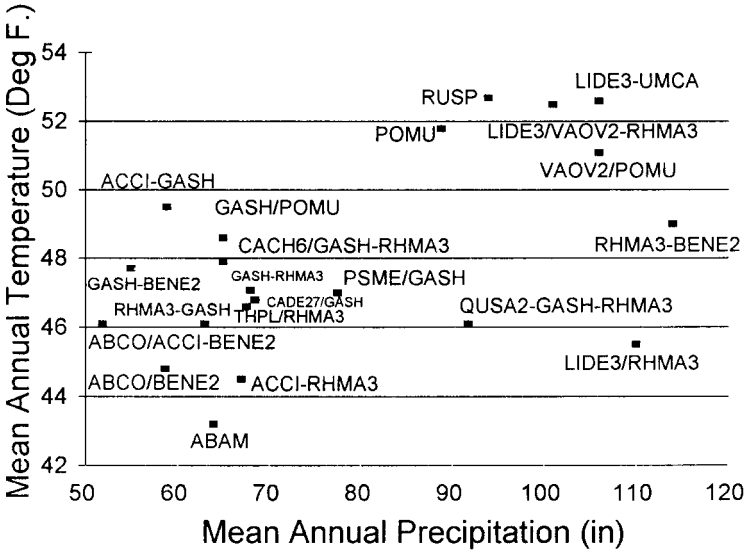


The Western Hemlock Series generally occurs in areas that are warm Average annual temperatures range from 43 degrees F in the High Cascades to 53 degrees F in coastal areas Average annual rainfall varies between 50 inches in drier areas of the Cascades to 115 inches near the coast

Parent material is highly variable, although andesite and basalt are the most common Soils range from shallow to deep, although moderately deep to deep are the most frequently encountered conditions They are generally moderately to excessively well drained Surface textures range from sand, sandy loam, loam, and loamy sand to sandy clay loam, silt loam, and clay loam Rock fragments range from 5 to 80 percent, and clay content ranges from 1 to 60 percent Subsurface textures range from sandy loam, loam, and silt loam, to sandy clay loam, clay loam, and occasionally clay Rock fragments are between 2 and 90 percent The soil moisture regime is either udic or xeric, the former being the most common. The temperature regime is frequently mesic and occasionally frigid Samples include 95 soil pits

TSHE 2

The relative environments of the plant associations are shown below. Each association is plotted by mean annual temperature and mean annual rainfall



As a result of frequent disturbances in southwestern Oregon, Douglas-fir, an early seral species, is the dominant overstory tree in the Western Hemlock Series Western hemlock is the dominant tree species in the understory, and is particularly abundant in older stands with a low frequency of disturbance In wetter areas of the Cascades, western redcedar is present, and at higher elevation, cooler areas, white fir or Pacific silver fir are present In the coastal Siskiyou Mountains, tanoak may be present, and in areas that tend toward ultramafic soils, Port-Orford-cedar is common Salal is widespread throughout the Series, absent only from the high elevation, cooler areas, and the lowest elevation wet sites Pacific rhododendron is common, but less widespread than salal, and tends to reflect low productivity areas Golden chinquapin and whipplevine are present on dry, rocky sites

Average vascular plant species richness for the Western Hemlock Series ranges between 18 and 38 In this series, richness is rated as very low, 18 to 21 species, low, 22 to 25 species, intermediate, 26 to 29 species, high, 30 to 33 species, and very high, 34 to 38 species

Upper layer tree canopy cover ranges from 58 percent in the Western Hemlock-Douglas-fir/Salal Association, to 84 percent in the coastal Western Hemlock/Pacific Rhododendron-Dwarf Oregongrape Association The mid-layer tree canopy cover ranges between 39 and 65 percent The lower layer tree canopy cover ranges

between 24 and 56 percent High shrub cover ranges between 1 and 44 percent, and low shrub cover ranges between 10 and 81 percent. Herb/grass layer cover ranges between 10 and 85 percent

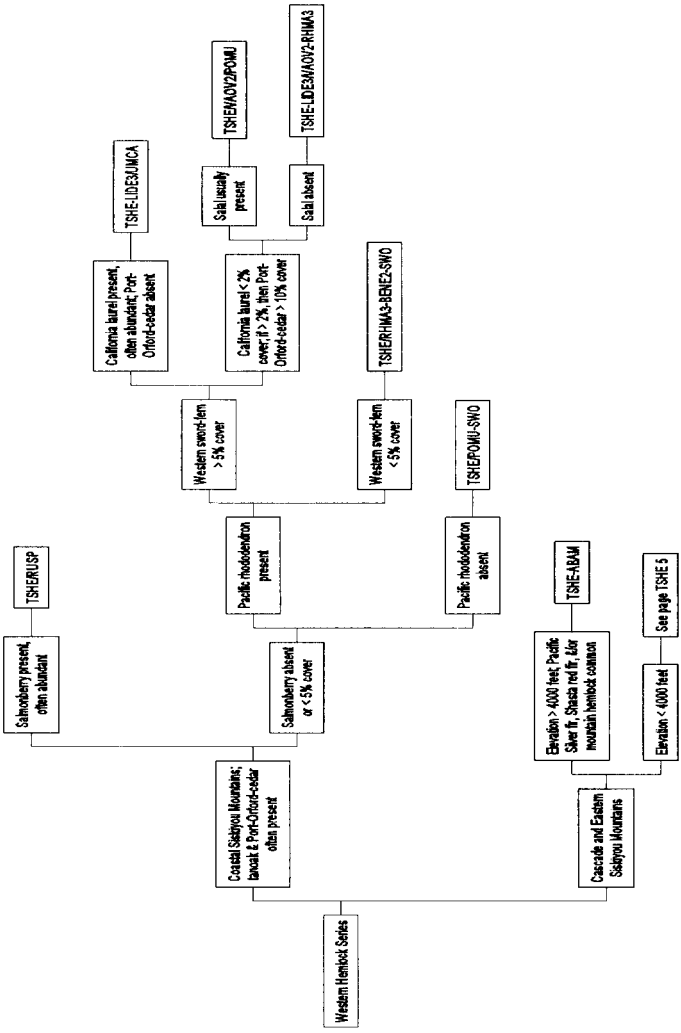
Twenty-one plant associations have been identified for the Series in southwestern Oregon They were described from 272 plots (178 Forest Service, 76 Natural Resource Conservation Service, and 18 Bureau of Land Management) In addition, on the Cottage Grove Ranger District, the Western Hemlock/Dwarf Oregongrape and Western Hemlock/Oregon Oxalis Plant Associations, described on the Willamette National Forest, may occur Complete descriptions of these plant associations may be found in the Plant Association and Management Guide, Willamette National Forest (Hemstrom, Logan, and Pavlat, 1987)

LITERATURE CITED

Hemstrom, M , S Logan, B Pavlat 1987 Plant Association and Management Guide, Willamette National Forest R6-ECOL 257-B-86 312 pp

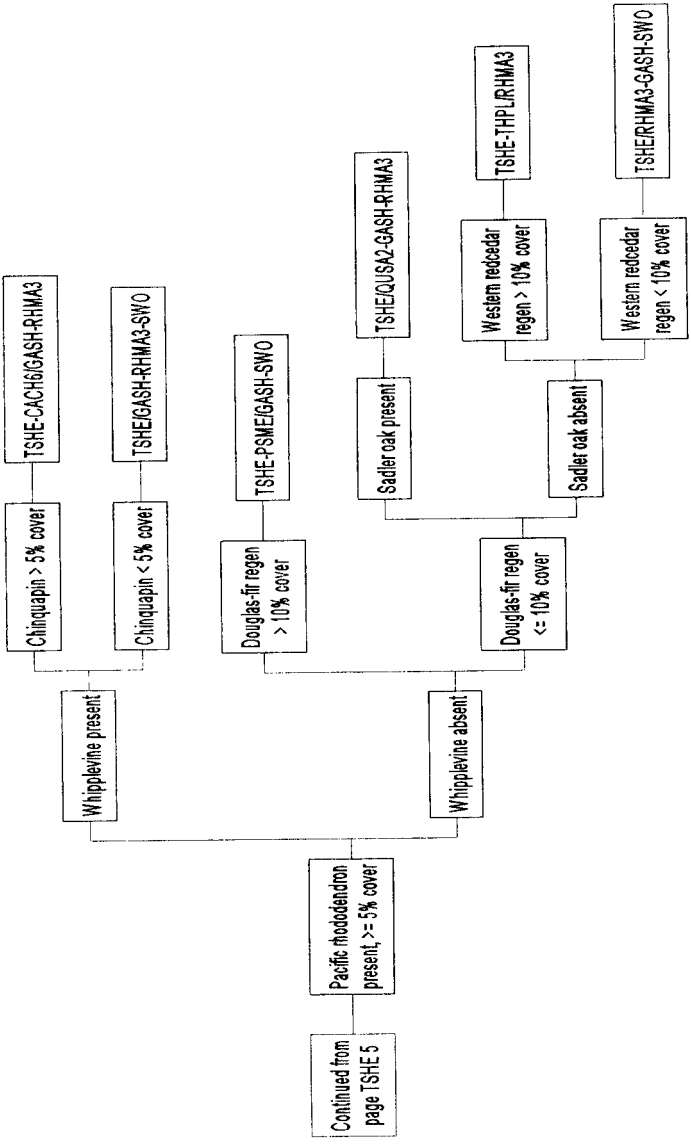
TSHE 4

The flow chart below shows a graphical presentation of the classification and the relationships between the plant associations



Continued from page TSHE 4
Elevation < 4000 feet
Salal present (warm)
Pacific rhododendron present, >= 5% cover
See page TSHE 6
Pacific rhododendron absent or < 5% cover
Western redcedar present
Western redcedar regeneration >= 5% cover
TSHE/GASH/POMU-SWO
Western redcedar regeneration < 5% cover
TSHE/ACCI-GASH-SWO
Western redcedar absent
Sadler oak present
TSHE-LIDE3/RHMA3
Sadler oak absent
Incense-cedar >= 10% cover
TSHE-CADE27/GASH
Incense-cedar < 10% cover
TSHE/GASH-BENE2-SWO
Salal absent (cool)
Pacific rhododendron present
TSHE/ACCI-RHMA3
Pacific rhododendron absent
Slender salal present; elevation averages 3900 feet
TSHE-ABCO/BENE2
Slender salal absent; elevation averages 3500 feet
TSHE-ABCO/ACCI-BENE2

TSHE 6


Continued from page TSHE 5
Pacific rhododendron present, >= 5% cover
Whipplevine present
Whipplevine absent
Chinquapin > 5% cover
Chinquapin < 5% cover
Douglas-fir regen > 10% cover
Douglas-fir regen <= 10% cover
Sadler oak present
Sadler oak absent
Western redcedar regen > 10% cover
Western redcedar regen < 10% cover
TSHE-CACH6/GASH-RHMA3
TSHE/GASH-RHMA3-SWO
TSHE-PSME/GASH-SWO
TSHE/QUSA2-GASH-RHMA3
TSHE-THPL/RHMA3
TSHE/RHMA3-GASH-SWO

The relationship of draft and final plant associations in the Western Hemlock Series is shown The draft associations are listed, with the final associations below each in order of most to least common, with the percentage of plots that make up each association (refer to Methods sections)

TSHE-ABAM/VAME (N=11)
TSHE-ABAM (46%)
TSHE/ACCI-RHMA3 (27%)
ABAM-TSHE/VAME/ACTR (18%)
ABCO-TSHE/BENE2/LIBOL (9%)

TSHE/VAME/LIBOL (N=6)
TSHE-ABCO/BENE2 (83%)
TSHE/ACCI-RHMA3 (17%)

TSHE/RHMA/LIBOL (N=22)
TSHE/ACCI-RHMA3 (57%)
TSHE/RHMA3-GASH-SWO (14%)
ABCO/RHMA3-BENE2 (10%)
TSHE/GASH-RHMA3-SWO (4%)
TSHE-ABCO/BENE2 (4%)
TSHE-PSME/GASH-SWO (4%)
TSHE-THPL/RHMA3 (4%)
PSME/ACCI-BENE2 (4%)

TSHE/GASH-CHUM (N=5)
TSHE/GASH-RHMA3-SWO (60%)
PSME/ACCI-BENE2 (20%)
ABCO/RHMA3-BENE2 (20%)

TSHE/GASH/HIAL (N=1)
TSHE/GASH-RHMA3-SWO (100%)

TSHE/ACGL/LIBOL (N=8)
TSHE-ABCO/BENE2 (38%)
TSHE-ABCO/ACCI-BENE2 (25%)
ABCO-TSHE/BENE2/LIBOL (25%)
TSHE/ACCI-RHMA3 (12%)

TSHE/BENE/LIBOL (N=28)
TSHE/GASH-BENE2-SWO (32%)
TSHE-ABCO/ACCI-BENE2 (29%)
ABCO-TSHE /BENE2/LIBOL (14%)
TSHE/ACCI-RHMA3 (11%)
ABCO/RHMA3-BENE2 (7%)
LIDE3-PSME-QUCH2/BENE2 (4%)
PSME/ACCI-BENE2 (4%)

TSHE/BENE/ACTR (N=11)
TSHE/ACCI-RHMA3 (18%)
TSHE-ABCO/ACCI-BENE2 (18%)
TSHE-ABCO/BENE2 (18%)
ABCO-TSHE/BENE2/LIBOL (18%)
TSHE/GASH-BENE2-SWO (9%)
PSME/ACCI-BENE2 (9%)
ABCO/RHMA3-BENE2 (9%)

TSHE-ACMA/POMU (N=14)
TSHE/ACCI-GASH-SWO (36%)
TSHE/GASH/POMU-SWO (29%)
TSHE/GASH-RHMA3-SWO (7%)
TSHE-PSME/GASH-SWO (7%)
THPL/BENE2/POMU (7%)
PSME/ACCI-BENE2 (7%)
ABCO/ACCI/OXOR (7%)

TSHE-TABR/RHMA (N=8)
TSHE-CACH6/GASH-RHMA3 (25%)
TSHE/RHMA3-GASH-SWO (25%)
TSHE/GASH-BENE2-SWO (13%)
PSME/ACCI-BENE2 (13%)
ABCO/RHMA3-BENE2 (13%)
ABCO-TSHE/BENE2/LIBOL (13%)

TSHE-CADE3/GASH (N=6)
TSHE/GASH-RHMA3-SWO (50%)
TSHE/RHMA3-GASH-SWO (33%)
PSME-CACH6/BENE2 (17%)

TSHE/GASH/LIBOL (N=9)
TSHE/RHMA3-GASH-SWO (33%)
TSHE/GASH-RHMA3-SWO (33%)
TSHE-THPL/RHMA3 (22%)
TSHE/GASH/POMU-SWO (11%)

TSHE 8

TSHE-PSME/GASH (N=21)
TSHE/GASH-RHMA3-SWO (37%)
TSHE/ACCI-GASH-SWO (13%)
TSHE-THPL/RHMA3 (13%)
TSHE/RHMA3-GASH-SWO (10%)
TSHE/GASH/POMU-SWO (9%)
TSHE/GASH-RHMA3-SWO (9%)
TSHE-CACH6/GASH-RHMA3 (9%)
TSHE-PSME/GASH-SWO (3%)
PSME/ACCI-BENE2 (3%)
ABCO-TSHE/BENE2/LIBOL (3%)

TSHE/ACCI-RUNI (N=10)
TSHE/GASH/POMU-SWO (50%)
TSHE/ACCI-GASH-SWO (20%)
TSHE/GASH-RHMA3-SWO (20%)
TSHE/ACCI-RHMA3 (10%)

TSHE-THPL/OXOR (N=3)
TSHE/GASH-RHMA3-SWO (33%)
TSHE/ACCI-RHMA3 (33%)
TSHE/GASH/POMU-SWO (33%)

TSHE/ACCI/OXOR (N=4)
TSHE/ACCI-RHMA3 (75%)
TSHE/RHMA3-GASH-SWO (25%)

TSHE/GASH/OXOR (N=2)
TSHE/GASH-BENE2-SWO (100%)

TSHE/BENE/OXOR (N=7)
TSHE/ACCI-RHMA3 (14%)
TSHE/GASH-BENE2-SWO (14%)
TSHE/RHMA3-BENE2-SWO (14%)
PSME/ACCI-BENE2 (14%)
PSME-ABCO (14%)
ABCO/ACCI/OXOR (14%)
ABCO-TSHE/BENE2/LIBOL (14%)

TSHE-ALRU/POMU (N=2)
TSHE-CACH6/GASH-RHMA3 (50%)
PSME/ACCI-BENE2 (50%)

TSHE/RHMA (N=8)
TSHE/VAOV2/POMU (38%)
TSHE/RHMA3-BENE2-SWO (38%)
TSHE/POMU-SWO (13%)
PSME-CACH6/BENE2 (13%)

TSHE-CHLA (N=7)
CHLA-TSHE/POMU (43%)
CHLA/RHMA3-GASH (29%)
TSHE/RHMA3-BENE2-SWO (14%)
TSHE/POMU-SWO (14%)

TSHE/GASH (N=6)
TSHE/VAOV2/POMU (50%)
TSHE-PSME/GASH-SWO (33%)
TSHE/RHMA3-BENE2-SWO (17%)

TSHE-UMCA (N=16)
TSHE/VAOV2/POMU (31%)
LIDE3-TSHE/VAOV2/POMU (25%)
LIDE3/VAOV2-RHMA3-GASH (25%)
TSHE/POMU-SWO (19%)

TSHE-THPL (N=2)
CHLA-TSHE/POMU (50%)
TSHE/POMU-SWO (50%)

TSHE-ABCO (N=9)
TSHE-LIDE3/RHMA3-QUSA (22%)
LIDE3-TSHE/VAOV2/POMU-RIP (22%)
ABCO-TSHE/BENE2/LIBOL (11%)
ABCO/ARNE (11%)
CHLA-TSHE/POMU (11%)
TSHE/POMU-SWO (11%)
TSHE/GASH-RHMA3-SWO (11%)

Western Hemlock Plant Associations

1a	Location on the west side of the Siskiyou Mountains	2
1b	Location not as above	10
2a	Soils ultramafic, Port-Orford-cedar (CHLA) common	Port-Orford-Cedar Series
2b	Soils not as above	3
3a	Salmonberry (RUSP) present, often abundant	TSHE/RUSP Page TSHE 12
3b	Salmonberry (RUSP) absent or less than 5 percent cover	4
4a	Pacific rhododendron (RHMA3) present	5
4b	Pacific rhododendron (RHMA3) absent	TSHE/POMU-SWO Page TSHE 14
5a	Western sword-fern (POMU) greater than 5 percent cover	6
5b	Western sword-fern (POMU) less than 5 percent cover	8
6a	California-laurel (UMCA) present, often abundant and Port-Orford-cedar (CHLA) absent	TSHE-LIDE3-UMCA Page TSHE 16
6b	California-laurel (UMCA) less than 2 percent cover If greater than 2 percent cover, then Port-Orford-cedar (CHLA) greater than 10 percent cover	7
7a	Salal (GASH) usually present	TSHE/VAOV2/POMU Page TSHE 18
7b	Salal (GASH) absent	TSHE-LIDE3/VAOV2-RHMA3 Page TSHE 20
8a	Port-Orford-cedar (CHLA) and/or tanoak (LIDE3) present	TSHE/RHMA3-BENE2-SWO Page TSHE 22
8b	Port-Orford-cedar (CHLA) and tanoak (LIDE3) absent	9

TSHE 10

9a	Douglas-fir (PSME) regeneration greater than or equal to 10 percent cover	TSHE-PSME/GASH-SWO Page TSHE 24
9b	Douglas-fir (PSME) regeneration less than 10 percent cover	TSHE/GASH-RHMA3-SWO Page TSHE 26
10a	Pacific silver fir(ABAM), Shasta red fir (ABMAS), and/or mountain hemlock (TSME) common, high elevation (over 4000 feet)	TSHE-ABAM Page TSHE 28
10b	Pacific silver fir (ABAM), Shasta red fir (ABMAS), and/or mountain hemlock (TSME) occasional or absent, medium to low elevation	11
11a	Salal (GASH) present (warmer)	12
11b	Salal (GASH) absent (cooler)	22
12a	Pacific rhododendron (RHMA3) present with cover greater than or equal to 5 percent	13
12b	Pacific rhododendron (RHMA3) absent or with cover less than 5 percent	18
13a	Whipplevine (WHMO) present	14
13b	Whipplevine (WHMO) absent	15
14a	Golden chinquapin (CACH6) present with greater than 5 percent cover	TSHE-CACH6/GASH-RHMA3 Page TSHE 30
14b	Golden chinquapin (CACH6) cover less than or equal to 5 percent	TSHE/GASH-RHMA3-SWO Page TSHE 26
15a	Douglas-fir regeneration (PSME) at least 10 percent cover	TSHE-PSME/GASH-SWO Page TSHE 24
15b	Douglas-fir (PSME) regeneration less than 10 percent cover	16
16a	Sadler oak (QUSA2) and tanoak (LIDE3) present	TSHE-LIDE3/RHMA3 Page TSHE 32
16b	Sadler oak (QUSA2) and/or tanoak (LIDE3) absent	17

17a	Western red cedar (THPL) regeneration at least 10 percent cover	TSHE-THPL/RHMA3 Page TSHE 34
17b	Western red cedar (THPL) regeneration less than 10 percent cover	TSHE/RHMA3-GASH-SWO Page TSHE 36
18a	Western redcedar (THPL) present	21
18b	Western redcedar (THPL) absent	19
19a	Sadler oak (QUSA2) present	TSHE/QUSA2-GASH-RHMA3 Page TSHE 38
19b	Sadler oak (QUSA2) absent	20
20a	Incense cedar (CADE27) with greater than or equal to 10 percent cover	TSHE-CADE27/GASH Page TSHE 40
20b.	Incense cedar (CADE27) with less than 10 percent cover	TSHE/GASH-BENE2-SWO Page TSHE 42
21a	Western redcedar (THPL) at least 5 percent cover	TSHE/GASH/POMU-SWO Page TSHE 44
21b	Western redcedar (THPL) less than 5 percent cover	TSHE/ACCI-GASH-SWO Page TSHE 46
22a	Pacific rhododendron (RHMA3) present	TSHE/ACCI-RHMA3 Page TSHE 48
22b	Pacific rhododendron (RHMA3) absent	23
23a	Slender salal (GAOV2) present, or at least four of the following herbs present pathfinder (ADBI), threeleaf anemone (ANDE3), fragrant bedstraw (GATR3), mountain sweet-root (OSCH), and western starflower (TRLA6)	TSHE-ABCO/BENE2 Page TSHE 50
23b	Not as above	TSHE-ABCO/ACCI-BENE2 Page TSHE 52

TSHE 12

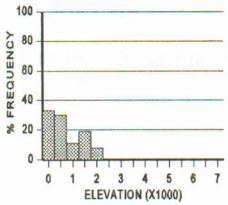
WESTERN HEMLOCK/SALMONBERRY
Tsuga heterophylla/Rubus spectabilis
TSHE/RUSP (N=28; NRCS=28)

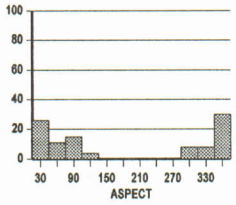
Distribution. This Association is found on the west side of the Siskiyou Mountains and adjacent coastal areas. Occurrence is likely on the Coos Bay District, Bureau of Land Management.

Distinguishing Characteristics. The shrub layer of this Association is dominated by salmonberry. This Association occurs on north aspects at low elevations. It is wet, and is the warmest Association of the Western Hemlock Series.

Soils. Soil data are not available.

Environment. This Association averages 855 feet in elevation. Aspect is primarily north, however sampling was biased to north slopes. Slope averages 30 percent and ranges between 1 and 60 percent.





No slope position data available

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 26. The overstory is dominated by Douglas-fir, and western hemlock is commonly present Red alder is frequently encountered and white fir is common. In the understory, western hemlock is frequently encountered and Port-Orford-cedar and tanoak are common. Hardwoods can be dense in some areas. In the shrub layer, salmonberry and red huckleberry are usually present. Evergreen huckleberry, dwarf Oregongrape, and Pacific blackberry are commonly encountered In the herb/grass layer, western sword-fern and candyflower are frequently present, and Oregon oxalis, fragrant bedstraw, and bearded fescue are common associates.

Common name	Code	Constancy	Class**	Avg Richness
Overstory				5
Red alder	ALRU2	89	2	
Douglas-fir	PSME	82	5	
Western hemlock	TSHE	68	4	
White fir	ABCO	61	1	
Port-Orford-cedar	CHLA	48	2	
Understory				4
Western hemlock	TSHE	93	2	
Port-Orford-cedar	CHLA	68	1	
Tanoak	LIDE3	61	1	
Douglas-fir	PSME	40	1	
Shrubs				6
Red huckleberry	VAPA	86	2	
Salmonberry	RUSP	79	2	
Pacific blackberry	RUUR	75	2	
Evergreen huckleberry	VAOV2	68	2	
Dwarf Oregongrape	BENE2	64	2	
Pacific rhododendron	RHMA3	49	2	
Red elderberry	SARA	46	1	
Thimbleberry	RUPA	32	1	
Herbs				13
Western sword-fern	POMU	100	4	
Candyflower	MOSI2	86	2	
Bearded fescue	FESU	76	1	
Fragrant bedstraw	GATR3	75	2	
Oregon oxalis	OXOR	75	2	
Oregon fairybell	DIHOO	68	1	
Pacific bleedingheart	DIFO	64	1	
Brome	BROMU	60	1	
Redwoods violet	VISE3	54	2	

**Class is given in Daubenmire dominance class codes

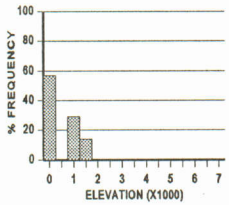
TSHE 14

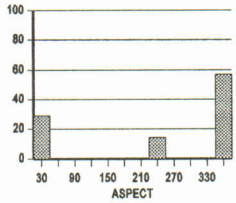
WESTERN HEMLOCK/SWORDFERN-SWO
Tsuga heterophylla/Polystichum munitum
TSHE/POMU-SWO (N=7; FS=7)

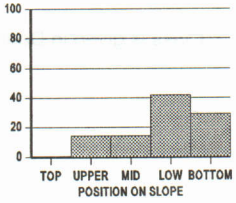
Distribution. The Western Hemlock/Western Sword-fern-SWO Association is found on the Powers and Gold Beach Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs on sites that are wet and warm during the winter months, and humid during the summer. Big-leaf maple and Port-Orford-cedar are indicators of these environmental conditions.

Soils. Parent material is most commonly sandstone, with one occurrence each of breccia and schist. Based on three pits sampled, soils are moderately deep and well drained. Surface textures are loams with 30 to 65 percent rock fragments and 15 to 20 percent clay. Subsurface textures are loams and clay loams with 65 to 75 percent rock fragments and 25 to 30 percent clay. The soil moisture regime is probably udic and the soil temperature regime is probably frigid. These soils classify into the following great groups: Typic Haplumbrepts and Typic Dystochrepts.







Environment Elevation averages 1210 feet in elevation and aspect is primarily north Slope averages 42 percent and ranges between 11 and 80 percent This Association occurs predominantly on lower slopes to valley bottoms

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 28. The overstory is dominated by Douglas-fir, western hemlock is present, and white fir may have high cover in some areas. Port-Orford-cedar is frequent, though at low covers. In the understory, in addition to western hemlock, big-leaf maple, tanoak, and Port-Orford-cedar are frequent, while California-laurel is common In some areas, vine maple may be dense, with up to 50 percent cover. Shrubs are a small component of this Association. Red huckleberry and dwarf Oregongrape are frequently encountered, but at low covers Evergreen huckleberry and salmonberry are common. The herbaceous layer is diverse. Western sword-fern is the most dominant species, with up to 90 percent cover in some areas Oregon oxalis is present with covers ranging from 1 to 40 percent Fern diversity is high. Moss cover is intermediate for the Series, averaging 26 percent

Upper layer tree cover is high for the Series, averaging 76 percent Mid-layer and lower layer tree covers are intermediate, averaging 55 and 39 percent, respectively Shrub cover is low, with high shrubs averaging 5 percent cover and low shrubs 10 percent cover This Association has, by far, the highest total herb/grass cover for the Series, averaging 85 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	38	
Western hemlock	TSHE	100	15	
Port-Orford-cedar	CHLA	86	5	
White fir	ABCO	43	23	
Understory trees				6
Western hemlock	TSHE	100	38	
Big-leaf maple	ACMA	86	9	
Tanoak	LIDE3	86	6	
Port-Orford-cedar	CHLA	86	4	
California-laurel	UMCA	71	9	
Shrubs				5
Red huckleberry	VAPA	100	2	
Dwarf Oregongrape	BENE	86	7	
Salmonberry	RUSP	57	7	
Evergreen huckleberry	VAOV2	57	3	
Herbs				16
Western sword-fern	POMU	100	70	
Oregon oxalis	OXOR	100	18	
Candyflower	MOSI	86	3	
White trillium	TROV2	71	2	
Round-leaved violet	VIOR	71	2	
Northern maidenhair	ADPE	71	1	
Deer-fern	BLSP	71	1	
White inside-out-flower	VAHE	71	1	

TSHE 16

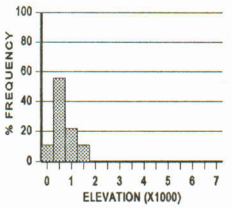
WESTERN HEMLOCK-TANOAK-CALIFORNIA-LAUREL
Tsuga heterophylla-Lithocarpus densiflorus-Umbellularia californica
TSHE-LIDE3-UMCA (N=9; NRCS=9)

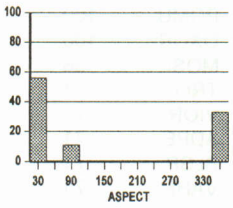
Distribution. This Association is found on the west side of the Siskiyou Mountains near the coast. This Association is likely found on the Coos Bay District, Bureau of Land Management.

Distinguishing Characteristics. This Association is found on north aspects at low elevations. It differs from the Western Hemlock-Tanoak/Evergreen Huckleberry-Pacific Rhododendron Association by the occurrence of California-laurel.

Soils. Soil data are not available.

Environment. This Association averages 850 feet in elevation and aspect is primarily north, although sampling was primarily on north slopes. Slope averages 51 percent and ranges between 30 and 65 percent.





No slope position data available

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 29. The overstory is dominated by western hemlock, while Douglas-fir and tanoak are frequently encountered. The understory is dominated by western hemlock. California-laurel is common. The hardwood component may be represented by tanoak, California-laurel, big-leaf maple, or vine maple. Evergreen huckleberry is frequently encountered in the shrub layer, and Pacific rhododendron may be abundant in some areas. Dwarf Oregongrape is frequently encountered. Western sword-fern is present in the herb/grass layer and may be dominant Oregon oxalis is frequent.

Common name	Code	Constancy	Class**	Avg. Richness
Overstory				5
Western hemlock	TSHE	100	4	
Douglas-fir	PSME	100	3	
Tanoak	LIDE3	100	2	
Big-leaf maple	ACMA3	78	2	
California-laurel	UMCA	67	3	
Understory				3
Western hemlock	TSHE	100	3	
Tanoak	LIDE3	78	2	
California-laurel	UMCA	56	1	
Shrubs				6
Evergreen huckleberry	VAOV2	89	3	
Dwarf Oregongrape	BENE2	89	2	
Pacific rhododendron	RHMA3	78	2	
Vine maple	ACCI	67	2	
Red huckleberry	VAPA	56	1	
California hazel	COCOC	44	1	
Herbs				10
Western sword-fern	POMU	100	4	
Oregon oxalis	OXOR	89	2	
Redwoods violet	VISE3	78	2	
Bearded fescue	FESU	78	2	
Redwoods violet	VISE3	56	2	
Western starflower	TRLA6	56	1	
Oregon fairybells	DIHOO	56	1	

**Class is given in Daubenmire dominance class codes.

TSHE 18

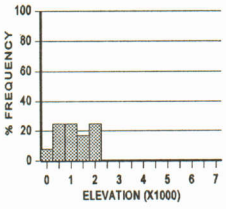
WESTERN HEMLOCK/EVERGREEN HUCKLEBERRY/WESTERN SWORD-FERN
Tsuga heterophylla/Vaccinium ovatum/Polystichum munitum
TSHE/VAOV2/POMU (N=12; FS=12)

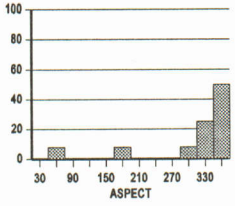
Distribution. This Association is found on the Gold Beach and Powers Ranger Districts, Siskiyou National Forest and may be present on adjacent Bureau of Land Management lands.

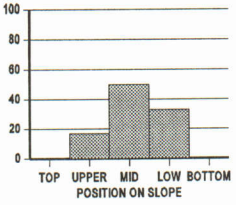
Distinguishing Characteristics. This Association is found in the warm, wet environments of the Western Hemlock Series. Elevation is generally low. Multiple species of ferns may be encountered, and Oregon oxalis is a common species.

Soils. Parent materials are predominantly sandstone. Based on nine plots sampled, soil is moderately deep to deep. Surface rock content ranges from 0 to 80 percent, and averages 12 percent.

Environment. This Association averages 1370 feet in elevation. Slopes are often steep, with an average of 62 percent, and a range between 20 and 80 percent. North aspects predominate. This Association rarely occurs on ridge tops or valleys.







Vegetation Composition and Structure Total species richness is low for the Series, averaging 24 The overstory tree layer is dominated by Douglas-fir, and western hemlock and Port-Orford-cedar are common The understory is dominated by western hemlock Tanoak is frequently present, but only with low cover Hardwoods are common to occasional, and may include vine maple, big-leaf maple, red alder, Pacific madrone, golden chinquapin, Pacific dogwood, tanoak, and California-laurel Pacific rhododendron, red huckleberry, dwarf Oregongrape, salal, and evergreen huckleberry are frequent components of the shrub layer The herb/grass layer is dominated by western sword-fern while Oregon oxalis is a frequent component Moss cover is high for the Series, averaging 34 percent

Upper and mid-layer tree covers are at intermediate and high for the Series, averaging 72 and 63 percent, respectively Lower layer tree cover is high, averaging 48 percent Shrub covers are also intermediate, with high shrubs averaging 23 percent and low shrubs, 32 percent. Total herb/grass cover averages 44 percent, but ranges from 6 to 95 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	57	
Western hemlock	TSHE	75	15	
Port-Orford-cedar	CHLA	50	6	
Understory trees				4
Western hemlock	TSHE	100	52	
Tanoak	LIDE3	92	9	
Port-Orford-cedar	CHLA	58	4	
Douglas-fir	PSME	58	3	
California-laurel	UMCA	42	7	
Shrubs				7
Pacific rhododendron	RHMA3	100	13	
Dwarf Oregongrape	BENE2	92	10	
Red huckleberry	VAPA	92	2	
Evergreen huckleberry	VAOV2	83	17	
Salal	GASH	83	16	
Baldhip rose	ROGY	58	1	
Vine maple	ACCI	50	6	
California hazel	COCOC	50	3	
Pacific blackberry	RUUR	50	1	
Herbs				12
Western sword-fern	POMU	100	35	
Oregon oxalis	OXOR	83	9	
Round-leaved violet	VIOR	75	1	
Western starflower	TRLA6	67	1	
Common beargrass	XETE	58	4	
White trillium	TROV2	58	1	
Fragrant bedstraw	GATR3	58	1	
Rattlesnake-plantain	GOOB2	50	1	
White inside-out-flower	VAHE	50	1	

TSHE 20

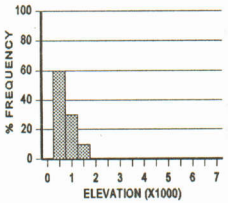
WESTERN HEMLOCK-TANOAK/EVERGREEN HUCKLEBERRY-PACIFIC RHODODENDRON
Tsuga heterophylla-Lithocarpus densiflorus/Vaccinium ovatum-Rhododendron macrophyllum
TSHE-LIDE3/VAOV2-RHMA3 (N=10; NRCS=10)

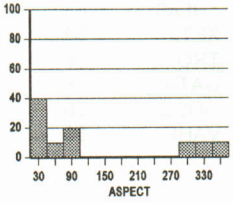
Distribution. This Association occurs on the west slopes of the Siskiyou Mountains near the coast. This Association likely occurs on the Coos Bay District, Bureau of Land Management.

Distinguishing Characteristics. Salmonberry is usually absent and tanoak is usually abundant. This Association is generally found at higher elevations and averages higher precipitation and slightly cooler temperatures than the Western Hemlock/ Salmonberry Association.

Soils. Soil data are not available.

Environment. This Association averages 960 feet in elevation and occurs primarily on northern aspects (although only north slopes were sampled). Slope averages 32 percent and ranges between 10 and 60 percent.





No slope position data available

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging only 19. The overstory is dominated by western hemlock and tanoak. Douglas-fir is frequently encountered and often abundant. Port-Orford-cedar and red alder are common In the understory, tanoak and western hemlock are frequent, and Port-Orford-cedar common The hardwood component, represented solely by tanoak, can be abundant Evergreen huckleberry is present in the shrub layer. Pacific rhododendron is frequently found and can be abundant in some areas Dwarf Oregongrape is common. Redwoods violet is present in the herb/grass layer Western sword-fern is frequent and can be abundant. Oregon oxalis is a common associate.

Common name	Code	Constancy	Class**	Avg Richness
Overstory				5
Western hemlock	TSHE	100	4	
Tanoak	LIDE3	100	2	
Douglas-fir	PSME	90	4	
Port-Orford-cedar	CHLA	80	2	
Red alder	ALRU2	70	2	
Understory				3
Tanoak	LIDE3	100	2	
Western hemlock	TSHE	90	3	
Port-Orford-cedar	CHLA	70	2	
Shrubs				5
Evergreen huckleberry	VAOV2	100	3	
Pacific rhododendron	RHMA3	80	3	
Dwarf Oregongrape	BENE2	70	2	
Red huckleberry	VAPA	60	1	
Herbs				8
Redwoods violet	VISE3	100	2	
Western sword-fern	POMU	90	3	
Oregon oxalis	OXOR	70	2	
Fragrant bedstraw	GATR3	60	2	
Bearded fescue	FESU	60	1	
Braken	PTAQ	60	1	
Western starflower	TRLA6	50	1	
Oregon fairybells	DIHOO	50	1	

**Class is given in Daubenmire dominance class codes

TSHE 22

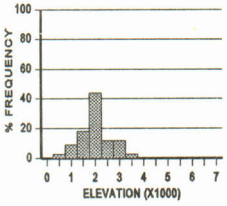
WESTERN HEMLOCK/PACIFIC RHODODENDRON-DWARF OREGONGRAPE-SWO
Tsuga heterophylla/Rhododendron macrophyllum-Berberis nervosa
TSHE/RHMA3-BENE2-SWO (N=34; NRCS=29, FS=5)

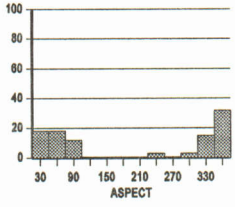
Distribution. This Association occurs in the western portion of the Siskiyou National Forest and adjacent coastal areas. It may also be present on adjacent Bureau of Land Management lands.

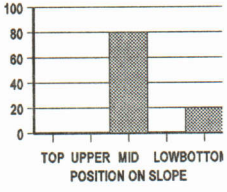
Distinguishing Characteristics. This is a coastal Siskiyou Mountain plant association. It is the wettest of the Western Hemlock Series and the coolest of the coastal Western Hemlock Associations. This Association has a dense shrub layer consisting of Pacific rhododendron and salal.

Soils. Parent material is sandstone. Based on four plots sampled, soils are deep. Surface rock averages 3 percent and ranges from 0 to 10 percent.

Environment. This Association averages 2250 feet in elevation and aspect is primarily north, although sampling was biased toward north slopes. Slope averages







37 percent and ranges between 5 and 65 percent This Association occurs primarily on middle thirds of slopes (based on data available only from the Forest Service plots)

Vegetation Composition and Structure Total species richness is the lowest for the Series, averaging only 18. The overstory is dominated by Douglas-fir, western hemlock is frequent, and Port-Orford-cedar is occasional The understory is dominated by western hemlock, while tanoak, Douglas-fir, and Port-Orford-cedar are also frequently encountered In the shrub layer, Pacific rhododendron, red huckleberry, salal, and dwarf Oregongrape are frequent. Salal may be quite dense in some areas. The most frequently found herbs are round-leaved violet and braken.

Upper layer tree cover is the highest for the Series, averaging 84 percent Mid-layer tree cover and low layer tree cover are intermediate, averaging 52 and 36 percent, respectively. Shrub cover is also intermediate with high shrub averaging 32 percent and low shrub 59 percent Herb cover is second lowest for the Series, averaging only 13 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	56	
Western hemlock	TSHE	60	17	
Port-Orford-cedar	CHLA	40	18	
Understory trees				3
Western hemlock	TSHE	100	46	
Douglas-fir	PSME	100	4	
Port-orford-cedar	CHLA	80	8	
Tanoak	LIDE3	80	7	
Golden chinquapin	CACH6	40	2	
Shrubs				6
Pacific rhododendron	RHMA3	100	16	
Dwarf Oregongrape	BENE2	100	11	
Red huckleberry	VAPA	100	5	
Salal	GASH	80	40	
Baldhip rose	ROGY	60	1	
Snow bramble	RUNI2	60	1	
Pacific blackberry	RUUR	60	1	
Evergreen huckleberry	VAOV2	40	44	
Herbs				7
Braken	PTAQ	80	6	
Round-leaved violet	VIOR	80	1	
Western sword-fern	POMU	60	2	
Little prince's-pine	CHME	60	1	
Rattlesnake-plantain	GOOB2	60	1	
Common prince's-pine	CHUM	40	2	
Candystick	ALVI2	40	1	
Western starflower	TRLA6	40	1	

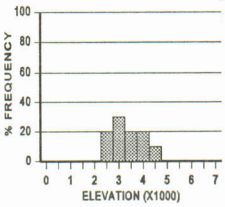
TSHE 24

WESTERN HEMLOCK-DOUGLAS-FIR/SALAL-SWO
Tsuga heterophylla-Pseudotsuga menziesii/Gaultheria shallon
TSHE-PSME/GASH-SWO (N=5; FS=5)

Distribution. This Association is found on the Cottage Grove and North Umpqua Ranger Districts, Umpqua National Forest and the Illinois Valley and Powers Ranger Districts, Siskiyou National Forest. It is likely found on the Swiftwater Resource Area of the Roseburg District, Bureau of Land Mangement.

Distinguishing Characteristics. This Association often occurs on dry, rocky sites on upper to middle-third slope positions. It is transitional to the Douglas-fir Series, as evidenced by the constancy and abundance of Douglas-fir regeneration and golden chinquapin cover.

Soils. Parent material is highly variable and may include chert, breccia, tephra, andesite, and granite. Based on four plots sampled, soils are moderately deep to deep, and well drained. Surface textures are loams with 30 to 60 percent rock fragments and 12 to 20 percent clay. Subsurface textures are loams and clay loams



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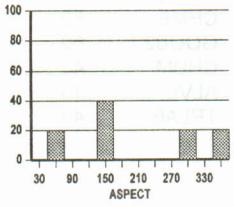
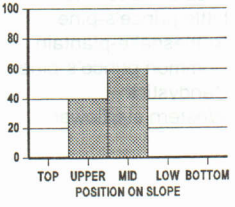




with 30 to 60 percent rock fragments. The soil moisture regime is probably xeric and soil temperature regime is probably mesic. Soils classify into the following subgroups: Typic Xerumbrepts and Typic Xerochrepts.

Environment. This Association averages 3160 feet in elevation and aspect is variable. Slope averages 33 percent and ranges between 13 and 45 percent. This Association occurs on middle to upper thirds of slopes.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 23. The overstory tree cover is dominated by Douglas-fir. Western hemlock is frequent, but at lower covers. The understory is dominated by western hemlock. It includes golden chinquapin and Douglas-fir regeneration averaging 14 percent and 11 percent cover, respectively. The hardwood component is dominated by the evergreen species, golden chinquapin, tanoak, and canyon live oak. Other hardwoods that may be present are vine maple, big-leaf maple, and Pacific dogwood. The shrub layer is dominated by salal and Pacific rhododendron. Dwarf Oregongrape is frequent at low covers, and red huckleberry and baldhip rose are common. Herbaceous species presence is variable, though whitevein pyrola and braken are frequently encountered. Moss cover is low for the Series, averaging only 9 percent.

Upper layer tree cover is lowest of the Series, averaging only 58 percent. Mid-layer tree cover is intermediate, averaging 55 percent and lower layer tree cover is very high, averaging 52 percent. Shrubs are a significant component of the structure in this Association. High shrubs average 40 percent cover, while low shrubs average 81 percent cover, the highest of the Series. Herb/grass cover ranges from 5 to 35 percent, and averages 16 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	50	
Western hemlock	TSHE	100	10	
Understory trees				7
Western hemlock	TSHE	100	28	
Golden chinquapin	CACH6	100	14	
Douglas-fir	PSME	100	11	
Pacific madrone	ARME	60	2	
Incense-cedar	CADE27	60	1	
Shrubs				9
Salal	GASH	100	57	
Pacific rhododendron	RHMA3	100	40	
Dwarf Oregongrape	BENE2	100	5	
Baldhip rose	ROGY	80	2	
Red huckleberry	VAPA	80	2	
Herbs				7
Braken	PTAQ	80	3	
Whitevein pyrola	PYPI2	80	1	
Common beargrass	XETE	60	9	

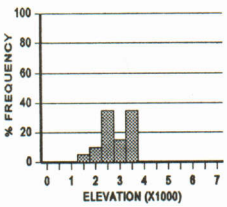
TSHE 26

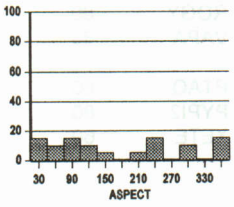
WESTERN HEMLOCK/SALAL-PACIFIC RHODODENDRON-SWO
Tsuga heterophylla/Gaultheria shallon-Rhododendron macrophyllum
TSHE/GASH-RHMA3-SWO (N=20; FS=20)

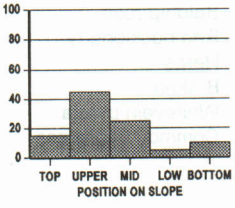
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Tiller Ranger Districts, Umpqua National Forest. It is likely to occur on the Swiftwater Resource Area of the Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. This Association is on warm sites, although not as harsh as the Western Hemlock-Golden Chinquapin/Salal-Pacific Rhododendron Association. On the Tiller Ranger District it occurs at elevations over 3500 feet. Whipplevine, a rocky site indicator, is generally present.

Soils. Parent material is primarily andesite or basalt, however, occasionally pumice, tephra, andesite, gabbro, sandstone, breccia, or granite may be present. Based on nine plots sampled, soils are moderately deep to deep, and well to moderately well drained. Surface textures are loams and clay loams with 15 to 70 percent rock fragments and 15 to 25 percent clay. Subsurface textures are loams, clay loams,







and clays, with 20 to 70 percent rock fragments The soil moisture regime is probably udic and the soil temperature regime is probably mesic. Subgroups include. Typic Haplumbrepts, Typic Udorthents, and Mollic Hapludalfs.

Environment. This Association averages 3010 feet in elevation and aspect is variable, though often east or north. Slope averages 34 percent and ranges between 7 and 67 percent. This Association is commonly on upper slopes.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 35. The overstory tree layer is dominated by Douglas-fir, and Douglas-fir and golden chinquapin are frequent in the understory. Hardwoods include Rocky Mountain maple, big-leaf maple, red alder, and tanoak; average covers are very low. The shrub layer is dominated by salal, Pacific rhododendron, and dwarf Oregongrape. Whipplevine and twinflower are frequent in the herb/grass layer, the latter at fairly high covers Rattlesnake-plantain, western sword-fern, common prince's-pine, and round-leaved violet are also frequent, and western starflower, Oregon fairybell, white-flowered hawkweed, and white trillium are common associates. Moss cover is moderate for the Series, averaging 18 percent.

Upper, middle, and lower layer tree covers are about average for the Western Hemlock Series averaging 68, 55, and 41 percent, respectively. High shrubs average 28 percent cover and low shrubs 57 percent cover. Herb/grass cover averages 26 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	50	
Western hemlock	TSHE	80	9	
Understory trees				7
Western hemlock	TSHE	100	31	
Douglas-fir	PSME	95	4	
Golden chinquapin	CACH6	85	3	
Western redcedar	THPL	70	9	
Pacific yew	TABR2	70	8	
Shrubs				11
Salal	GASH	100	31	
Pacific rhododendron	RHMA3	100	25	
Dwarf Oregongrape	BENE2	100	16	
Red huckleberry	VAPA	90	3	
Vine maple	ACCI	80	14	
Baldhip rose	ROGY	80	2	
Pacific blackberry	RUUR	80	2	
Herbs				17
Western twinflower	LIBOL	100	11	
Whipplevine	WHMO	100	3	
Western sword-fern	POMU	90	3	
Rattlesnake-plantain	GOOB2	85	1	
Common prince's-pine	CHUM	80	2	
Round-leaved violet	VIOR	80	2	

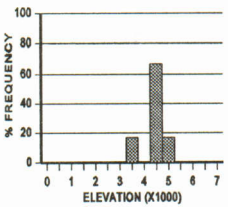
TSHE 28

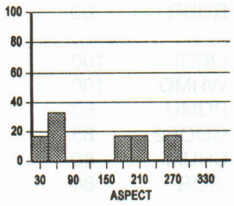
WESTERN HEMLOCK-PACIFIC SILVER FIR
Tsuga heterophylla-Abies amabilis
TSHE-ABAM (N=6; FS=6)

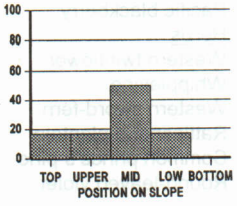
Distribution. This Association occurs on the Umpqua National Forest, primarily on the Diamond Lake Ranger District, but also on the Cottage Grove and North Umpqua Ranger Districts.

Distinguishing Characteristics. This Association is present at the highest elevations of the Series, on cool, moist sites. It is bounded at higher elevations by the Pacific Silver Fir Series and at lower elevations by other Western Hemlock Associations.

Soils. Parent material is most commonly basalt, andesite, or pumice mixed with ash. Based on five plots sampled, soils are deep and somewhat excessively well drained. Surface textures are loams and loamy sands with 10 to 80 percent rock fragments and 1 to 17 percent clay. Subsurface textures are loams and sandy loams with 20 to 90 percent rock fragments. The soil moisture regime is probably udic and the soil temperature regime is probably frigid. Soils classify into the following subgroups:







Dystrochrepts and Typic Udorthents.

Environment. This Association occurs at high elevations, averaging 3930 feet, and on variable aspects. Slope averages 32 percent and ranges between 3 and 77 percent. This Association is commonly found on middle-third slope positions.

Vegetation Composition and Structure. Total species richness for the Series is low compared with other plant associations in the Series, averaging 24. The overstory tree layer is dominated by Douglas-fir and western hemlock, with a significant component of Pacific silver fir in both the overstory and understory. Thin-leaved huckleberry is a frequent component of the shrub layer. Shrubs are generally not dominant, compared with other western hemlock associations. Vanillaleaf, common prince's-pine, western twinflower, one-sided pyrola, and coolwort foamflower are frequent in the herb/grass layer. Moss cover averages 9 percent.

Upper layer tree cover is relatively high for the Series, averaging 73 percent. Mid-layer tree cover averages 39 percent, and lower layer tree cover averages 24 percent. High shrub cover is very low (1 percent), but low shrub cover averages close to 10 percent. The herbaceous layer is quite variable, ranging from 2 to 85 percent cover, and averaging 30 percent.

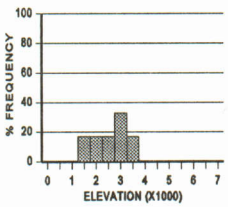
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Douglas-fir	PSME	100	28	
Western hemlock	TSHE	100	24	
Pacific silver fir	ABAM	100	12	
White fir	ABCO	40	5	
Understory trees				3
Western hemlock	TSHE	100	33	
Pacific silver fir	ABAM	100	28	
Douglas-fir	PSME	40	1	
Pacific yew	TABR2	40	1	
Shrubs				6
Thin-leaved huckleberry	VAME	80	5	
Dwarf bramble	RULA2	80	4	
Dwarf Oregongrape	BENE2	60	1	
Herbs				14
Coolwort foamflower	TITRU	100	4	
Vanillaleaf	ACTR	100	3	
Common prince's-pine	CHUM	80	3	
Western twinflower	LIBOL	80	2	
One-sided pyrola	PYSE	80	1	
Starry false Solomon's-seal	SMST	60	2	
White trillium	TROV2	60	1	
Rattlesnake-plantain	GOOB2	60	1	

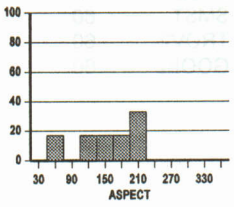
WESTERN HEMLOCK-GOLDEN CHINQUAPIN/SALAL-PACIFIC RHODODENDRON
Tsuga heterophylla-Castanopsis chrysophylla/Gaultheria shallon-Rhododendron macrophyllum
TSHE-CACH6/GASH-RHMA3 (N=6; FS=6)

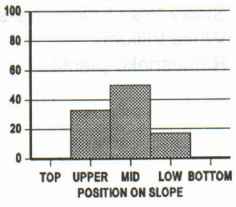
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Tiller Ranger Districts of the Umpqua National Forest.

Distinguishing Characteristics. This Association occurs on rocky sites. The climate is warmer compared with other Cascade Mountain western hemlock associations. Dry site indicators golden chinquapin and whipplevine are present, and honeysuckle and poison oak may be present occasionally.

Soils. Parent material is most commonly andesite, basalt, or sandstone, with infrequent occurrences of tephra. Based on five plots sampled, soils are moderately deep and well drained. Surface texture is loam with 45 to 70 percent rock fragments and 20 to 30 percent clay. Subsurface texture is loam and clay loam with 35 to 75 percent rock fragments. The soil moisture regime is probably xeric, and the soil temperature regime is probably mesic. Soils classify into the following subgroups:







Typic Xerochrepts and Typic Haploxeralfs.

Environment. This Association averages 2900 feet in elevation and occurs predominantly on south aspects. Slopes average 42 percent and range between 20 and 75 percent. This Association occurs primarily on middle to upper thirds of slopes.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 35. The overstory tree layer is dominated by Douglas-fir. Incense-cedar, sugar pine, and western hemlock are almost always present. Understory tree cover is rich, with western hemlock, Douglas-fir, golden chinquapin, incense-cedar, and Pacific yew frequent, and Pacific madrone common Hardwoods include big-leaf maple, vine maple, red alder, and Pacific dogwood. Dwarf Oregongrape, salal, and Pacific rhododendron are frequent, with high covers of salal and Pacific rhododendron. The dry site indicators silk-tassel (*Garrya*) and honeysuckle (*Lonicera*) are sometimes present. The most frequent herbs are vanillaleaf, whipplevine, and western twinflower. Moss cover averages 19 percent.

Upper layer tree cover is low for the Series, averaging 66 percent Middle and lower tree layer covers are moderate with 52 and 43 percent cover, respectively. Shrub covers are high; high shrubs average 36 percent cover and low shrubs 62 percent cover. Herb/grass cover is fairly low for the Series, averaging 20 percent, and ranges between 10 and 45 percent cover.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Douglas-fir	PSME	100	41	
Western hemlock	TSHE	86	9	
Sugar pine	PILA	86	7	
Incense-cedar	CADE27	71	5	
Understory trees				8
Golden chinquapin	CACH6	100	21	
Western hemlock	TSHE	100	19	
Douglas-fir	PSME	100	7	
Incense-cedar	CADE27	86	10	
Pacific yew	TABR2	86	4	
White fir	ABCO	57	10	
Shrubs				12
Salal	GASH	100	39	
Pacific rhododendron	RHMA3	100	27	
Red huckleberry	VAPA	83	2	
Dwarf bramble	RULA2	80	4	
Vine maple	ACCI	71	11	
Herbs				15
Vanillaleaf	ACTR	100	3	
Whipplevine	WHMO	100	3	
Western starflower	TRLA6	100	1	
Common prince's-pine	CHUM	80	3	
Western twinflower	LIBOL	80	2	
One-sided pyrola	PYSE	80	1	

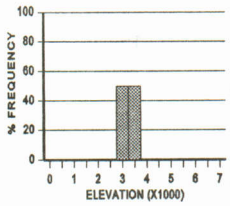
TSHE 32

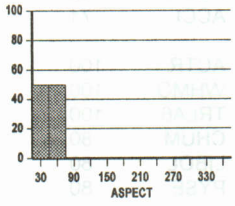
WESTERN HEMLOCK-TANOAK/PACIFIC RHODODENDRON
Tsuga heterophylla-Lithocarpus densiflorus/Rhododendron macrophyllum
TSHE-LIDE3/RHMA3 (N=2; FS=2)

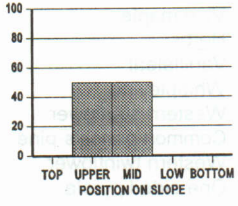
Distribution. This Association occurs on the Galice Ranger District, Siskiyou National Forest. It may also be present on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs at intermediate elevations, on cold aspects, in very wet areas. Tanoak and Sadler oak, in addition to Pacific rhododendron and common beargrass, are the characteristic species.

Soils. Parent material is sandstone. Based on two plots sampled, soils are moderately deep and well drained. Surface and subsurface textures are sandy clay loam with 60 to 80 percent rock fragments and 20 to 35 percent clay. The soil moisture regime may be udic or xeric and the soil temperature regime may be mesic or frigid. Soils classify into the following subgroups: Typic and Mollic Hapludalfs.







Environment. This Association averages 3490 feet in elevation and aspect is northerly Slope averages 62 percent and ranges between 38 and 85 percent This Association occurs on middle to upper thirds of slopes.

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 29. The overstory is dominated by western hemlock and Douglas-fir. White fir is also present, and incense-cedar is common. In addition to the overstory species, the understory includes tanoak, Pacific yew and western redcedar, all at low covers. Hardwoods are not a dominant component. The shrub layer is characterized by vine maple, Pacific rhododendron, and sometimes Sadler oak. Most other shrubs are present at very low covers. The herbaceous layer also has low cover. Moss cover exceeds herb cover, averaging 18 percent

Upper layer tree cover averages 80 percent and is exceeded only by the Western Hemlock/Pacific Rhododendron-Dwarf Oregongrape-SWO Association. Mid-layer tree cover is intermediate, averaging 63 percent, and lower layer tree cover is sparse, averaging only 30 percent. High shrub and low shrub layers average only 13 and 18 percent cover, respectively. Total herb/grass cover, lowest of the Series, averages 10 percent.

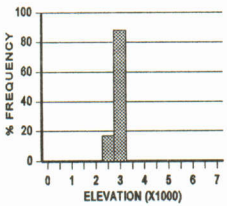
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Western hemlock	TSHE	100	53	
Douglas-fir	PSME	100	28	
White fir	ABCO	100	1	
Incense-cedar	CADE27	50	1	
Understory trees				7
Western hemlock	TSHE	100	43	
Tanoak	LIDE3	100	4	
White fir	ABCO	100	3	
Pacific yew	TABR2	100	3	
Western redcedar	THPL	100	3	
Golden chinquapin	CACH6	50	1	
Shrubs				12
Pacific rhododendron	RHMA3	100	13	
Vine maple	ACCI	100	6	
Sadler oak	QUSA2	100	5	
Dwarf Oregongrape	BENE2	100	3	
Salal	GASH	100	3	
Baldhip rose	ROGY	100	1	
Pacific blackberry	RUUR	100	1	
Herbs				15
Little prince's-pine	CHME	100	1	
Common prince's-pine	CHUM	100	1	
Oregon fairybell	DIHOO	100	1	
Toothleaf pyrola	PYDE	100	1	
White inside-out-flower	VAHE	100	1	
Round-leaved violet	VIOR	100	1	
Common beargrass	XETE	100	1	

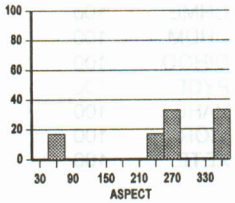
WESTERN HEMLOCK-WESTERN REDCEDAR/PACIFIC RHODODENDRON
Tsuga heterophylla-Thuja plicata/Rhododendron macrophyllum
TSHE-THPL/RHMA3 (N=6; FS=6)

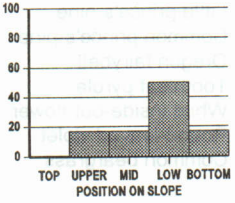
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Diamond Lake Ranger Districts, Umpqua National Forest. It is likely to occur on the Swiftwater Resource Area, Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs at moderate elevations in the Cascade Mountains. It occurs in moist environments, although not quite as moist as the Western Hemlock/Salal/Western Sword-fern-SWO Association. Western redcedar is an important component, and Pacific yew, a humid site indicator, is present.

Soils. Parent material is highly variable and may include gabbro, tephra, rhyolite, pumice, andesite, sandstone, and breccia. Based on five plots sampled, soils are moderately deep to deep and well drained. Surface textures are loams and loamy sands with 45 to 80 percent rock fragments and 10 to 20 percent clay. Subsurface







textures are sandy loams, clay loams, and clays, with 30 to 85 percent rock fragments The soil moisture regime is probably udic and the soil temperature regime is probably mesic The soils classify into the following subgroups Typic Dystrochrepts and Mollic Hapludalfs.

Environment. This Association averages 3110 feet in elevation and aspects are north and west. Slope averages 31 percent, and ranges between 14 and 60 percent. This Association occurs predominantly on lower slopes

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 28. The overstory is dominated by Douglas-fir, and western hemlock and western redcedar are also frequent. The understory may have abundant western redcedar. Pacific yew and golden chinquapin are frequent, however, the covers are low Hardwoods are not a significant component of the stand. Vine maple and golden chinquapin are present, but average only 2 and 3 percent cover, respectively. The shrub layer is dominated by Pacific rhododendron. Salal and dwarf Oregongrape are frequent and may also be abundant. Red huckleberry is also frequent, but at low cover. Western twinflower and whitevein pyrola are frequent in the herb/grass layer. Western sword-fern is frequent, but at very low cover. Moss cover is intermediate for the Series, and averages 23 percent.

Upper layer tree cover is high for the Series, averaging 73 percent. Middle and lower layer tree covers average 57 and 40 percent, respectively. Shrub cover is dominant in this association. High shrubs average 44 percent cover, the highest in the Series, and low shrubs average 60 percent cover. Total herb/grass cover is intermediate for the Series, averaging 23 percent, and ranges from 5 to 55 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Douglas-fir	PSME	100	56	
Western hemlock	TSHE	100	11	
Western redcedar	THPL	100	3	
Understory trees				6
Western hemlock	TSHE	100	35	
Western redcedar	THPL	100	22	
Golden chinquapin	CACH6	100	3	
Pacific yew	TABR2	100	3	
Douglas-fir	PSME	83	2	
Shrubs				9
Pacific rhododendron	RHMA3	100	42	
Salal	GASH	100	32	
Dwarf Oregongrape	BENE2	100	24	
Red huckleberry	VAPA	100	6	
Vine maple	ACCI	100	2	
Pacific blackberry	RUUR	83	2	
Herbs				13
Western twinflower	LIBOL	100	11	
Whitevein pyrola	PYPI2	100	1	
Western sword-fern	POMU	83	2	
Common prince's-pine	CHUM	83	2	

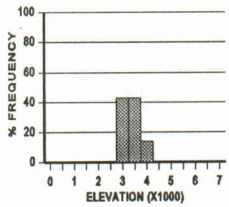
TSHE 36

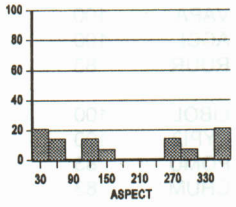
WESTERN HEMLOCK/PACIFIC RHODODENDRON-SALAL-SWO
Tsuga heterophylla/Rhododendron macrophyllum-Gaultheria shallon
TSHE/RHMA3-GASH-SWO (N=14; FS=14)

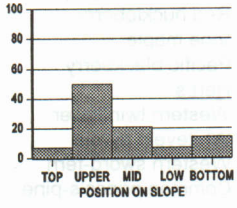
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Tiller Ranger Districts, Umpqua National Forest and is likely found on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. The Western Hemlock/Pacific Rhododendron-Salal -SWO Association is similar to the Western Hemlock-Western Redcedar/Pacific Rhododendron Association, only drier.

Soils. Parent material is most commonly andesite and basalt, with occasional occurrences of granite, breccia, sandstone, and tephra. Based on six plots sampled, soils are moderately deep and well drained. Surface soil textures are loam with 30 to 55 percent rock fragments and 15 to 25 percent clay. Subsurface textures are clay loams and loams with 30 to 60 percent rock fragments. The soil moisture regime is probably udic; the soil temperature regime may be mesic or frigid. Soils







classify into the following subgroups: Typic Dystrochrepts and Typic Hapludalfs.

Environment. This Association averages 3430 feet in elevation and aspect is variable, though rarely directly south. Slope averages 36 percent and ranges between 3 and 89 percent. This Association often occurs on upper slopes.

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 27. The overstory is dominated by Douglas-fir. Western hemlock is frequently found and western white pine is commonly encountered. The understory is predominantly western hemlock. Douglas-fir and Pacific yew are common, while golden chinquapin is frequently encountered. The shrub layer is dominated by Pacific rhododendron, which in some areas can be very dense. Salal, dwarf Oregongrape, Pacific blackberry, and red huckleberry are frequently encountered. Common prince's-pine, western twinflower, and western sword-fern are frequently encountered in the herb/grass layer. Moss cover is intermediate for the Series, averaging 20 percent cover.

Upper and mid-layer tree covers are intermediate for the Series, averaging 70 and 56 percent, respectively. Lower layer tree cover is low, averaging only 29 percent. High shrub cover is high, averaging 42 percent, and low shrub cover is intermediate, averaging 54 percent. Total herb/grass cover is very low for the Series, averaging 15 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	48	
Western hemlock	TSHE	86	18	
Western white pine	PIMO3	50	2	
Understory trees				5
Western hemlock	TSHE	100	39	
Golden chinquapin	CACH6	86	5	
Pacific yew	TABR2	79	8	
Douglas-fir	PSME	71	3	
Shrubs				10
Pacific rhododendron	RHMA3	100	41	
Salal	GASH	100	23	
Dwarf Oregongrape	BENE2	100	10	
Pacific blackberry	RUUR	86	2	
Red huckleberry	VAPA	79	3	
Vine maple	ACCI	71	9	
Thin-leaved huckleberry	VAME	50	2	
Snow bramble	RUNI2	50	2	
Baldhip rose	ROGY	50	1	
Herbs				10
Western twinflower	LIBOL	93	7	
Common prince's-pine	CHUM	93	2	
Western sword-fern	POMU	86	1	
Whitevein pyrola	PYPI2	71	1	
Rattlesnake-plantain	GOOB2	64	1	
Common beargrass	XETE	50	2	

TSHE 38

WESTERN HEMLOCK/SADLER OAK-SALAL-PACIFIC RHODODENDRON

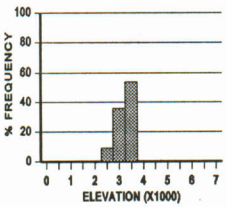
Tsuga heterophylla/Quercus sadleriana-Gaultheria shallon-Rhododendron macrophyllum

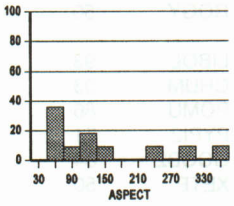
TSHE/QUSA2-GASH-RHMA3 (N=11; BLM=11)

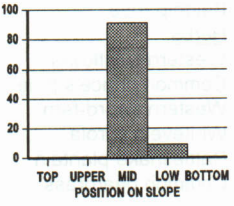
Distribution. This Association occurs in the Grants Pass Resource Area of the Medford District, Bureau of Land Management and may be present on adjacent Forest Service lands.

Distinguishing Characteristics. This Association is characterized by high elevations, high precipitation, and cool temperatures. Pacific rhododendron, Sadler oak, and salal are present. This Association resembles the Western Hemlock-Tanoak/Pacific Rhododendron Association, which has higher precipitation.

Soils. Parent material is most commonly granite, diorite, or sandstone. Based on seven plots sampled, soils are well drained. Textures are sandy loams, sandy clay loams, and silt loams, with 15 to 75 percent rock fragments.







Environment. This Association averages 3420 feet in elevation and aspect is predominantly, though not exclusively, east Slope averages 49 percent and ranges between 25 and 72 percent. This Association occurs primarily on middle third slope positions.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 20 species. The tree layer is dominated by Douglas-fir. Western hemlock, white fir, and sugar pine are frequently present. Port-Orford-cedar is a common associate. The hardwood species are common to occasional, and may consist of golden chinquapin and tanoak. The shrub layer can be dense and may include Pacific rhododendron, salal, Sadler oak, and dwarf Oregongrape The herbaceous species presence is variable and does not support high cover. Western twinflower is frequently found. Moss cover ranges from 0 to 35 percent, but averages 3 percent

Stratification of total tree and shrub layer covers differs in this Association (refer to the Methods section). Total tree cover averages 74 percent, and cover of trees less than 10 feet tall (3 meters) averages 24 percent. Shrubs, both greater and less than 20 inches (50 centimeters) tall, average 61 percent cover. Total herb/grass cover averages only 12 percent, but ranges from 2 to 35 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				6
Douglas-fir	PSME	100	35	
Sugar pine	PILA	73	14	
Understory trees				6
Western hemlock	TSHE	90	5	
White fir	ABCO	90	5	
Port-Orford-cedar	CHLA	70	5	
Shrubs				8
Pacific rhododendron	RHMA3	100	32	
Dwarf Oregongrape	BENE2	100	8	
Salal	GASH	91	51	
Sadler oak	QUSA2	91	33	
Red huckleberry	VAPA	73	5	
Pacific blackberry	RUUR	64	1	
Baldhip rose	ROGY	45	1	
Herbs				5
Western twinflower	LIBOL	82	10	
Little prince's-pine	CHME	73	1	
Common prince's-pine	CHUM	64	6	
Common beargrass	XETE	55	6	
Rattlesnake-plantain	GOOB2	45	1	
Western starflower	TRLA6	45	1	

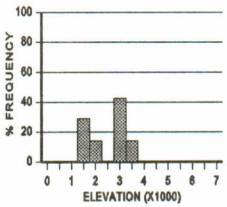
TSHE 40

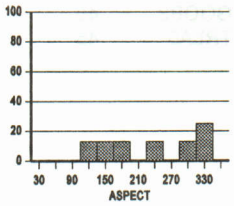
WESTERN HEMLOCK-INCENSE-CEDAR/SALAL
Tsuga heterophylla-Calocedrus decurrens/Gaultheria shallon
TSHE-CADE27/GASH (N=7; BLM=7)

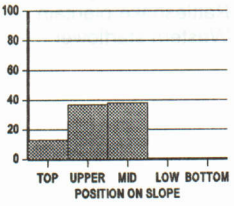
Distribution. This Association occurs on the Medford District, Bureau of Land Management and may be present on adjacent Forest Service lands.

Distinguishing Characteristics. The presence of both salal and incense-cedar, and absence of Pacific rhododendron, characterize this Association. Whipplevine occurrence suggests rocky soil, yet the relatively high cover of western sword-fern indicates moist conditions.

Soils. Parent materials include metasediments, metavolcanics, and andesite. Based on six plots sampled, soils are well drained to moderately well drained. Textures are silty loams, sandy loams, and silty clays, with 15 to 45 percent rock fragments.







Environment. This Association averages 2760 feet in elevation and occurs predominantly on east, south, and west aspects. Slopes average 39 percent and ranges from 12 to 89 percent. This Association occurs mostly on middle to upper slopes.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 25. The tree layer is dominated by Douglas-fir. Incense-cedar is present and may be abundant, while western hemlock cover is often low. Golden chinquapin is commonly encountered. The shrub layer is often dominated by salal, although occasionally it is not present. Dwarf Oregongrape and baldhip rose are frequent, and Pacific blackberry is common. Western twinflower is present in the herb/grass layer, and western sword-fern, white inside-out-flower, and whipplevine are common.

Stratification of tree and shrub layer covers differs in this Association (refer to Methods section). Total tree cover averages 74 percent, and cover of trees less than 10 feet (3 meters) tall averages 16 percent. Shrubs greater than 20 inches tall (50 centimeters) averages 18 percent cover and shrubs less than 20 inches tall average 38 percent cover. Total herb/grass cover averages 33 percent and ranges between 10 and 70 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				5
Douglas-fir	PSME	100	20	
Western hemlock	TSHE	83	5	
Incense-cedar	CADE27	67	30	
Understory trees				5
Douglas-fir	PSME	100	5	
Incense-cedar	CADE27	100	5	
Western hemlock	TSHE	100	4	
Shrubs				7
Dwarf Oregongrape	BENE2	100	6	
Baldhip rose	ROGY	86	2	
Salal	GASH	71	61	
Pacific blackberry	RUUR	71	1	
Creambush ocean-spray	HODI	57	2	
Red huckleberry	VAPA	57	2	
Herbs				13
Western twinflower	LIBOL	100	3	
Western sword-fern	POMU	71	24	
Whipplevine	WHMO	71	4	
White inside-out-flower	VAHE	71	2	
Trail plant, Pathfinder	ADBI	71	1	
Threeleaf anemone	ANDE3	57	1	
Oregon fairybells	DIHOO	57	1	
Fragrant bedstraw	GATR3	57	1	
White-flowered hawkweed	HIAL2	57	1	
Snow-queen	SYRE	57	1	
Western starflower	TRLA6	57	1	
White trillium	TROV2	57	1	

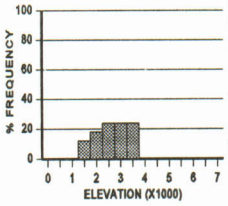
TSHE 42

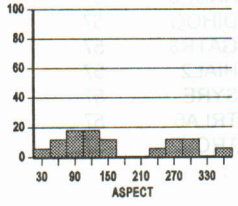
WESTERN HEMLOCK/SALAL-DWARF OREGONGRAPE-SWO
Tsuga heterophylla/Gaultheria shallon-Berberis nervosa
TSHE/GASH-BENE2-SWO (N=17; FS=17)

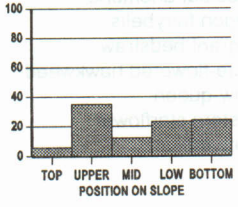
Distribution. This Association occurs on all Ranger Districts of the Umpqua National Forest and may occur on the South River Resource Area of the Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs at low elevations, on warm, dry sites with gentle slopes. Whipplevine, a rocky site indicator, is often present. Other dry site indicators may also be present such as, canyon live oak, Piper's Oregongrape, and hairy honeysuckle. This Association is similar to the Western Hemlock/Dwarf Oregongrape and the Western Hemlock/Oregon Oxalis; both are described in the Willamette National Forest Plant Association Guide (Hemstrom, et. al. 1987).

Soils. This Association was found on 10 different parent materials and may be the most variable of the Series. Based on seven plots sampled, soils are shallow to







deep, and well drained to moderately well drained. Surface textures vary from loamy sand to clay loam, while four of the soils have a heavy clay layer beginning at 3 to 17 inches Rock fragment content is also variable, from 0 to 60 percent. Subsurface textures include loamy sands, silt loams, and sandy loams. Subsurface rock fragments varied from 0 to 55 percent. The soil moisture regime is probably udic, and the soil temperature regime is probably mesic Soils classify into the following subgroups: Typic Hapludalfs, Haploxeralfs and Palexeralfs, Typic Xerochrepts and Dystrochrepts.

Environment. This Association averages 2870 feet in elevation and occurs predominantly on north, east, and west aspects. Slope averages 35 percent and ranges from 5 to 70 percent. This Association occurs on all slope positions.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 36. Douglas-fir and western hemlock are present in the overstory. White fir and incense-cedar are common, while sugar pine is occasional Pacific yew, Douglas-fir, golden chinquapin, western hemlock, and white fir are frequently encountered in the understory. Vine maple may be dense in some areas. Other hardwoods include big-leaf maple, Pacific madrone, Pacific dogwood, and canyon live oak. In the shrub layer, dwarf Oregongrape and salal are present. Red huckleberry, baldhip rose, and Pacific blackberry are frequent. Western twinflower, western sword-fern, and round-leaved violet are almost always present Moss cover is fairly high for the Series, averaging 20 percent.

Upper and mid-layer tree covers are high for the Series, averaging 74 and 65 percent cover, respectively. Lower layer tree cover averages 39 percent Shrub cover is low to intermediate, with high shrub cover averaging only 5 percent and low shrub cover 34 percent. Herb/grass cover ranges from 8 to 90 percent and averages 22 percent.

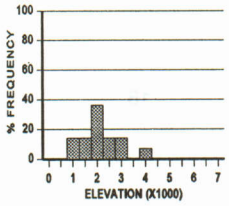
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	50	
Western hemlock	TSHE	76	18	
Understory trees				7
Western hemlock	TSHE	100	36	
Pacific yew	TABR2	94	8	
Douglas-fir	PSME	94	5	
Golden chinquapin	CACH6	94	5	
White fir	ABCO	82	8	
Shrubs				11
Salal	GASH	100	15	
Dwarf Oregongrape	BENE2	100	13	
Baldhip rose	ROGY	88	1	
Pacific blackberry	RUUR	88	1	
Vine maple	ACCI	82	20	
Herbs				18
Round-leaved violet	VIOR	100	1	
Western sword-fern	POMU	94	5	
Western twinflower	LIBOL	94	4	

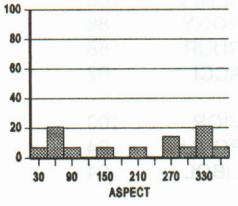
TSHE 44

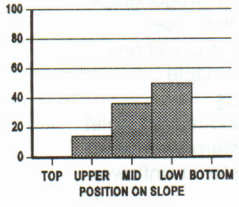
WESTERN HEMLOCK/SALAL/WESTERN SWORD-FERN-SWO
Tsuga heterophylla/Gaultheria shallon/Polystichum munitum
TSHE/GASH/POMU-SWO (N=14; FS=14)

Distribution. This Association occurs predominantly on the Cottage Grove and North Umpqua Ranger Districts, and occasionally on the Tiller Ranger District, Umpqua National Forest. It is likely to occur on the Swiftwater Resource Area of the Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. The Western Hemlock/Salal/Western Sword-fern-SWO Association is present at moderately low elevations. It occurs on warm sites that are often adjacent to streams and moist of the year. Western redcedar is frequent in the overstory. It is also present, and often abundant, in the understory. Pacific yew, also an indicator of humid conditions, is often present along with several fern species. This Association is similar to the Western Hemlock/Dwarf Oregongrape and the Western Hemlock/Oregon Oxalis Plant Associations on the Willamette National Forest (Hemstrom, et. al. 1987).







Soils. Parent material is most commonly andesite and basalt, and occasionally breccia, sandstone, or tephra. Based on eight plots sampled, soils are moderately deep to deep and well drained. Surface textures are loams with 5 to 65 percent rock fragments and 15 to 25 percent clay. Subsurface textures are loams, clay loams, and some clays, with 5 to 80 percent rock fragments. The soil moisture regime may be either udic or xeric and the soil temperature regime is probably mesic. Soils classify into the following subgroups: Typic Hapludalfs, Typic Haploxeralfs, and Typic Haplumbrepts.

Environment. This Association averages 2430 feet in elevation, and aspect is highly variable. Slope averages 52 percent and ranges from 12 to 80 percent. This Association occurs predominantly on lower slopes.

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 30 species. The overstory layer is dominated by Douglas-fir, with western hemlock occurring frequently. Western redcedar is common. All species in the overstory are reproducing in the understory. Additional understory species include Pacific yew and the hardwoods big-leaf maple, red alder, golden chinquapin, and Pacific dogwood. Vine maple is frequently encountered in the shrub layer and is sometimes abundant. Salal and dwarf Oregongrape are also frequent. Western sword-fern is the only herb consistently present. Moss cover is high for the Series, averaging 34 percent.

Upper layer tree cover averages 71 percent. Middle and lower layer tree covers were the highest for the Series, averaging 65 and 56 percent cover, respectively. Shrub cover was low with only 8 percent high shrub cover and 24 percent low shrub cover. Herb/grass cover averages 36 percent.

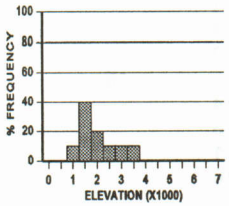
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	47	
Western hemlock	TSHE	86	17	
Western redcedar	THPL	71	8	
Understory trees				6
Western hemlock	TSHE	100	50	
Western redcedar	THPL	100	14	
Golden chinquapin	CACH6	93	4	
Pacific yew	TABR2	86	4	
Shrubs				9
Salal	GASH	100	13	
Vine maple	ACCI	93	18	
Dwarf Oregongrape	BENE2	93	10	
Pacific blackberry	RUUR	93	1	
Red huckleberry	VAPA	79	4	
Snow bramble	RUNI2	79	2	
Herbs				15
Western sword-fern	POMU	100	14	
Western twinflower	LIBOL	86	8	
White trillium	TROV2	79	1	
Oregon oxalis	OXOR	71	10	

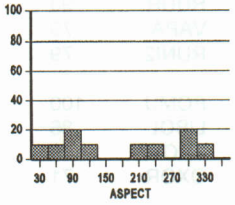
WESTERN HEMLOCK/VINE MAPLE-SALAL-SWO
Tsuga heterophylla/Acer circinatum-Gaultheria shallon
TSHE/ACCI-GASH-SWO (N=10; FS=10)

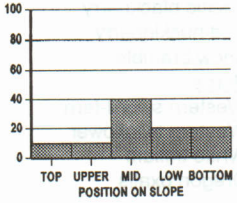
Distribution. This Association is found on all Ranger Districts, Umpqua National Forest and is likely to occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association is present at moderately low elevations. Temperatures are relatively mild. The presence of whipplevine suggests the sites are moderately dry and somewhat rocky.

Soils. Parent material is predominantly basalt and andesite, but may also be rhyolite, tephra, or mixed metamorphosed or sedimentary material. Based on nine plots sampled, soils are deep and well drained. Surface textures are loams and sandy loam with 20 to 60 percent rock fragments and 10 to 23 percent clay. Subsurface textures are clay loam and silt loam with 10 to 75 percent rock fragments. The soil moisture regime can be both udic and xeric and the soil temperature regime is probably mesic. Soils classify into the following subgroups:







Typic and Mollic Haploxeralfs, Typic Udorthents, and Dystric Xerorthents

Environment This Association averages 2180 feet in elevation and aspect is highly variable. Slope is variable and averages 43 percent. The Association occurs predominantly on middle slope positions.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 35. The overstory is dominated by Douglas-fir. Western hemlock has low cover. The understory is dominated by western hemlock with a small amount of western redcedar and Douglas-fir Golden chinquapin and Pacific dogwood are frequent. Vine maple may be an abundant shrub on some sites. In the shrub layer, dwarf Oregongrape, salal, Pacific blackberry, and baldhip rose are frequent. Western sword-fern, western twinflower, vanillaleaf, cutleaf goldthread, white trillium, and white inside-out-flower are frequent in the herb/grass layer. Moss cover is the highest of the Series, averaging over 40 percent.

Upper layer tree cover is very low for the Series, 65 percent; while mid-layer cover is high at 64 percent. Lower layer tree cover is about average. High shrub cover and low shrub cover average 11 and 40 percent, respectively. Herb/grass cover is moderate for the Series at about 22 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	41	
Western hemlock	TSHE	91	9	
White fir	ABCO	55	5	
Understory trees				8
Western hemlock	TSHE	100	43	
Douglas-fir	PSME	100	5	
Western redcedar	THPL	100	2	
Golden chinquapin	CACH6	91	2	
Pacific dogwood	CONU4	82	4	
White fir	ABCO	64	8	
Shrubs				10
Salal	GASH	100	20	
Dwarf Oregongrape	BENE2	100	15	
Vine maple	ACCI	91	22	
Baldhip rose	ROGY	82	1	
Pacific blackberry	RUUR	82	1	
Red huckleberry	VAPA	82	1	
California hazel	COCOC	73	2	
Herbs				18
Western sword-fern	POMU	100	7	
Western twinflower	LIBOL	100	4	
White trillium	TROV2	91	1	
Vanillaleaf	ACTR	91	1	
Cutleaf goldthread	COLA3	82	3	
White inside-out-flower	VAHE	82	1	

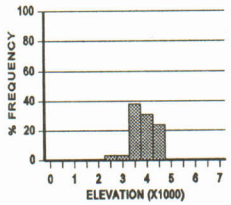
TSHE 48

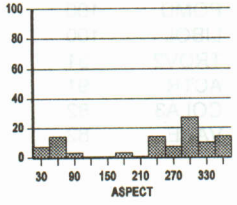
WESTERN HEMLOCK/VINE MAPLE-PACIFIC RHODODENDRON
Tsuga heterophylla/Acer circinatum-Rhododendron macrophyllum
TSHE/ACCI-RHMA3 (N=28; FS=28)

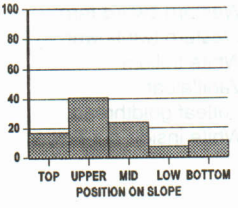
Distribution. This Association occurs on all Ranger Districts of the Umpqua National Forest and on the Prospect Ranger District, Rogue River National Forest.

Distinguishing Characteristics. This Association is present at high elevations which are cool into the spring months. Salal is rarely present, but Pacific rhododendron is almost always present; abundance varies. The cool site indicators white fir and thin-leaved huckleberry are frequently encountered.

Soils. Parent material is most commonly andesite, but may also be basalt, tephra, breccia, highly weathered sandstone, granite, gabbro, or rhyolite. Based on four plots sampled, soils are moderately deep and well drained. Surface textures are loams and silt loams with 10 to 20 percent rock fragments and 10 to 20 percent clay. The subsurface textures are silt loams with 20 to 50 percent rock fragments. The soil moisture regime is probably udic, and the soil temperature regime may be







either mesic or frigid. Soils classify into the following subgroups. Typic Dystrochrepts and Typic Haplumbrepts.

Environment. This Association averages 4040 feet and occurs on most aspects, although rarely on south aspects. Slope averages 36 percent and ranges from 0 to 75 percent. This Association occurs frequently on upper slope positions.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 37 species. The overstory tree layer is dominated by Douglas-fir, with lesser amounts of western hemlock and white fir. Pacific silver fir, incense-cedar, sugar pine, white pine and western redcedar may also be present. In addition to those species in the overstory, Shasta red fir and Pacific yew are also present in the understory. The hardwood component is rich; vine maple, Rocky Mountain maple, Pacific madrone, golden chinquapin, and Pacific dogwood may be present. Vine maple may be dense in some areas. Dwarf Oregongrape, Pacific rhododendron, thin-leaved huckleberry, baldhip rose, and Pacific blackberry are high in constancy. Western twinflower and common prince's-pine occur frequently. In some areas, Oregon oxalis may have high cover, up to 75 percent. Moss cover is very low for the Series, averaging only 7 percent.

Upper layer tree cover is moderate for the Series, averaging 72 percent. Mid-layer tree cover averages 54 percent, and lower layer tree cover 40 percent. High shrub cover is fairly sparse, averaging 18 percent, as is low shrub cover with 28 percent. Herb/grass cover ranges from 3 to 98 percent, with an average of 37 percent.

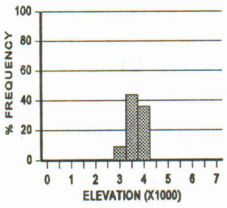
Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	57	
Western hemlock	TSHE	83	11	
Understory trees				5
Western hemlock	TSHE	100	33	
White fir	ABCO	83	4	
Douglas-fir	PSME	72	4	
Pacific yew	TABR2	69	13	
Golden chinquapin	CACH6	52	5	
Shrubs				11
Salal	GASH	100	39	
Pacific rhododendron	RHMA3	96	18	
Dwarf Oregongrape	BENE2	96	10	
Baldhip rose	ROGY	96	1	
Pacific blackberry	RUUR	86	2	
Thin-leaved huckleberry	VAME	86	2	
Dwarf bramble	RULA2	80	4	
Vine maple	ACCI	66	18	
Herbs				21
Common prince's-pine	CHUM	93	3	
Western twinflower	LIBOL	90	7	
Vanillaleaf	ACTR	83	11	
Queen's cup	CLUN2	83	1	
Rattlesnake-plantain	GOOB2	83	1	

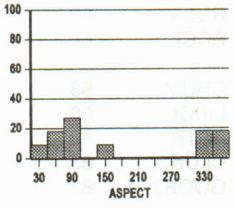
WESTERN HEMLOCK-WHITE FIR/DWARF OREGONGRAPE
Tsuga heterophylla-Abies concolor/Berberis nervosa
TSHE-ABCO/BENE2 (N=11; FS=11)

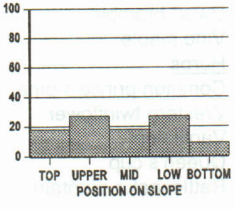
Distribution. This Association occurs on the North Umpqua and Diamond Lake Ranger Districts, Umpqua National Forest, and the Prospect and Butte Falls Ranger Districts, Rogue River National Forest.

Distinguishing Characteristics. This is a cool, dry, high elevation western hemlock association. The cool site indicators thin-leaved huckleberry and slender salal are common. This Association is often adjacent to the White Fir Series.

Soils. The predominant parent material is either basalt or andesite, while ash, pumice, breccia, sandstone, and tephra may be present occasionally. Based on nine plots sampled, soils are moderately deep and well drained. Surface and subsurface textures are loams, sandy loams, and silt loams with 20 to 70 percent rock fragments and 10 to 20 percent clay. The soil moisture regime may be udic or xeric and the soil moisture regime may be mesic or frigid. Soils classify into the







following subgroups: Typic Xerochrepts and Dystrochrepts, Typic Udorthents and Xerorthents.

Environment. This Association averages 3930 feet in elevation and is found predominantly on north and east aspects. Slope averages 30 percent and ranges from 3 to 50 percent. The Association occurs on all slope positions.

Vegetation Composition and Structure. This Association has very high total species richness for the Series, averaging 38. The overstory is dominated by Douglas-fir; western hemlock, white fir, and white pine are common. The understory is dominated by western hemlock, although Douglas-fir is also present. White fir and Pacific yew occur frequently. The most frequently encountered hardwood is golden chinquapin. Vine maple may have up to 30 percent cover. The shrub layer is dominated by dwarf Oregongrape, which may be dense. Slender salal, snow bramble, and creeping snowberry are common; and thin-leaved huckleberry, Pacific blackberry, Oregon boxwood, and baldhip rose are frequent. Western twinflower and common prince's-pine are present in the herb layer. Vanillaleaf and rattlesnake-plantain are frequent, and queen's cup, western starflower, white inside-out-flower, and round-leaved violet are common. Moss cover is low for the Series, averaging 6 percent.

Upper and mid-layer tree cover is relatively low for the Series, averaging 69 and 50 percent cover respectively. Lower layer tree cover is intermediate, averaging 44 percent. High shrub cover is low, averaging only 3 percent while low shrubs are more abundant with 37 percent cover. Total herb cover is intermediate for the Series, averaging 31 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Douglas-fir	PSME	100	27	
Western hemlock	TSHE	73	28	
White fir	ABCO	64	20	
Western white pine	PIMO3	64	10	
Understory trees				6
Western hemlock	TSHE	100	28	
Douglas-fir	PSME	100	5	
White fir	ABCO	91	9	
Pacific yew	TABR2	91	5	
Golden chinquapin	CACH6	82	6	
Western white pine	PIMO3	64	2	
Shrubs				12
Dwarf Oregongrape	BENE2	100	19	
Thin-leaved huckleberry	VAME	100	2	
Baldhip rose	ROGY	91	2	
Pacific blackberry	RUUR	91	2	
Oregon boxwood	PAMY	82	2	
Herbs				19
Western twinflower	LIBOL	100	8	
Common prince's-pine	CHUM	100	5	
Vanillaleaf	ACTR	82	8	

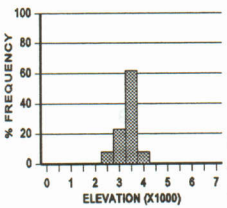
TSHE 52

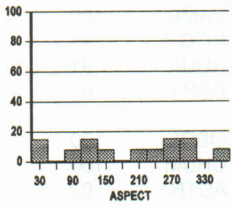
WESTERN HEMLOCK-WHITE FIR/VINE MAPLE-DWARF OREGONGRAPE
Tsuga heterophylla-Abies concolor/Acer circinatum-Berberis nervosa
TSHE-ABCO/ACCI-BENE2 (N=13; FS=13)

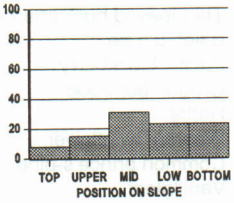
Distribution. This Association is located on the Butte Falls and Prospect Ranger Districts, Rogue River National Forest and on the Diamond Lake Ranger District, Umpqua National Forest.

Distinguishing Characteristics. This is a cool, high elevation plant association. Neither salal, slender salal, nor Pacific rhododendron are present.

Soils. Parent material is most commonly andesite, although basalt, diorite, pumice, ash, and tephra occur occasionally. Based on five plots sampled, soils are moderately deep and well to somewhat excessively well drained. Surface textures are loams and sands, with 5 to 40 percent rock fragments and 3 to 17 percent clay. Subsurface textures are sandy loams and silt loams with 2 to 40 percent rock fragments. The soil moisture regime is probably xeric and the soil temperature







regime can be mesic or frigid. Soils classify into the following subgroups. Typic Xerumbrepts, Typic Xerorthents, and Typic Xeropsamments.

Environment. This Association averages 3500 feet in elevation and aspect is highly variable. Slope averages 28 percent and ranges from 2 to 60 percent Occurrence is most often on middle to lower slopes and valley bottoms

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 37 species. The overstory is dominated by Douglas-fir and white fir is encountered on most plots. Sugar pine is common. The understory contains western hemlock and white fir. Incense-cedar is common and Pacific yew frequent. In some areas hardwoods are abundant; for example, vine maple can be very dense. Pacific dogwood is frequent, and golden chinquapin is commonly encountered. The shrub layer is dominated by dwarf Oregongrape. California hazel, baldhip rose, and Pacific blackberry are frequently encountered. Western twinflower can reach up to 30 percent cover in the herb layer. Moss cover averages 10 percent.

Upper layer tree cover is intermediate for the Series averaging 67 percent, mid-layer cover, 49 percent, and lower layer tree cover, 32 percent. High shrub and low shrub covers are intermediate for the Series, averaging 23 and 43 percent, respectively. Total herb/grass cover averages 32 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				4
Douglas-fir	PSME	100	46	
White fir	ABCO	92	9	
Western hemlock	TSHE	77	4	
Sugar pine	PILA	62	4	
Understory trees				7
Western hemlock	TSHE	100	27	
White fir	ABCO	100	11	
Douglas-fir	PSME	100	4	
Pacific yew	TABR2	92	8	
Pacific dogwood	CONU4	85	4	
Incense-cedar	CADE27	77	4	
Golden chinquapin	CACH6	69	10	
Shrubs				10
Dwarf Oregongrape	BENE2	100	19	
Pacific blackberry	RUUR	92	5	
Baldhip rose	ROGY	92	1	
California hazel	COCOC	85	6	
Creeping snowberry	SYMO	77	2	
Herbs				19
Western twinflower	LIBOL	100	11	
Common prince's-pine	CHUM	100	7	
Rattlesnake-plantain	GOOB2	85	1	
Threeleaf anemone	ANDE3	77	1	
Oregon fairybell	DIHOO	77	1	
Whitevein pyrola	PYPI2	77	1	
Western starflower	TRLA6	77	1	

WESTERN REDCEDAR SERIES

WESTERN REDCEDAR SERIES

Thuja plicata
THPL

Diane E. White

The Western Redcedar Series has both an interior range and a coastal range in western North America. The interior range includes the north half of Idaho, fringes of western Montana west of the continential divide, and the southeastern corner of British Columbia. The coast range extends further, both north and south. It begins at the southern-most tip of southeastern Alaska, and continues through western Washington and Oregon west of the Cascade Mountain crest. In southwestern Oregon, the Series occurs on the Cottage Grove, North Umpqua, and Diamond Lake Ranger Districts, Umpqua National Forest.

In southwestern Oregon, the Western Redcedar Series nearly always has a major component of western hemlock This Series occurs in areas that average 48 F in temperature and 64 inches in rainfall

The Western Redcedar Series in southwestern Oregon is represented by one plant association, the Western Redcedar/Dwarf Oregongrape/Western Sword-fern Association.

The relationship of draft and final plant associations in the Western Redcedar Series is shown below. The draft associations are listed, with the final associations below each, in order of most to least common, with the percentage of plots that make up each association

THPL/RHMA3/LIBOL (N=2)
TSHE-THPL/RHMA3 (50%)
TSHE/GASH/POMU-SWO (50%)

THPL/WHMO/ANDE (N=7)
THPL/BENE2/POMU (57%)
TSHE/GASH-RHMA3-SWO (14%)
PSME/ACCI-BENE2 (14%)
ABCO/RHMA3-BENE2 (14%)

THPL 2

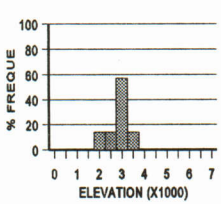
WESTERN REDCEDAR/DWARF OREGONGRAPE/WESTERN SWORD-FERN
Thuja plicata/Berberis nervosa/Polystichum munitum
THPL/BENE2/POMU (N=7; FS=7)

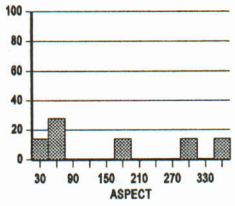
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Diamond Lake Ranger Districts, Umpqua National Forest and probably the Roseburg District, Bureau of Land Management.

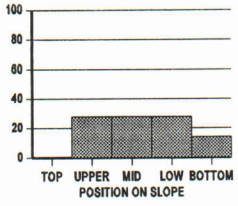
Distinguishing Characteristics. This Association occurs at low to intermediate elevations in moist areas.

Soils. Parent material is primarily basalt, with infrequent occurrences on breccia and rhyolite. Soil data are not available.

Environment. This Association averages 2970 feet in elevation and aspect is predominantly north and east. Slope averages 37 percent and ranges between 5 and 52 percent. This Association rarely occurs on ridge top slope positions.







Vegetation Composition and Structure Total species richness is very high compared with associations in the Western Hemlock Series, and averages 36 The overstory is dominated by Douglas-fir, while western hemlock and western redcedar are common Western redcedar is dominant in the understory. Western hemlock is present, but at lower covers Small amounts of Pacific yew are common Hardwoods may be abundant, vine maple, for example, is frequently encountered and may be dense in some areas Bigleaf maple, golden chinquapin, and Pacific dogwood are common Dwarf Oregongrape, salal, and Pacific rhododendron are present in the shrub layer. Any of these species can be dense in an area Red huckleberry is a frequent associate Western sword-fern, three-leaf anemone, and Oregon fairybell are consistently present in the herb/grass layer, but at low covers Moss cover is very high compared with plant associations in the Western Hemlock Series, averaging 42 percent

Upper layer tree cover is high compared with plant associations in the Western Hemlock Series, averaging 75 percent Mid-layer tree cover is intermediate averaging 60 percent cover, and lower layer tree cover is very high, averaging 58 percent High shrub cover averages 23 percent and low shrub cover is dense, averaging 64 percent Herb/grass cover is intermediate, averaging 24 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	53	
Western hemlock	TSHE	71	5	
Understory trees				8
Western redcedar	THPL	100	26	
Western hemlock	TSHE	100	12	
Douglas-fir	PSME	86	3	
White fir	ABCO	71	4	
Shrubs				11
Dwarf Oregongrape	BENE2	100	26	
Salal	GASH	100	26	
Red huckleberry	VAPA	86	3	
Pacific rhododendron	RHMA3	71	18	
Herbs				19
Western sword-fern	POMU	100	6	
Three-leaf anemone	ANDE3	100	1	
Oregon fairybell	DIHOO	100	1	
Western twinflower	LIBOL	86	9	
Whipplevine	WHMO	86	4	
Western starflower	TRLA6	86	1	
White trillium	TROV2	86	1	

PORT-ORFORD-CEDAR SERIES

PORT-ORFORD-CEDAR SERIES

Chamaecyparis lawsoniana

CHLA

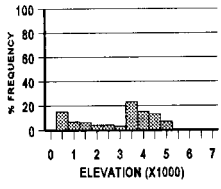
Vince Randall

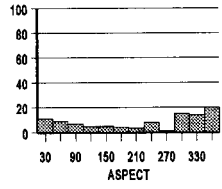
Lands climax to Port-Orford-cedar were classified into eight plant associations Most plots were located in Oregon However, observations indicate that application in northern California is limited. Thomas Jimerson's (1994) Port-Orford-cedar guide should be consulted for areas south of the Siskiyou crest that divides the Rogue and Klamath basins

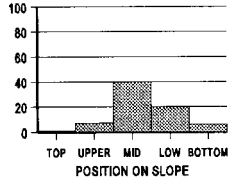
Port-Orford-cedar, a member of the Cupressaceae family, occupies a restricted range, compared to most northwest conifers. Its range somewhat coincides with the Klamath Geological Province, which roughly forms a square with Coos Bay, Eureka, Redding, and Roseburg as the corners Except for an isolated population near Mount Shasta, inland stands, east of the Coast Range crest are uncommon They occur where moisture stress is dampened by summer fog (topographically protected drainages, on north aspects)

North of the California border, Port-Orford-cedar occurs throughout the landscape In the Powers, Coos Bay area, it commonly occurs on upper slope topographic positions Inland it is rarely found on ridges or upper slope positions, density increases toward the lower slope positions and bottoms In northern California, populations are mostly associated with bottoms and lower slope positions (Jimerson, 1994) Throughout its range, Port-Orford-cedar occurs on ultramafic parent material, particularly where the water table is close to the surface (perched) Scattered, perched water tables are characteristic of ultramafic parent material The Port-Orford-Cedar/Huckleberry Oak/Common Beargrass and the Port-Orford-Cedar/Hairy Honeysuckle/Fescue Associations often occur on perched water tables

The Port-Orford-Cedar Series is most common west of the Coast Range crest, but is associated with lower third to bottoms or moist ultrabasic material inland Coastal sites are low, averaging less than 1500 feet, inland sites average about 3500 feet

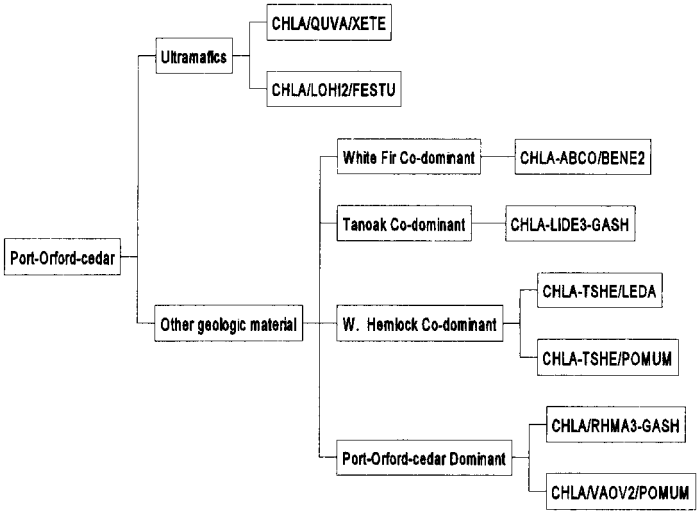






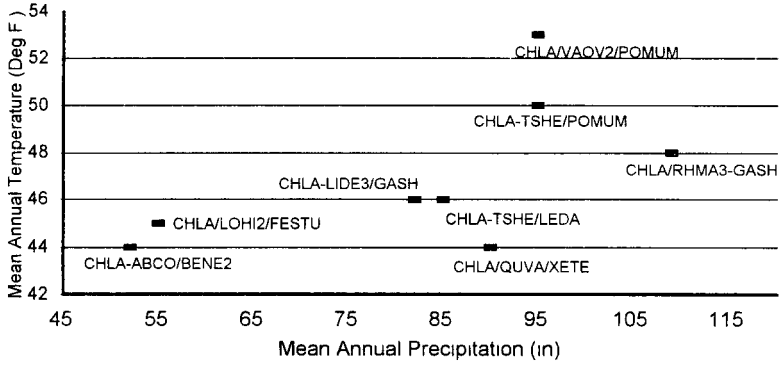
CHLA 2

The Series can be divided into associations occuring on ultramafic parent material, those co-climax with other species, and those dominated by Port-Orford-cedar The diagram below illustrates the relationship among the associations



The "Other geologic material" fork is arranged from cold, dry to warm, wet The Port-Orford-cedar-White Fir/Dwarf Oregongrape Association is at the upper limits of the Series, where cold limits survival, growth, and reproduction The Port-Orford-cedar-Tanoak/Salal Association intergrades with the Tanoak Series in the hotter, drier

Environmental Graph



environments The Western Hemlock group, including the Port-Orford-cedar-Western Hemlock/Sierra-laurel Association, and the Port-Orford-cedar-Western Hemlock/Western Sword-fern Association, intergrades with the Western Hemlock Series at the warm, wet extreme for the Port-Orford-Cedar Series

Port-Orford-cedar root rot, *Phytophtera lateralis*, introduced into the northwest early in this century (infections were first found in southwest Oregon about 40 years ago) is thought to be fatal to Port-Orford-cedar Infected trees occur along streams, roads, and are sparsely scattered throughout the landscape However, survivors are often found within infected areas, indicating the possibility of resistance or uneven distribution of the pathogen (spores) We have not yet determined the reasons for the existence of these survivors, but resistance, if it does exist, may be related to plant association For example, the drier associations seem to be less susceptible to infection

Page CHLA 3 below shows the relationship of draft and final plant associations Draft associations are underlined and final associations are listed below in the order they most likely fall into the final associations This cross reference could be used to determine how sites keyed with the draft should fall into the final classification However re-keying in the field or running existing species information through the final key is recommended

CHLA/BENE/ACTR N=4
CHLA-ABCO/BENE2 (100%)

CHLA/BENE/LIBOL N=10
CHLA-ABCO/BENE2 (85%)
CHLA/QUVA/XETE (15%)

CHLA/GABU N=2
LIDE3-PIMO3/QUVA/XETE (50%)
PIMO3-LIDE3/QUVA/XETE (50%)

CHLA/GASH N=15
CHLA/RHMA3-GASH (67%)
CHLA-ABCO/BENE2 (33%)

LITERATURE CITED

Jimerson, T M 1994 A Field Guide To Port Orford Cedar Plant Associations In Northwest California USDA Forest Service, Six Rivers National Forest, Eureka, CA 109 p

KEY TO THE PORT-ORFORD-CEDAR PLANT ASSOCIATIONS

1a Vegetation dominated by ultramafic parent material, or soils with ultramafic influence (Serpentine, Peridotite) 2

1b Vegetation not as above 3

2a Huckleberry oak (QUVA), common beargrass, and whitevein pyrola (PYPI2) present CHLA/QUVA/XETE Page CHLA 6

2b Huckleberry oak (QUVA), common beargrass (XETE), and whitevein pyrola (PYPI2) absent Hairy honeysuckle (LOHI2) and fescue (FESTU) present (Usually found on shallow ultramafic soils) CHLA/LOHI2/FESTU Page CHLA 8

3a Area usually between the Pistol River and 4 Mile Creek within twenty miles of the ocean, at less than 1,000 feet elevation Western sword-fern (POMUM) present with at least 25% cover Fragrant bedstraw (GATR3) usually present at 5% cover Salmonberry (RUSP) is common CHLA/VAOV2/POMUM Page CHLA 10

3b Western hemlock (TSHE), tanoak (LIDE3), or white fir (ABCO) seldom codominant or subdominant to Port-Orford-cedar (CHLA) in the understory and/or overstory layers Pacific rhododendron (RHMA3) and salal (GASH) frequently dominate the shrub layer (Areas are mainly found scattered along the western flank of the coastal crest, although they can occasionally be seen widely scattered on the east side of the Siskiyous) CHLA/RHMA3-GASH Page CHLA 12

3c Western hemlock (TSHE), tanoak (LIDE3), or white fir (ABCO) present and codominant or subdominant to Port-Orford-cedar (CHLA) in the understory and/or overstory layer 4

4a Tanoak (LIDE3) found codominant or subdominant to Port-Orford-cedar in the understory Salal (GASH), dwarf Oregongrape (BENE2), and red huckleberry (VAPA) frequently found in the shrub layer (Areas are usually found east of the coastal crest between 2,400 and 4,100 feet elevation) CHLA-LIDE3/GASH Page CHLA 14

4b White fir (ABCO) present and codominant or subdominant to Port-Orford-cedar (CHLA) in the understory Dwarf Oregongrape (BENE2) present, rattlesnake-plantain (GOOB2), western twinflower (LIBOL), and western starflower (TRLA6) frequently present. (Areas are usually found in or near the eastern half of the Illinois Valley Ranger District of the Siskiyou National Forest above 3,000 feet elevation) CHLA-ABCO/BENE2 Page CHLA16

4c Western hemlock (TSHE) codominant or subdominant to Port-Orford-cedar (CHLA) in the understory and/or the overstory 5

5a Western hemlock (TSHE) present and codominant or subdominant to Port-Orford-cedar in the understory Western swordfern (POMUM), Oregon oxalis (OXOR), dwarf Oregongrape (BENE2), and salal (GASH) present (Area is usually in or near the Powers Ranger District of the Siskiyou National Forest, less than 3,200 feet elevation) CHLA-TSHE/POMUM Page CHLA 18

5b Western hemlock (TSHE) frequently present and codominant or subdominant to Port-Orford-cedar in the understory Sierra-laurel (LEDA) and salal (GASH) frequently present (Area is usually within the upper reaches of Silver Creek and Howard Creek on the Siskiyou National Forest, above 3,200 feet) CHLA-TSHE/LEDA Page CHLA 20

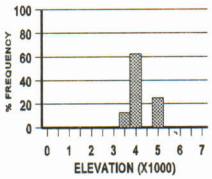
CHLA 6

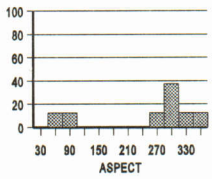
PORT-ORFORD-CEDAR/HUCKLEBERRY OAK/COMMON BEARGRASS
Chamaecyparis lawsoniana/Quercus vaccinifolia/Xerophyllum tenax
CHLA/QUVA/XETE (N=8; BLM=5, FS=3)

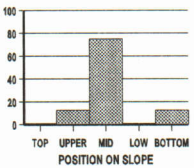
Distribution. This Association occurs along Chrome Ridge on the Galice Ranger District, near Black Butte on the Illinois Valley Ranger District, and near Snow Camp Meadow on the Gold Beach Ranger District, Siskiyou National Forest. It may also be found on other ultramafically influenced areas within southwest Oregon.

Distinguishing Characteristics. This Association is one of the highest in elevation. It is moist and cool with a mean annual temperature of 44 degrees F and mean annual precipitation of 90 inches. Huckleberry oak, common beargrass, and whitevein pyrola are consistently present.

Soils. Parent material is a mixture of intrusive volcanics and ultramafics. Average surface rock fragment cover is 32 percent, with 14 percent gravel and 4 percent bareground exposed. Soils are shallow to deep, with an average depth of greater than 28 inches. Soil texture is silt loam or sandy loam, with some silty clay. Average







rock fragment content is 58 percent, with 21 percent gravel and up to 46 percent cobbles and stones

Environment Elevation averages 4150 feet This Association is found primarily in northwest aspects Slopes average 43 percent and range from 15 to 65 percent The dominant slope position is midslope, but this Association is also found in lower slope positions, as well as upper slopes with perched water tables

Vegetation Composition and Structure Total species richness, intermediate for the series, averages 28 species The overstory is dominated by Douglas-fir and Port-Orford-cedar The understory is dominated by Port-Orford-cedar Douglas-fir, white fir, and western white pine are frequently present Jeffery pine is less common Huckleberry oak, red huckleberry, common beargrass, and whitevein pyrola are frequently present Moss cover averages 5 percent

On the Forest Service sites, upper layer tree cover is low, averaging 50 percent Mid-layer tree cover is intermediate, averaging 50 percent while the lower layer tree cover averages 15 percent, also intermediate for the Series High shrub cover is low, averaging 17 percent and low shrub cover is high, averaging 31 percent Total herb cover is low, averaging 18 percent

On the Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) averages 39 percent, while cover for trees less than 10 feet tall averages 10 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 58 percent, with cover for shrubs less than 20 inches tall averaging 49 percent Herb cover averages 13 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	88	27	
Port-Orford-cedar	CHLA	88	16	
Understory trees				6
Port-Orford-cedar	CHLA	100	8	
Douglas-fir	PSME	100	1	
White fir	ABCO	75	4	
Western white pine	PIMO3	63	3	
Shrubs				7
Huckleberry oak	QUVA	100	30	
Red huckleberry	VAPA	88	8	
Pinemat manzanita	ARNE	75	34	
Baldhip rose	ROGY	63	3	
Sadler oak	QUSA2	50	25	
Box-leaved silk-tassel	GABU2	50	10	
Herbs				12
Common beargrass	XETE	100	11	
Whitevein pyrola	PYPI2	100	1	
Western fescue	FEOC	75	2	
Rattlesnake-plantain	GOOB2	75	1	
Western starflower	TRLA6	63	1	
Whipplevine	WHMO	50	1	

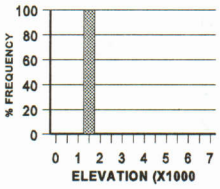
CHLA 8

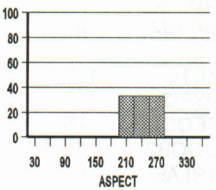
PORT-ORFORD-CEDAR/HAIRY HONEYSUCKLE-FESCUE
Chamaecyparis lawsoniana/Lonicera hispidula/Festuca
CHLA/LOHI2/FESTU (N=3; BLM=3)

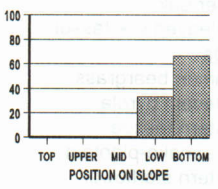
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest and the Ashland Resource Area of the Medford District, Bureau of Land Management. This Association may also occur on the Ashland Ranger District, Rogue River National Forest.

Distinguishing Characteristics. This is a relatively low elevation Port-Orford-cedar Association found solely on shallow soils derived from ultramafic parent material. It is dry and warm with a mean annual temperature of 45 degrees F and mean annual precipitation of 55 inches. Port-Orford-cedar is present in both the overstory and understory, with a combined cover exceeding 28 percent.

Soils. Parent material consists of ultramafic materials. Soils are mostly shallow, with an average depth of 11 inches. Based on three plots sampled, soil texture is silty clay, with 12 percent rock fragments, most of which is gravel (averaging 8 percent).







Environment Elevation averages 1690 feet This Association is found primarily on southwest aspects, near or in wetlands Slopes average 22 percent and range from 14 to 35 percent This Association may also be found on the lower third of slopes in areas with perched water tables

Vegetation Composition and Structure Total richness, low for the series, averages 18 species The overstory is dominated by Port-Orford-cedar The understory is dominated by Port-Orford-cedar, with Douglas-fir, Jeffrey pine and sugar pine common California black oak occurs on about 30 percent of the sites Fescue dominates the herbaceous layer with an average of 45 percent cover Hairy honeysuckle, sickleleaf onion, and obscure bedstraw are frequently found with individual species averaging two percent cover Western azalea is common, averaging greater than 30 percent cover California pitcher-plant is occasionally found, averaging greater than 20 percent cover Moss cover averages nine percent

Cover for trees greater than 10 feet tall (3 meters) averages 57 percent, while cover for trees less than 10 feet tall averages 23 percent Cover for shrubs greater than 20 inches (50 centimeters) tall averages three percent Cover for shrubs less than 20 inches tall averages 38 percent Herb cover averages 59 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Port-Orford-cedar	CHLA	100	9	
Douglas-fir	PSME	33	20	
Sugar pine	PILA	33	13	
Understory trees				4
Port-Orford-cedar	CHLA	100	19	
Douglas-fir	PSME	100	13	
Sugar pine	PILA	67	13	
Jeffrey pine	PIJE	67	13	
California black oak	QUKE	33	50	
Shrubs				2
Hairy honeysuckle	LOHI2	100	3	
Western azalea	RHOC	67	55	
Poison oak	RHDI6	33	3	
Hoary manzanita	ARCA5	33	2	
Herbs				10
Fescue	FESTU	100	45	
Sickleleaf onion	ALFA3	100	2	
Obscure bedstraw	GAAM2	100	2	
Spatula-leaf stonecrop	SESP	67	2	
California pitcher-plant	DACA3	33	22	
Carex ssp	CAREX	33	10	
Howell's horkelia	HOSE	33	3	
Snow-queen	SYRE	33	2	

CHLA 10

PORT-ORFORD-CEDAR/EVERGREEN HUCKLEBERRY/WESTERN SWORD-FERN
Chamaecyparis lawsoniana/Vaccinium ovatum/Polystichum munitum munitum
CHLA/VAOV2/POMUM (N=15, NRCS=15)

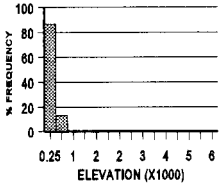
Picture not available

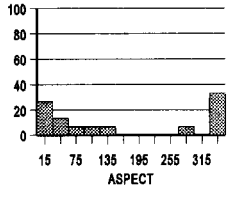
Distribution This Association occurs on the Coos Bay District, Bureau of Land Management, and the Gold Beach Ranger District, Siskiyou National Forest

Distinguishing Characteristics This Association is the lowest and furthest west of all Port-Orford-cedar associations Sites are located near the coast between the Pistol River and 4 Mile Creek Only one site greater than 10 miles inland of the Pacific Ocean is known This Association is the warmest, averaging 53 degrees F, and among the wettest, with 95 inches of precipitation annually

Soils Soils data are not available

Environment Elevation averages 265 feet, with a range from 32 to 853 feet This Association is generally found on northerly aspects with slopes averaging 28 percent, between a range of 1 to 60 percent





Soils data are not available

Vegetation Composition and Structure Total species richness, intermediate for the series, averages 23 species The overstory is dominated by Douglas-fir Port-Orford-cedar dominates the understory with an average of 16 percent cover California-laurel, western hemlock, and tanoak are also common, but with low covers Western sword-fern is present with classes* averaging greater than 25 percent Fragrant bedstraw, evergreen huckleberry, salmonberry, and western starflower are frequently found with individual species covers averaging greater than ten percent

Common name	Code	Constancy	*Class	Avg Richness
Overstory trees				2
Douglas-fir	PSME	93	65	
Port-Orford-cedar	CHLA	47	11	
California-laurel	UMCA	40	10	
Understory trees				4
Port-Orford-cedar	CHLA	100	16	
Western hemlock	TSHE	67	7	
California-laurel	UMCA	53	8	
Tanoak	LIDE3	53	8	
Shrubs				5
Evergreen huckleberry	VAOV2	80	22	
Salmonberry	RUSP	73	18	
Red huckleberry	VAPA	67	15	
Pacific rhododendron	RHMA3	67	15	
Dwarf Oregongrape	BENE2	60	11	
Thimbleberry	RUPA	47	6	
Salal	GASH	40	18	
Poison oak	RHDI6	40	13	
Herbs				11
Western sword-fern	POMUM	100	45	
Fragrent bedstraw	GATR3	93	11	
Western starflower	TRLA6	73	11	
Serbian montia	MOSIS	60	19	
Redwoods violet	VISE3	53	14	
Braken	PTAQ	53	8	
Bearded fescue	FESU	53	8	
Nettle-leaf horse-mint	AGUR	47	14	
Bromus ssp	BROMUS	47	11	
Oregon oxalis	OXOR	40	19	

* Percent cover was converted from NRCS dominance ratings as follows
Dominance Rating = Percent Cover 1 = 5%, 2 = 15%, 3 = 30%, 4 = 50%, 5 = 70%

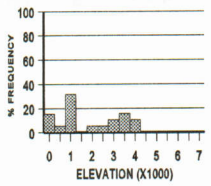
CHLA 12

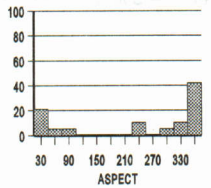
PORT-ORFORD-CEDAR/PACIFIC RHODODENDRON-SALAL
Chamaecyparis lawsoniana/Rhododendron macrophyllum-Gaultheria shallon
CHLA/RHMA3-GASH (N=19; NRCS=10, FS=9)

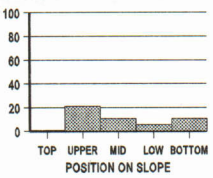
Distribution. This Association has the widest distribution of the Series. Sites are scattered from the coastal town of Langlois, Oregon, to Number 8 Gulch on the east side of the Illinois Valley Ranger District, Siskiyou National Forest. However, about 80 percent of the sites are located west of the coastal crest.

Distinguishing Characteristics. This Association is the wettest of the Series, with a mean annual precipitation of 109 inches. It is also among the warmest, with a mean annual temperature of 48 degrees F. A dense shrub layer of Pacific rhododendron, salal, dwarf Oregongrape, and/or evergreen huckleberry often dominate this Association with their high covers.

Soils. Forest Service plot data indicates variable parent material including andesite, basalt, schist, diorite, sandstone, conglomerate, and serpentine. Average surface rock fragment cover is 23 percent, with 12 percent gravel. Soils are moderately deep to deep, with an average depth of greater than 41 inches.







Environment Elevation averages 1834 feet. This Association is found primarily on northerly aspects Slopes average 30 percent and range from one to 70 percent The dominant slope position is upper slope, but this Association occurs on lower slope positions as well

Vegetation Composition and Structure Total species richness, intermediate for the series, averages 22 species The overstory is dominated by Douglas-fir, Port-Orford-cedar is common. The understory is dominated by Port-Orford-cedar with tanoak and Douglas-fir common Pacific rhododendron and salal occur frequently with dwarf Oregongrape, red huckleberry, and evergreen huckleberry common Common beargrass often has the highest cover on the site. Moss cover averages 22 percent

Forest Service data indicate that upper layer tree cover is high for the Series, averaging 70 percent Mid-layer cover is high, averaging 48 percent while lower layer tree cover averages 42 percent, also high for the Series. High shrub cover is intermediate, averaging 36 percent and low shrub cover is high, averaging 76 percent Total herb cover is low, averaging 10 percent

Common name	Code	Constancy	*Class	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	52	
Port-Orford-cedar	CHLA	74	25	
Understory trees				5
Port-Orford-cedar	CHLA	100	23	
Tanoak	LIDE3	68	11	
Douglas-fir	PSME	58	4	
Western hemlock	TSHE	42	18	
Golden chinquapin	CACH2	42	4	
Sugar pine	PILA	42	3	
Shrubs				6
Pacific rhododendron	RHMA3	95	45	
Salal	GASH	89	47	
Dwarf Oregongrape	BENE2	74	15	
Red huckleberry	VAPA	68	4	
Evergreen huckleberry	VAOV2	53	29	
Sadler oak	QUSA2	21	24	
Herbs				7
Rattlesnake-plantain	GOOB2	74	4	
Common beargrass	XETE	63	11	
Western sword-fern	POMUM	58	6	
Braken	PTAQ	58	4	
Western starflower	TRLA6	53	2	
Common prince's-pine	CHUM	47	7	
Little prince's-pine	CHME	42	5	

* Percent cover was converted from NRCS dominance ratings as follows
Dominance Rating = Percent Cover 1 = 5%, 2 = 15%, 3 = 30%, 4 = 50%, 5 = 70%

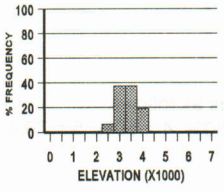
CHLA 14

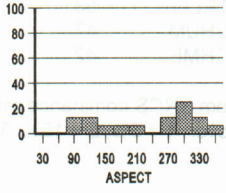
PORT-ORFORD-CEDAR-TANOAK/SALAL
Chamaecyparis lawsoniana-Lithocarpus densiflorus/Gaultheria shallon
CHLA-LIDE3/GASH (N=16; BLM=16)

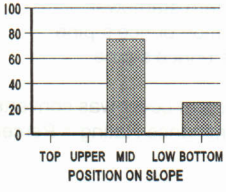
Distribution. This Association occurs in the upper reaches of Silver and Howard Creek watersheds in the Grants Pass Resource Area, Medford District , Bureau of Land Management and in the Galice Ranger District, Siskiyou National Forest. Sites can also be found near Little Sugarloaf Peak on the Illinois Valley Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association is environmentally similar to the Port-Orford-cedar-Western hemlock/Sierra-laurel Association, averaging 46 degrees F and 82 inches of precipitation annually. It is the only Association where tanoak is codominant with Port-Orford-cedar in the understory, and western hemlock is absent in the overstory.

Soils. The dominant parent material is a mixture of intrusive volcanic, metavolcanic, (including ultrabasics), and metasediments. Soils are moderately deep, averaging







more than 15 inches in depth Soil texture is mainly silt loam, with some sandy loam, and clay loam Average rock fragment content is 51 percent, 33 percent of which is gravel

Environment Elevation averages 3330 feet This Association is generally found at midslope on all aspects, except northeast Slopes average 38 percent with a range of 15 to 77 percent

Vegetation Composition and Structure Total species richness, intermediate for the series, averages 22 species The overstory is dominated by Douglas-fir and Port-Orford-cedar Port-Orford-cedar dominates the understory with an average of 22 percent cover Tanoak is the next most common species, averaging 15 percent cover Douglas-fir and white fir are commonly found in the understory, but with low covers Salal is frequently found, cover averages 46 percent Dwarf Oregongrape and red huckleberry are frequently present with covers averaging four percent Western twinflower, western starflower, little prince's-pine and whipplevine are common, with low covers Moss cover averages 6 percent

Tree cover exceeding 10 feet (3 meters) averages 86 percent while cover for tree species less than ten feet tall averages 28 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 43 percent and cover for shrubs less than 20 inches tall averages 27 percent Herb cover averages 11 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				2
Douglas-fir	PSME	94	39	
Port-Orford-cedar	CHLA	94	32	
Sugar pine	PILA	31	8	
Understory trees				5
Port-Orford-cedar	CHLA	100	22	
Tanoak	LIDE3	94	15	
Douglas-fir	PSME	69	5	
White fir	ABCO	50	8	
Canyon live oak	QUCH2	38	3	
Golden chinquapin	CACH6	31	7	
Shrubs				5
Salal	GASH	81	46	
Dwarf Oregongrape	BENE2	75	6	
Red huckleberry	VAPA	75	4	
Pacific rhododendron	RHMA3	50	18	
Sadler oak	QUSA2	44	20	
Western azalea	RHOC	44	11	
Herbs				9
Western twinflower	LIBOL	69	4	
Western starflower	TRLA2	63	1	
Little Prince's-pine	CHME	56	1	
Whipplevine	WHMO	56	1	
Western sword-fern	POMU	44	4	

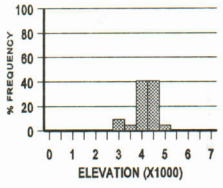
CHLA 16

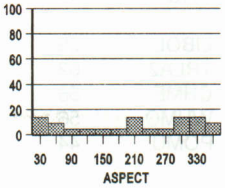
PORT-ORFORD-CEDAR-WHITE FIR/DWARF OREGONGRAPE
Chamaecyparis lawsoniana-Abies concolor/Berberis nervosa
CHLA-ABCO/BENE2 (N=22; FS=13, BLM=9)

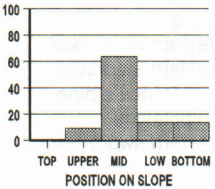
Distribution. This Association occurs in the eastern half, Illinois Valley Ranger District, Siskiyou National Forest, and the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may also occur on the Applegate Ranger District, Rogue River National Forest, and the Happy Camp Ranger District, Klamath National Forest.

Distinguishing Characteristics. This high elevation Association is the coolest and driest of the Port-Orford-cedar associations, averaging 44 degrees F and 52 inches of precipitation annually. It is the only association in which white fir is codominant with Port-Orford-cedar in the understory.

Soils. Parent material is a mix of andesite and basalt, granitics and diorite. Soils can be shallow to deep, averaging 30 inches in depth. Soil textures are mainly silty







clay and sandy loam, with some silty clay loam Average rock fragment content is 32 percent; gravel size particles average 32 percent

Environment Elevation averages 4165 feet This Association is found on all aspects Slopes average 34 percent, ranging from 8 to 68 percent. The slope position is mainly midslope, although it ranges from upper thirds to bottoms

Vegetation Composition and Structure Total richness, high for the series, averages 32 species The overstory is dominated by Douglas-fir and Port-Orford-cedar Port-Orford-cedar and white fir dominate the understory with an average cover of 30 and 10 percent, respectively Dwarf Oregongrape averages four percent cover Rattlesnake-plantain, western twinflower, and western starflower are frequently present in the species-rich herbaceous layer. Moss cover averages 11 percent

On Forest Service sites upper layer tree cover is high, for the series, averaging 70 percent. Mid-layer tree cover is also high, averaging 51 percent, while lower layer tree cover is intermediate, averaging 32 percent High shrub cover is low, averaging three percent, and low shrub cover is intermediate, averaging 11 percent Herb cover averages 32 percent

On Bureau of Land Management sites, tree cover exceeding 10 feet (3 meters) tall averages 80 percent, while cover for tree species less than 10 feet tall, averages 27 percent Cover for shrubs greater than 20 inches (50 centimeters) tall averages 6 percent, and cover for shrubs less than 20 inches tall averages 20 percent Herb cover averages 27 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory				3
Douglas-fir	PSME	100	37	
Port-Orford-cedar	CHLA	95	30	
White fir	ABCO	68	8	
Understory				5
Port-Orford-cedar	CHLA	100	30	
White fir	ABCO	100	10	
Pacific yew	TABR2	59	5	
Douglas-fir	PSME	55	7	
Golden chinquapin	CACH6	50	6	
Shrubs				6
Dwarf Oregongrape	BENE2	100	4	
Baldhip rose	ROGY	77	2	
Red huckleberry	VAPA	55	4	
Pacific blackberry	RUUR	50	2	
California hazel	COCOC	36	2	
Thin-leaved huckleberry	VAME	32	1	
Herbs				18
Rattlesnake-plantain	GOOB2	86	1	
Western twinflower	LIBOL	82	4	
Western starflower	TRLA6	82	1	
White trillium	TROV2	73	1	
Little prince's-pine	CHME	73	1	

CHLA 18

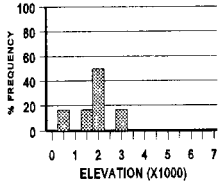
PORT-ORFORD-CEDAR-WESTERN HEMLOCK/WESTERN SWORD-FERN
Chamaecyparis lawsoniana-Tsuga heterophylla/Polystichum munitum
CHLA-TSHE/POMU (N=6, FS=6)

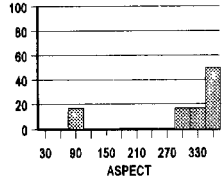
Picture not available

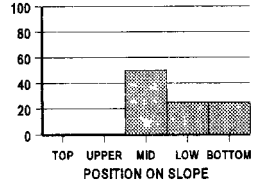
Distribution This Association occurs on the Powers Ranger District, Siskiyou National Forest It may also be found on the Myrtlewood Resource Area, Coos Bay District, Bureau of Land Management, and the Gold Beach Ranger District, Siskiyou National Forest

Distinguishing Characteristics This Association is warmer and wetter than most Port-Orford-cedar associations, averaging 50 degrees F and 95 inches of precipitation annually It is the only association dominated by western sword-fern in the herb layer

Soils The dominant parent material is sandstone, and occasionally diorite Average surface rock fragment cover is 19 percent, with 6 percent gravel Soils are moderately deep to deep, averaging greater than 45 inches







Environment Elevation averages 1810 feet This Association is generally found on northerly aspects with slopes averaging 43 percent, with a range of 10 to 80 percent Slope position ranges from midslope to bottoms

Vegetation Composition and Structure Total species richness, high for the series, averages 30 species The overstory is dominated by Douglas-fir and Port-Orford-cedar Port-Orford-cedar, western hemlock, and Douglas-fir dominate the understory with an average cover of 33, 13, and 3 percent, respectively Tanoak is frequently found, averaging 6 percent cover Dwarf Oregongrape, salal, and red huckleberry are all present with moderate to low covers Pacific rhododendron and evergreen huckleberry are frequently found as well Western sword-fern and Oregon oxalis are present, usually dominating the herbaceous layer Moss cover averages 28 percent

Upper layer tree cover is high for the series, averaging 77 percent Mid-layer tree cover is high, averaging 61 percent, while the lower layer tree cover is intermediate, averaging 43 percent High shrub cover is low, averaging 13 percent and low shrub cover is intermediate, averaging 23 percent Herb cover averages 66 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory				3
Douglas-fir	PSME	100	52	
Port-Orford-cedar	CHLA	100	16	
Western hemlock	TSHE	50	10	
Understory				6
Port-Orford-cedar	CHLA	100	33	
Western hemlock	TSHE	100	13	
Douglas-fir	PSME	100	3	
Tanoak	LIDE3	83	6	
Shrubs				7
Dwarf Oregongrape	BENE2	100	11	
Salal	GASH	100	7	
Red huckleberry	VAPA	100	2	
Pacific rhododendron	RHMA3	83	11	
Evergreen huckleberry	VAOV2	83	4	
Baldhip rose	ROGY	50	2	
Mountain balm	MOOD	50	1	
Vine maple	ACCI	50	9	
Herbs				14
Western sword-fern	POMU	100	52	
Oregon oxalis	OXOR	100	18	
Western starflower	TRLA6	83	1	
White trillium	TROV2	83	1	
Catchweed bedstraw	GAAP2	67	2	
Smith fairybell	DISM2	67	1	
Northern maidenhair	ADPE	67	1	
Rattlesnake-plantain	GOOB2	67	1	
Whitevein pyrola	PYPI2	50	1	

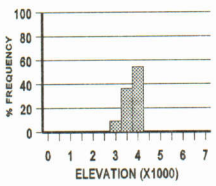
CHLA 20

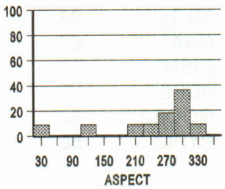
PORT-ORFORD-CEDAR-WESTERN HEMLOCK/SIERRA-LAUREL
Chamaecyparis lawsoniana-Tsuga heterophylla/Leucothoe davisiae
CHLA-TSHE/LEDA (N=11; BLM=11)

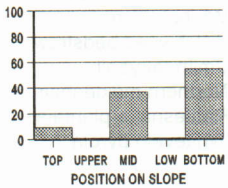
Distribution. This Association occurs in the upper reaches of Silver and Howard Creek watersheds in the Grants Pass Resource Area, Medford District, Bureau of Land Management, and the Galice Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association is slightly cooler and drier than most other Port-Orford-cedar associations, averaging 46 degrees F and 85 inches of precipitation annually. It is the only Association with Sierra-laurel as a major component of the shrub layer.

Soils. The dominant parent material is grano-diorite with some metavolcanic material. Soils are mostly moderately deep, with an average depth of greater than 15 inches. Based on 11 plots, soil texture is highly variable including sand, sandy loam, silt loam, sandy clay loam, and clay loam. Average rock fragment content is 6 percent, most of which is gravel (32 percent).







Environment Elevation averages 3700 feet This Association is generally found on westerly aspects with slopes averaging 20 percent, and a range of 7 to 39 percent Slope position is mainly bottoms and basins, but this Association is also found midslope, or even on ridgetops associated with perched water tables

Vegetation Composition and Structure Total species richness, low for the Series, averages 18 species The overstory is dominated by Port-Orford-cedar and western hemlock Port-Orford-cedar and western hemlock also dominate the understory with an average of 20 percent cover Pacific yew and Douglas-fir are also present, but with low covers Sierra-laurel and salal are frequently found with their covers averaging 30 and 15 percent respectively Pacific rhododendron, red huckleberry, and rattlesnake-plantain are common with covers averaging 30, 2 and 1 percent respectively Moss cover averages 6 percent

Tree cover exceeding 10 feet tall (3 meters), averages 94 percent, while cover for tree species less than 10 feet tall averages 22 percent Cover for shrubs greater than 20 inches (50 centimeters) tall, averages 39 percent, and cover for shrubs less than 20 inches tall averages 37 percent Herb cover averages 5 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Port-Orford-cedar	CHLA	100	51	
Western hemlock	TSHE	82	29	
Douglas-fir	PSME	73	23	
Understory trees				4
Port-Orford-cedar	CHLA	100	28	
Western hemlock	TSHE	82	20	
Pacific yew	TABR2	55	7	
Douglas-fir	PSME	45	4	
White fir	ABCO	36	17	
Shrubs				5
Sierra-laurel	LEDA	91	31	
Salal	GASH	82	16	
Pacific rhododendron	RHMA3	73	30	
Red huckleberry	VAPA	73	2	
Dwarf Oregongrape	BENE2	64	4	
Sadler oak	QUSA2	36	2	
Pacific blackberry	RUUR	36	1	
Herbs				7
Rattlesnake-plantain	GOOB2	73	1	
Little prince's-pine	CHME	64	1	
Western twinflower	LIBOL	55	1	
White trillium	TROV2	55	1	
Braken	PTAQ	36	1	
Common beargrass	XETE	36	1	
Western Sword-fern	POMUM	27	2	

JEFFREY PINE SERIES

JEFFREY PINE SERIES

Pinus jeffreyii

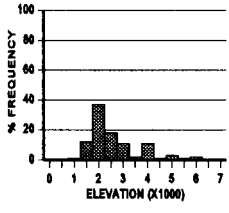
PIJE

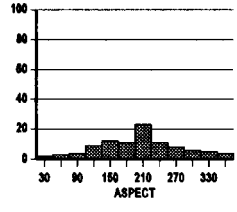
Patricia A. Martinez

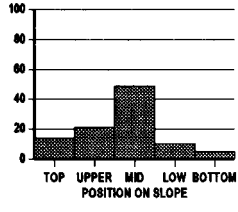
Southwestern Oregon is the northern extent of the range of Jeffrey pine This species is scattered throughout Curry, Josephine, Jackson, and Douglas counties, with the heaviest concentrations in Josephine and Jackson counties It usually occurs on ultramafic parent material. Jeffrey pine is often the dominant tree species on soils derived from ultramafic parent material, especially in interior valleys and foothills. Tanoak (*Lithocarpus densiflora*), western hemlock (*Tsuga heterophylla*), or Port-Orford-cedar (*Chamaecypans lawsoniana*) may replace Jeffrey pine as the stand dominant near the coast

Ultramafic bedrock, mainly serpentine and peridotite, is high in ferromagnesium silicate minerals with an unusually high proportion of nickel and chromium This chemical composition, toxic to most plants, results in an unique and diverse flora Soils weathered from ultramafic rock strongly reflect the elemental composition of the parent rock with high concentrations of magnesium, iron, and silica (Kruckeberg 1984)

As shown in the graphs below, the Jeffrey Pine Series covers a wide elevational band, from 1200 feet to 6000 feet, with a concentration near 2000 feet, and an average elevation of 2586 feet Although this Series occurs on all aspects and slope positions, it is more commonly found on southerly aspects and mid-slope positions







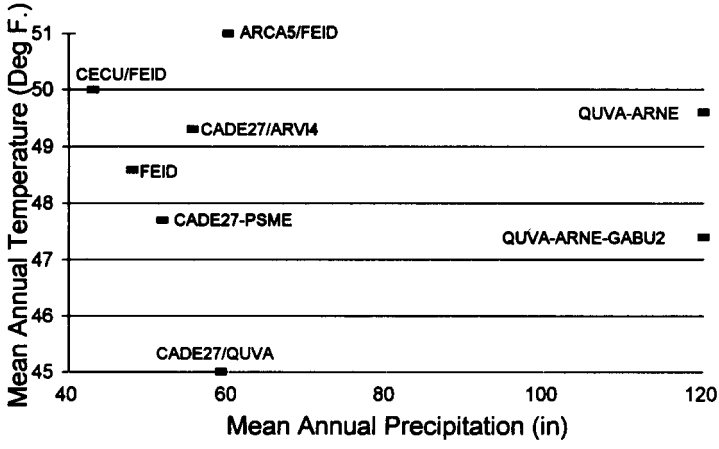
Parent material is either pure serpentine or peridotite (66 percent of the time) or a mixture of undifferentiated ultramafic material with other rock types. The Series rarely occurs on grano-diorite or meta-volcanic soils that apparently do not have any ultramafic influence.

The Jeffrey Pine Series tends to have high exposed gravel, surface rock, and bedrock components. Gravel cover ranges from 3 to 95 percent, with an average of 28 percent Rock cover ranges from 5 to 75 percent, with an average of 39 percent Bedrock cover ranges from 0 to 15 percent, with an average of 4 percent Moss cover, however, is low compared to other Series, ranging from 0 to 50 percent, with an average of 3 percent. This reflects the dry surface soil conditions typical of the Series

PIJE 2

Based on ten plots sampled, soils are shallow to deep, and moderately well to well drained. Surface texture is clay loam, loam, or silty clay loam, with 0 to 33 percent gravel, 0 to 50 percent cobbles and stones, and 25 to 32 percent clay. Subsurface textures are clay, clay loam, loam, and silty clay loam, with 0 to 50 percent gravel, 5 to 70 percent cobbles and stones, and 20 to 50 percent clay. The soil moisture regimes are xeric or udic and the soil temperature regimes are mesic or frigid. Soils classify to the following subgroups: Lithic Xerochrept, Typic Xerochrept, Dystric Xerochrept, Lithic Haploxeralf, Typic Haploxeralf, and Typic Palexeralf.

The mean annual temperature for the Jeffrey Pine Series ranges from 45 degrees F to 51 degrees F and the mean annual precipitation ranges from 43 inches to 120 inches. The relative positions of the plant associations in the environment are shown below. Each association is plotted by mean annual temperature and mean annual precipitation.



As a result of the serpentine/peridotite parent material influence, there are many unique species found in this Series, i.e., Jeffrey pine, rock fern, dwarf ceanothus, Tolmie's mariposa, and box-leaved silk-tassel. These species will be frequently found, yet will usually have low covers. Jeffrey pine was present in every association in both the overstory and the understory. Douglas-fir and incense-cedar are consistently found in most associations in both the overstory and the understory. Coffeeberry and dwarf ceanothus are frequently found along with rock fern, huckleberry oak, and common beargrass.

Average total species richness, based on vascular plants only, is calculated for each association. The average total species richness for the Jeffrey Pine Series ranges from 15 to 49 species per plot. Richness is rated as very low, 15 to 21 species; low, 22 to 29 species; intermediate, 30 to 36 species; high, 37 to 43 species; and very high, greater than 44 species.

A characteristic feature of the Series is an open canopy of trees, shrubs, and herbs. On Forest Service sites, upper layer tree cover ranges from 6 to 25 percent, and averages 17 percent. Mid-layer tree cover ranges from 23 to 31 percent, and averages 27 percent, while lower layer tree cover ranges from 21 to 45 percent, and averages 35 percent. High shrub cover ranges from 3 to 18 percent, and averages 9 percent, while low shrub cover ranges from 21 to 56 percent, and averages 32 percent. Herb/grass cover ranges from 28 to 74 percent, and averages 49 percent. Low, intermediate, and high canopy covers are defined as the lower, middle, and upper thirds of the total range of average covers for each layer.

On Bureau of Land Management sites, cover for trees greater than 10 feet tall (3 meters) ranges from 12 to 50 percent, and averages 30 percent, while cover for trees less than 10 feet tall ranges from 1 to 11 percent, and averages 5 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) ranges from 3 to 46 percent, and averages 25 percent, while cover for shrubs less than 20 inches tall ranges from 3 to 32 percent, and averages 13 percent. Herb/grass cover ranges from 31 to 62 percent, and averages 48 percent.

Eight plant associations have been classified for the Jeffrey Pine Series in southwestern Oregon. They were described from 91 plots, 54 from Bureau of Land Management data and 37 from Forest Service data. There may be some additional types on the Illinois Valley, Galice, and Chetco Ranger Districts of the Siskiyou National Forest not detected by sampling. If the southwestern Oregon key fails, try the Jeffrey Pine Series Key from "A Field Guide to Serpentine Plant Associations and Sensitive Plants in Northwestern California" by Thomas M. Jimerson et. al. (R5-ECOL-TP-006, 1995).

SPECIES TO KNOW

There are several species used in the plant association key that are easily confused with similar species. A general description of each of these occurs below.

Idaho fescue (FEID) - In southwestern Oregon, the native dryland fine-leaved fescues with gray-green or blue-tinged leaf color have been called Idaho fescue (*Festuca idahoensis*), red fescue (*Festuca rubra*), Roemer's fescue (*Festuca roemeri*), and sheep fescue (*Festuca ovina*). Field characteristics to discriminate between these species are not usable in southwestern Oregon. Name(s) were attached to these fescues in order to refer to them in this guide. Idaho fescue (*Festuca idahoensis*) is used as the name in this publication for all the native dryland fine-leaved fescues with gray-green or blue-tinged leaf color. It is not a taxonomic determination (Rolle 1996).

Hoary manzanita (ARCA5) - An erect or spreading shrub, 1 to 3 (or to 6) feet high, without a basal burl. Bark is smooth, dark red-brown; densely soft white-pubescent branchlets, and peduncles. Leaves are pale green and gray pubescent or canescent on both surfaces; ovate to roundish; 1.25 to 2 inches long. Flowers about 0.25 inches long, in short racemes or panicles, white or pinkish; bracts large and foliaceous. Fruit is depressed-globular, 0.25 to 0.38 inches broad, usually pubescent, sometimes slightly glandular or glabrate and glaucous. Easily confused with whiteleaf manzanita (ARVI4) (Munz 1968).

Whiteleaf manzanita (ARVI4) - Evergreen, erect shrub; 3.3 to 13 0 feet high, without a basal burl. Bark is smooth, reddish-brown. Leaves are pale, glaucous, whitish-green, sticky; ovate or elliptic, rounded at the tip; 1 - 1.5 inches long. Flowers urn-shaped, pink to whitish; 0.2 - 0.3 inches long Fruit is light brown or red berry, smooth or glandular, 0 2 - 0 3 inches in diameter Whiteleaf manzanita is capable of inhabiting low elevation, dry sites It can withstand extremely high moisture stress levels and is capable of extracting water from bedrock (Zwieniecki and Newton 1996) Easily confused with hoary manzanita (ARCA5) (Seda, Atzet, and Wheeler 1989).

Box-leaved silk-tassel (GABU) - Low, evergreen shrub, 2 - 6.5 feet tall. Young twigs are stiffly hairy. This species is dioecious (male and female plants). Leaves are oblong-elliptic to roundish, 0 4 - 1.6 inches long, glabrous on upper surface, densely pubescent below, with petiole 0.1 - 0.2 inches long Flowers - male catkins 2 - 2.8 inches long, in clusters of 2 - 4, female flowers 1.2 - 3.5 inches long Fruit are blue-black, subglabrous berries, 0.1 - 0 2 inches. Be careful not to assume this is a manzanita at first glance. Silk-tassels have opposite leaves (Seda, Atzet, and Wheeler 1989).

Squaw carpet (CEPR) - Evergreen trailing shrub forming dark green mats. Leaves opposite, leathery, with toothed margins Flowers showy, blue to white clusters. Fruit capsules, 0 2 - 0 4 inches broad, with three lobes. Dwarf ceanothus (CEPU) is very similar, but the leaves are smaller and it grows in ultrabasic soils, such as serpentine (Seda, Atzet, and Wheeler 1989)

Dwarf ceanothus (CEPU) - Low, mat-forming, creeping shrub. Leaves opposite, persistent, wedge-shaped to oblong-lanceolate; 0.2 - 0 6 inches long on petioles less than 0.1 inches long, often with few teeth on the margins. Flowers blue to white, borne in few-flowered umbels Fruit globose capsules, 0.2 inches in diameter, containing shiny, flattened seeds. Similar to squaw carpet (CEPR) (Seda, Atzet, and Wheeler 1989).

The relationship of draft and final plant associations in the Jeffrey Pine Series is shown below. The draft associations are listed, with the final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section).

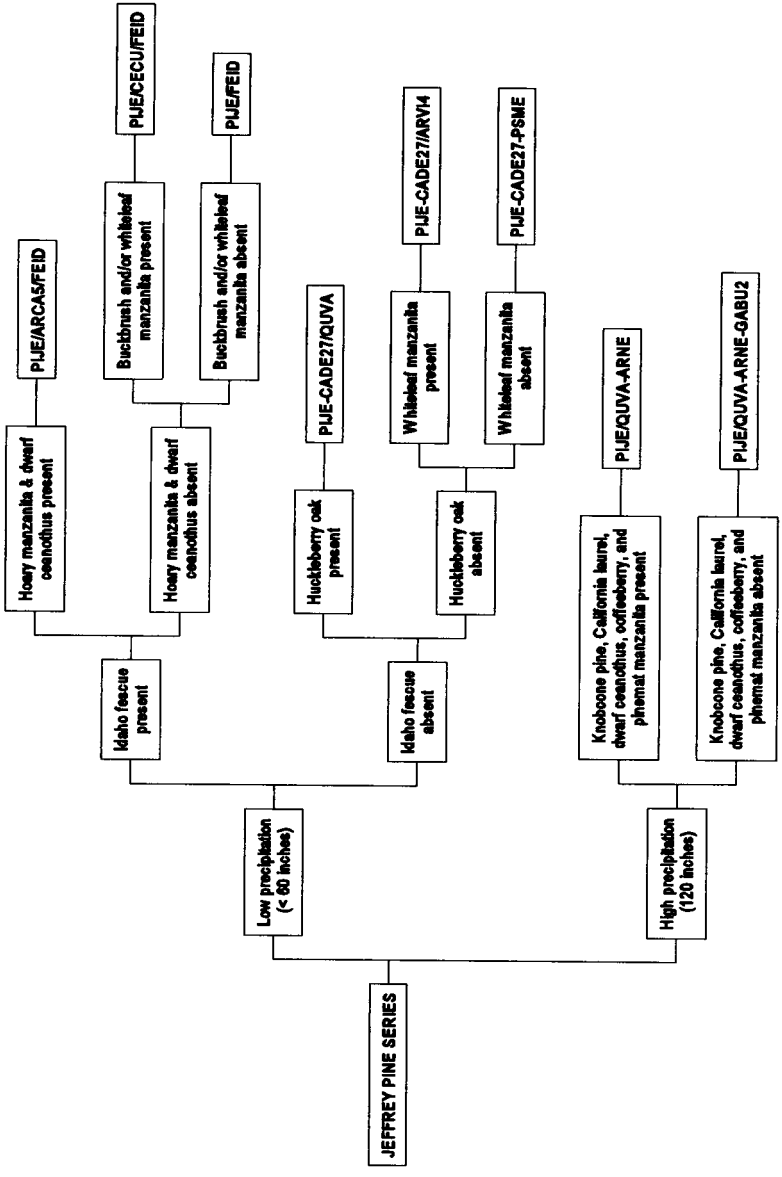
PIJE-PIMO (N=9)
PIJE/QUVA-ARNE-GABU2 (33%)
PIJE-CADE27/QUVA (22%)
PIMO3-PIJE/QUVA/XETE (22%)
CHLA/QUVA-XETE (11%)
LIDE3-PIMO3/QUVA/XETE (11%)

PIJE/CEPU (N=8)
PIJE-CADE27/ARVI4 (88%)
PIJE-CADE27/QUVA (12%)

PIJE-QUVA (N=14)
PIJE-CADE27/QUVA (72%)
PIJE-CADE27/ARVI4 (14%)
PIJE/QUVA-ARNE-GABU2 (14%)

PIJE/GRASS (N=1)
PIJE-CADE27/ARVI4 (100%)

The flow chart below shows a graphical presentation of the classification and the relationships between the plant associations. It is not intended to be used as the plant association key.



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KEY TO THE JEFFREY PINE PLANT ASSOCIATIONS

1a. Idaho fescue* (FEID) usually present. 2

1b. Idaho fescue* (FEID) usually absent. 4

See Idaho fescue write-up in the Jeffrey Pine Series writeup for list of species called Idaho fescue.

2a. Hoary manzanita (ARCA5) and dwarf ceanothus (CEPU) present. PIJE/ARCA5/FEID Page PIJE 8

2b. Hoary manzanita (ARCA5) and dwarf ceanothus (CEPU) absent. 3

3a. Buckbrush (CECU) and/or whiteleaf manzanita (ARVI4) present. PIJE/CECU/FEID Page PIJE 10

3b. Whiteleaf manzanita (ARVI4) absent. PIJE/FEID Page PIJE 12

4a. Huckleberry oak (QUVA) usually present. 5

4b. Huckleberry oak (QUVA) usually absent. 7

5a. Incense-cedar (CADE27) present. PIJE-CADE27/QUVA Page PIJE 14

5b. Incense-cedar (CADE27) absent. 6

6a. Knobcone pine (PIAT), California-laurel (UMCA), dwarf ceanothus (CEPU), coffeeberry (RHCA), and pinemat manzanita (ARNE) present. PIJE/QUVA-ARNE Page PIJE 16

6b. Not as above. PIJE/QUVA-ARNE-GABU2 Page PIJE 18

7a. Whiteleaf manzanita (ARVI4) usually present. PIJE-CADE27/ARVI4 Page PIJE 20

7b. Whiteleaf manzanita (ARVI4) usually absent. PIJE-CADE27-PSME Page PIJE 22

PIJE 8

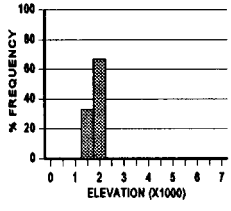
JEFFREY PINE/HOARY MANZANITA/IDAHO FESCUE
Pinus jeffreyi/Arctostaphylos canescens/Festuca idahoensis
PIJE/ARCA5/FEID (N=6; BLM=6)

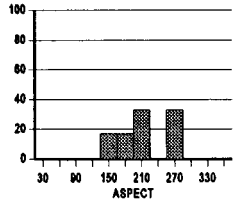
NO PICTURE AVAILABLE

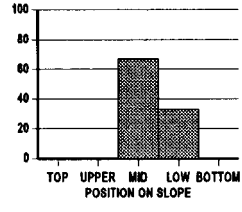
Distribution. This Association occurs on the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may also occur on the Illinois Valley and Galice Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics This is a low elevation Jeffrey pine association and is one of the warmer, drier Jeffrey pine associations. Hoary manzanita and Idaho fescue are frequently present, both with covers greater than 30 percent Dwarf ceanothus is also frequently present with covers usually greater than 5 percent

Soils. Parent material consists of mixed-ultramafics, serpentine, and peridotite. Surface rock (defined as greater than 7 centimeters in size) cover averages 8 percent, while exposed bedrock cover averages 6 percent Bare ground averages 19 percent.







Environment. Elevation averages 1730 feet. Aspects vary, though this Association is rarely found on north aspects. Slope averages 44 percent, with a range of 35 to 60 percent. Slope position ranges from mid-slope to lower slope and rolling topography is common.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 19 species. The overstory is dominated by Jeffrey pine. The only understory species commonly found is Jeffrey pine, although incense-cedar is occasionally found. Hoary manzanita and dwarf ceanothus are frequently present in the shrub layer. Hoary manzanita covers are generally greater than 30 percent and Dwarf ceanothus covers are generally greater than 5 percent. Brewers oak is common. In the herb/grass layer, Idaho fescue is frequently found, with high covers Buttercup and common eriophyllum are also frequently found, but with low covers. Applegate's paintbrush, sickleleaf onion, locoweed, and ookow are all common, also with low covers. Moss is absent.

Cover for trees greater than 10 feet tall (3 meters) averages 12 percent, while cover for trees less than 10 feet tall averages 1 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 46 percent, and cover for shrubs less than 20 inches tall averages 8 percent. Herb/grass cover averages 47 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				1
Jeffrey pine	PIJE	67	10	
Pacific madrone	ARME	17	10	
Incense-cedar	CADE27	17	5	
Understory trees				2
Jeffrey pine	PIJE	67	6	
Incense-cedar	CADE27	33	2	
Douglas-fir	PSME	17	3	
California-laurel	UMCA	17	3	
California black oak	QUKE	17	1	
Canyon live oak	QUCH2	17	1	
Shrubs				3
Hoary manzanita	ARCA5	100	38	
Dwarf ceanothus	CEPU	100	8	
Brewers oak	QUGAB	67	9	
Coffeeberry	RHCA	33	2	
Herbs				14
Idaho fescue	FEID	100	32	
Buttercup	RAFLU	83	2	
Common eriophyllum	ERLA6	83	1	
Applegate's paintbrush	CAAP4	67	1	
Sickleleaf onion	ALFA3	67	1	
Locoweed/Milk vetch	ASDI2	50	1	
Ookow	BRCO2	50	1	
Geyer's oniongrass	MEGE	33	4	
Silky horkelia	HOSE	33	2	
Common yarrow	ACMI2	33	1	

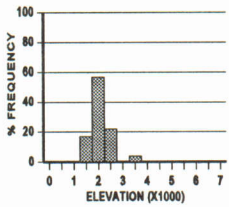
PIJE 10

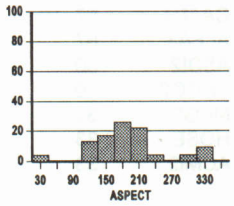
JEFFREY PINE/BUCKBRUSH/IDAHO FESCUE
Pinus jeffreyi/Ceanothus cuneatus/Fescue idahoensis
PIJE/CECU/FEID (N=23; BLM=23)

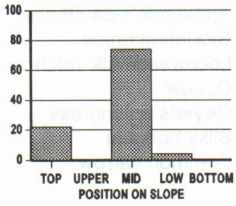
Distribution. This Association occurs on the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may also be found on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs at low elevations and is the driest Jeffrey pine association. Buckbrush, a dry site indicator, occurred on 21 out of 23 plots, with an average cover of 37 percent. Buckbrush is abundant only in this Jeffrey Pine Association. Idaho fescue and whiteleaf manzanita occur frequently, with average covers of 53 and 20 percent, respectively.

Soils. The predominant parent material is mixed ultramafics, with serpentine and granodiorite occurring occasionally. Surface rock (defined as greater than 7 centimeters in size) cover averages 18 percent with less than 1 percent exposed bedrock present.







Environment. Elevation averages 2080 feet. Aspect is variable, though generally south, southeast, or southwest. Slope averages 43 percent and ranges from 0 to 60 percent. This Association occurs on all slope positions, but mostly mid-slope.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 15 species. The overstory is dominated by Jeffrey pine. The understory is also dominated by Jeffrey pine. Incense-cedar is common, while Douglas-fir and Pacific madrone occur occasionally. Understory covers are low. The shrub layer is dominated by buckbrush and whiteleaf manzanita, both with high covers. The herb/grass layer is dominated by Idaho fescue, with covers generally greater than 30 percent. Sulphurflower and rock fern are frequent, Pacific hound's-tongue is common, and bluegrass, big squirreltail, and common yarrow are occasional, all with low covers. Moss cover averages less than 1 percent.

Cover for trees greater than 10 feet tall (3 meters) averages 27 percent while cover for trees less than 10 feet tall averages 4 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 25 percent, while cover for shrubs less than 20 inches tall averages 32 percent. Herb/grass cover averages 52 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				1
Jeffrey pine	PIJE	100	19	
Incense-cedar	CADE27	22	4	
Douglas-fir	PSME	9	8	
Understory trees				3
Jeffrey pine	PIJE	87	9	
Incense-cedar	CADE27	65	10	
Douglas-fir	PSME	39	4	
Pacific madrone	ARME	30	3	
California-laurel	UMCA	22	5	
Shrubs				3
Buckbrush	CECU	91	37	
Whiteleaf manzanita	ARVI4	87	20	
Poison oak	RHDI6	26	5	
Pale serviceberry	AMPA2	26	2	
Herbs				8
Idaho fescue	FEID	87	53	
Sulphurflower	ERUM	74	2	
Rock fern	ASDE6	74	1	
Pacific hound's-tongue	CYGR	52	4	
Bluegrass	POA	43	3	
Big squirreltail	SIJU	35	3	
Common yarrow	ACMI2	35	1	
Deadly zigadenus	ZIVE	22	1	

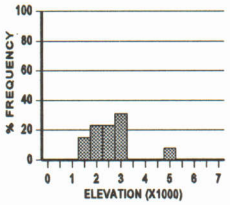
PIJE 12

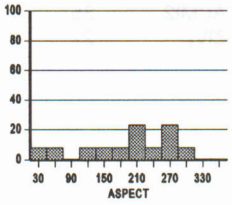
JEFFREY PINE/IDAHO FESCUE
Pinus jeffreyi/Festuca idahoensis
PIJE/FEID (N=13; BLM=13)

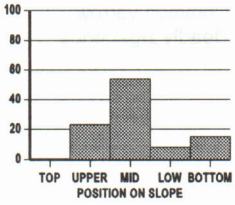
Distribution. This Association occurs on the Grants Pass, Glendale, and Butte Falls Resource Areas, Medford District, Bureau of Land Management and the Galice Ranger District, Siskiyou National Forest. This Association may also occur on the Illinois Valley Ranger District, Siskiyou National Forest and the Tiller Ranger District, Umpqua National Forest.

Distinguishing Characteristics. Jeffrey Pine/Idaho Fescue is one of the warmer, drier Jeffrey pine associations. Idaho fescue is frequently present with covers ranging from 10 to 90 percent and averaging 44 percent.

Soils. Parent materials consist of serpentine (the most predominant), peridotite, mixed ultramafics, and mixed ultramafics with metavolcanics. Surface rock (defined as greater than 7 centimeters in size) cover averages 9 percent while exposed bedrock cover averages 5 percent. Bare ground also averages 5 percent.







Based on two plots sampled, soils are moderately well drained. The surface texture is clay loam, with 0 to 15 percent gravel, 0 to 25 percent cobbles, and 25 to 29 percent clay. The subsurface texture is clay, with 10 percent gravel, 50 to 60 percent cobbles, and 40 to 50 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is probably mesic. Soils classify to the following subgroups: Lithic Haploxeralf or Typic Palexeralf.

Environment. Elevation averages 2570 feet. Aspect is variable. The average slope is 31 percent with a range of 12 to 45 percent. All slope positions are represented, with mid-slopes being the most common.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 18 species. The overstory is dominated by Jeffrey pine. The understory is dominated by Jeffrey pine with common occurrences of incense-cedar and Douglas-fir. Idaho fescue is frequently found, usually with high covers. Common eriophyllum and rock fern are common, while prairie junegrass, spreading phlox, common yarrow, and sulphurflower are occasional, all with low covers. Moss cover averages 5 percent.

Cover for trees greater than 10 feet tall (3 meters) averages 30 percent while cover for trees less than 10 feet tall averages 4 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 3 percent and cover for shrubs less than 20 inches tall averages 3 percent. Herb/grass cover averages 62 percent.

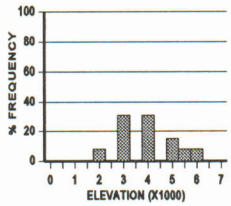
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				1
Jeffrey pine	PIJE	92	20	
Douglas-fir	PSME	15	4	
Incense-cedar	CADE27	15	2	
Understory trees				3
Jeffrey pine	PIJE	77	8	
Incense-cedar	CADE27	69	18	
Douglas-fir	PSME	54	6	
Canyon live oak	QUCH2	23	2	
Pacific madrone	ARME	8	3	
Shrubs				1
Buckbrush	CECU	23	3	
Pale serviceberry	AMPA2	23	2	
Herbs				13
Idaho fescue	FEID	100	44	
Common eriophyllum	ERLA6	69	1	
Rock fern	ASDE6	54	1	
Prairie junegrass	KOCR	46	6	
Spreading phlox	PHDI3	31	1	
Common yarrow	ACMI2	31	1	
Sulphurflower	ERUM	31	1	
Blue wildrye	ELGL	23	7	
Big squirreltail	SIJU	23	3	
Buttercup	RAFLU	23	1	

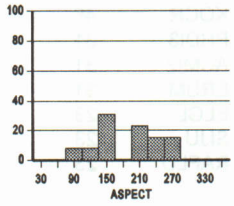
JEFFREY PINE-INCENSE-CEDAR/HUCKLEBERRY OAK
Pinus jeffreyi-Calocedrus decurrens/Quercus vaccinifolia
PIJE-CADE27/QUVA (N=13; FS=13)

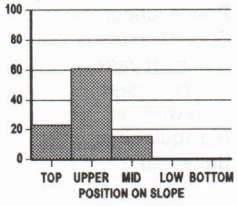
Distribution. This Association occurs on the Applegate and Ashland Ranger Districts, Rogue River National Forest and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on the Ashland and Grants Pass Resource Areas, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This is a relatively high elevation Jeffrey pine association and is the coolest of the Jeffrey pine associations. Huckleberry oak and incense-cedar are usually present.

Soils. Parent material is serpentine, with one occurrence of peridotite. Surface gravel and rock content averages 26 and 36 percent cover, respectively, while exposed bedrock cover averages 5 percent. Based on two plots sampled, soils are deep (greater than 40 inches) and well drained. Surface texture is silty clay loam, with 8 to 25 percent gravel, 35 to 50 percent cobbles and stones, and 32 percent







clay. Subsurface texture is silty clay loam, with 5 percent gravel, 40 percent cobbles and stones, and 32 to 35 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is probably frigid. Soils classify to the following subgroups: Dystric Xerochrept and Typic Xerochrept.

Environment. Elevation averages 3990 feet. Aspect is variable, although generally not northerly. Slope averages 33 percent with a range of 5 to 68 percent. Slope position ranges from ridgetops down to the middle one-third of the slope.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 27 species. The overstory is dominated by Jeffrey pine. Incense-cedar is frequently present but with low covers. Douglas-fir is common in the overstory, although covers are low. The understory is dominated by Jeffrey pine, with frequent occurrences of incense-cedar and Douglas-fir. White fir occurred on one plot. Hardwoods found in this Association, although rare and with low covers, consist of Pacific madrone, golden chinquapin, canyon live oak, Oregon white oak, and California-laurel. The shrub layer is dominated by box-leaved silk-tassel and huckleberry oak, both with fairly high covers. Whiteleaf manzanita, buckbrush, and dwarf ceanothus commonly occur, while pinemat manzanita and pygmy Oregongrape are occasionally present. Rock fern is frequently found while common beargrass and common yarrow are common; all had low covers. Moss cover averages 1 percent.

Upper layer tree cover is high for the Series, averaging 25 percent, while mid-layer tree cover is low, averaging 23 percent. Lower layer tree cover averages 36 percent, intermediate for the Series. High shrub and low shrub covers are low for the Series, averaging 3 and 30 percent, respectively. Herb/grass cover is intermediate for the Series, averaging 47 percent.

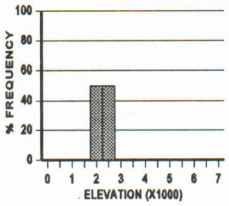
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Jeffrey pine	PIJE	100	26	
Incense-cedar	CADE27	100	5	
Douglas-fir	PSME	54	4	
Understory trees				4
Jeffrey pine	PIJE	100	14	
Incense-cedar	CADE27	100	12	
Douglas-fir	PSME	92	6	
Pacific madrone	ARME	31	1	
Western white pine	PIMO3	23	4	
Shrubs				6
Huckleberry oak	QUVA	92	17	
Box-leaved silk-tassel	GABU2	69	14	
Whiteleaf manzanita	ARVI4	54	15	
Buckbrush	CECU	46	16	
Dwarf ceanothus	CEPU	46	3	
Herbs				14
Rock fern	ASDE6	92	2	
Common beargrass	XETE	54	2	
Common yarrow	ACMI2	46	1	

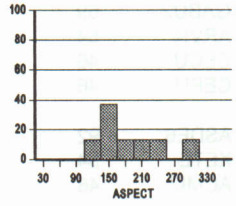
JEFFREY PINE/HUCKLEBERRY OAK-PINEMAT MANZANITA
Pinus jeffreyi/Quercus vaccinifolia-Arctostaphylos nevadensis
PIJE/QUVA-ARNE (N=8; FS=8)

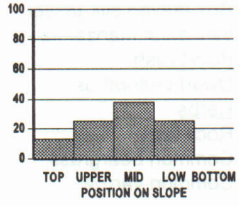
Distribution. This Association occurs on the Chetco Ranger District, Siskiyou National Forest. All plots were located in the Lemmingsworth Gulch Research Natural Area.

Distinguishing Characteristics. This Association is a coastal expression of vegetation on ultramafics. It is the only warm, wet Jeffrey pine association, with an average annual temperature of 50 degrees F and average annual precipitation of 120 inches. Jeffrey Pine/Huckleberry Oak-Pinemat Manzanita-Box-Leaved Silk-Tassel is cooler but also averages 120 inches of precipitation per year. Both associations are by far the wettest of the Series.

Soils. Parent material is serpentine. Surface gravel averages 24 percent, while surface rock averages 27 percent. Average exposed bedrock cover is 1 percent. Based on two plots sampled, soils are shallow to moderately deep (10 to 30 inches)







and well drained. Surface texture is loam, with 25 to 33 percent gravel, 2 percent cobbles, and 25 percent clay Subsurface textures are loam and clay loam, with 0 to 50 percent gravel, 5 to 50 percent cobbles, and 20 to 35 percent clay The soil moisture regime is probably xeric and the soil temperature regime is probably mesic. Soils classify to the following subgroups: Lithic Xerochrept and Typic Haploxeralf.

Environment. Elevation averages 2240 feet. This Association is found predominantly on southern aspects. Slope averages 41 percent and ranges from 13 to 60 percent. All slope positions are represented.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 49 species. The overstory is dominated by Jeffrey pine, Douglas-fir, and knobcone pine. The understory is dominated by Jeffrey pine, with frequent occurrences of Douglas-fir and California-laurel. Huckleberry oak is frequently present with an average cover of 22 percent. The shrub form of tanoak is commonly found. Pinemat manzanita, dwarf ceanothus, and coffeeberry are frequently present, as is rock fern, obscure bedstraw, few-fruited biscuit-root, death camas, common yarrow, variable morning-glory, slender-tubed iris, and spreading phlox, all with low covers. Moss cover averages 2 percent.

Upper layer tree cover is low for the Series, averaging 6 percent Mid-layer tree cover is high for the Series, averaging 31 percent, while lower layer tree cover is intermediate, averaging 38 percent. High shrub and low shrub covers are low for the Series, averaging 5 and 21 percent, respectively. Herb/grass cover is intermediate for the Series, with an average of 48 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Jeffrey pine	PIJE	100	15	
Douglas-fir	PSME	100	10	
Knobcone pine	PIAT	88	7	
Understory trees				5
Jeffrey pine	PIJE	100	4	
Douglas-fir	PSME	100	2	
California-laurel	UMCA	88	18	
Knobcone pine	PIAT	38	3	
Shrubs				9
Huckleberry oak	QUVA	100	22	
Pinemat manzanita	ARNE	100	8	
Dwarf ceanothus	CEPU	100	3	
Coffeeberry	RHCA	88	4	
Tanoak (shrub form)	LIDEE	63	3	
Herbs				32
Carex spp.	CAREX	100	7	
Death camas	ZIMI	100	2	
Rock fern	ASDE6	100	2	
Obscure bedstraw	GAAM2	100	1	
Few-fruited biscuit-root	LOMA5	100	1	
Common yarrow	ACMI2	88	2	

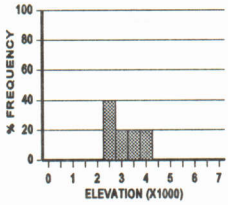
PIJE 18

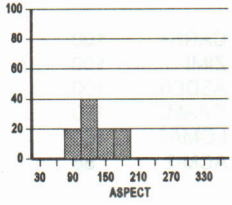
JEFFREY PINE/HUCKLEBERRY OAK-PINEMAT MANZANITA-BOX-LEAVED SILK-TASSEL
Pinus jeffreyi/Quercus vaccinifolia-Arctostaphylos nevadensis-Garrya buxifolia
PIJE/QUVA-ARNE-GABU2 (N=5; FS=5)

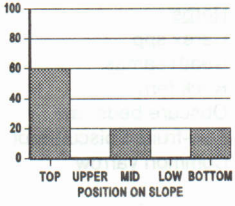
Distribution. This Association occurs on the Chetco, Gold Beach, Galice, and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on the Grants Pass Resource Area, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association, along with the Jeffrey Pine/ Huckleberry Oak-Pinemat Manzanita Association, is the wettest of the Series, averaging 120 inches of precipitation annually. This Association differs from the Jeffrey Pine/Huckleberry Oak-Pinemat Manzanita Association by the presence of box-leaved silk-tassel, generally with covers greater than 20 percent. It is also cooler, averaging 47 degrees F, annually.

Soils. The predominant parent material is serpentine, with one occurrence of peridotite. Surface gravel averages 24 percent cover and surface rock averages 51







percent cover. Exposed bedrock averages 6 percent cover. Based on two plots sampled, soils are moderately deep (27 inches) and well drained. Surface texture is clay loam, with 20 percent gravel, 5 percent cobbles, and 25 percent clay. Subsurface texture is also clay loam, with 25 percent gravel, 20 percent cobbles, and 35 percent clay. The soil moisture regime can be either xeric or udic and the soil temperature regime is probably frigid. Soils classify to the following subgroup: Dystric Xerochrept.

Environment. Elevation averages 3070 feet. This Association is generally found on south to southeast aspects. Slope averages 21 percent, with a range of 8 to 35 percent. This Association can be found from ridgetops to draws.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 27 species. The dominant overstory species is Jeffrey pine. The understory is also dominated by Jeffrey pine with Douglas-fir frequently present, although with low covers. Knobcone pine, western white pine, and California-laurel are common, but with low covers. Pinemat manzanita, box-leaved silk-tassel, and huckleberry oak are frequently present with covers averaging greater than 20 percent. Pygmy Oregongrape is also frequently present, but with low covers. Slender-tubed iris, common juniper, dwarf ceanothus, rock fern, whipplevine, and common beargrass are common with low covers. Squaw carpet, variable morning-glory, coffeeberry, red huckleberry, and Horkelia are occasional, also with low covers. Moss cover averages less than 1 percent.

Upper layer and mid-layer tree covers are intermediate for the Series, averaging 15 and 27 percent, respectively. Lower layer tree cover is high for the Series, averaging 45 percent. High shrub cover is low, averaging 8 percent, while low shrub cover averages 56 percent, highest for the Series. Herb/grass cover averages 28 percent, lowest for the Series.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Jeffrey pine	PIJE	100	20	
Understory trees				6
Jeffrey pine	PIJE	100	13	
Douglas-fir	PSME	100	3	
Knobcone pine	PIAT	80	5	
Western white pine	PIMO3	60	6	
California-laurel	UMCA	60	4	
Shrubs				8
Huckleberry oak	QUVA	100	26	
Pinemat manzanita	ARNE	100	22	
Box-leaved silk-tassel	GABU2	100	22	
Pygmy Oregongrape	BEPU	100	1	
Common juniper	JUOC	60	9	
Dwarf ceanothus	CEPU	60	3	
Herbs				10
Common beargrass	XETE	80	4	
Rock fern	ASDE6	60	1	
Whipplevine	WHMO	60	1	

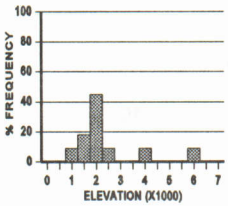
PIJE 20

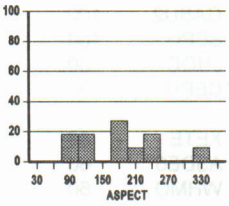
JEFFREY PINE-INCENSE-CEDAR/WHITELEAF MANZANITA
Pinus jeffreyi-Calocedrus decurrens/Arctostaphylos viscida
PIJE-CADE27/ARVI4 (N=11; FS=11)

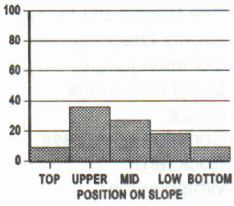
Distribution. This Association occurs on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and the Applegate Ranger District, Rogue River National Forest. It may also occur on the Grants Pass and Ashland Resource Areas, Medford District, Bureau of Land Management.

Distinguishing Characteristics. This is one of the warmer, drier Jeffrey pine associations. Whiteleaf manzanita is frequently present with high covers, usually greater than 30 percent. Huckleberry oak is usually absent.

Soils. Parent material is serpentine, with one occurrence of diorite. Surface gravel averages 35 percent cover while surface rock averages 42 percent cover. Exposed bedrock averages 1 percent cover. Based on two plots sampled, soils are shallow to moderately deep (18 to 23 inches), and moderately well drained. Surface texture is clay loam, with 15 to 25 percent gravel, 10 to 25 percent cobbles, and 25 percent







clay. Subsurface textures are clay loam and clay, with 15 percent gravel, 30 to 70 percent cobbles and stones, and 35 to 45 percent clay. The soil moisture regime is probably xeric and the soil temperature regime is probably mesic. Soils classify to the following subgroups: Lithic Xerochrept and Typic Xerochrept.

Environment. Elevation averages 2310 feet. Aspects vary. Slope averages 33 percent and ranges from 15 to 45 percent. Slope position ranges from the lower one-third to the ridgetop. This Association can also be found on narrow flats and benches.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 29 species. The overstory is dominated by Jeffrey pine, with incense-cedar and Douglas-fir common. Incense-cedar and Douglas-fir generally have low cover values. The understory is dominated by Jeffrey pine and incense-cedar, with Douglas-fir occurring occasionally. All have low covers. In the shrub layer, whiteleaf manzanita is frequently present, with covers usually greater than 30 percent. Dwarf ceanothus is common, but with covers of less than 10 percent. Coffeeberry occurs occasionally, but with low covers. In the herb/grass layer, rock fern is common, again with very low covers. Tolmie's mariposa and western buttercup are common, while slender-tubed iris, common eriophyllum, and sickleleaf onion are occasionally present, all with low covers. Moss cover averages 3 percent.

Upper layer tree cover is high for the Series, averaging 23 percent. Mid-layer tree cover is intermediate, averaging 27 percent, while lower layer tree cover is low for the Series, averaging 21 percent. High shrub cover is high for the Series, averaging 18 percent, and low shrub cover is low, averaging 22 percent. Herb/grass cover is one of the highest of the Series, averaging 74 percent (mostly grasses).

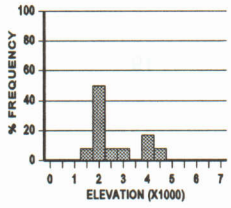
Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Jeffrey pine	PIJE	100	23	
Incense-cedar	CADE27	55	5	
Douglas-fir	PSME	45	4	
Sugar pine	PILA	27	3	
Understory trees				4
Jeffrey pine	PIJE	82	9	
Incense-cedar	CADE27	82	8	
Douglas-fir	PSME	45	8	
California-laurel	UMCA	36	5	
California black oak	QUKE	27	5	
Shrubs				4
Whiteleaf manzanita	ARVI4	91	24	
Dwarf ceanothus	CEPU	64	7	
Coffeeberry	RHCA	45	4	
Herbs				19
Rock fern	ASDE6	73	1	
Tolmie's mariposa	CATO	64	1	
Western buttercup	RAOC	55	2	
Slender-tubed iris	IRCH	45	1	
Common eriophyllum	ERLA6	45	1	

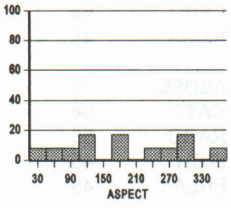
JEFFREY PINE-INCENSE-CEDAR-DOUGLAS-FIR
Pinus jeffreyi-Calocedrus decurrens-Pseudotsuga menziesii
PIJE-CADE27-PSME (N=12; BLM=12)

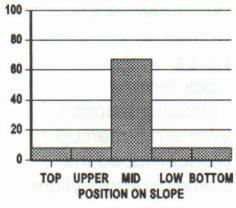
Distribution. This Association occurs on the Grants Pass and Butte Falls Resource Areas, Medford District, Bureau of Land Management. It may also occur on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association is highly variable in both vegetation and environment and is one of the warmer, drier Jeffrey pine associations. Based on the presence of Douglas-fir and non-serpentine species such as tanoak, hairy honeysuckle, and western starflower, this Association may represent a transition to the Douglas-fir Series.

Soils. Parent materials consist of serpentine, peridotite, and mixed ultramafics, with one occurrence of sandstone. Surface rock (defined as greater than 7 centimeters in size) cover averages 7 percent and exposed bedrock cover averages 3 percent.







Environment. Elevation averages 2700 feet. Aspects vary. Slope averages 36 percent with a range of 4 to 65 percent. All slope positions are represented, with mid-slope most predominant.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 21 species. The overstory is dominated by Jeffrey pine, with Douglas-fir and incense-cedar common. The understory is dominated by Jeffrey pine, with incense-cedar and Douglas-fir occurring frequently. All have low covers. Pacific madrone and canyon live oak occur occasionally. The shrub and herb/grass layers may have a large variety of species, but rarely one individual species that occurs frequently. Coffeeberry, western twinflower, and golden iris occur most frequently. Moss cover averages 10 percent, the highest for the Series.

Tree cover exceeding 10 feet tall (3 meters) averages 50 percent while cover for tree species less than 10 feet tall averages 11 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 24 percent and cover for shrubs less than 20 inches tall averages 8 percent. Herb/grass cover averages 31 percent.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				2
Jeffrey pine	PIJE	83	21	
Douglas-fir	PSME	58	14	
Incense-cedar	CADE27	58	8	
Port-Orford-cedar	CHLA	8	10	
Pacific madrone	ARME	8	5	
Understory trees				5
Jeffrey pine	PIJE	92	16	
Incense-cedar	CADE27	92	11	
Douglas-fir	PSME	92	6	
Pacific madrone	ARME	50	6	
Canyon live oak	QUCH2	42	9	
California-laurel	UMCA	25	2	
Shrubs				3
Coffeeberry	RHCA	42	3	
Western azalea	RHOC	25	42	
Brewers oak	QUGAB	25	17	
Pinemat manzanita	ARNE	25	17	
Herbs				11
Western starflower	TRLA6	42	1	
Golden iris	IRIN	33	1	
Common beargrass	XETE	25	32	
Common yarrow	ACMI2	25	1	
Snow-queen	SYRE	25	1	
Field woodrush	LUCA2	25	1	
Common eriophyllum	ERLA6	25	1	
Idaho fescue	FEID	25	1	
Obscure bedstraw	GAAM2	25	1	
White-flowered hawkweed	HIAL2	25	1	
Rock fern	ASDE6	25	1	
Whipplevine	WHMO	17	36	

WHITE FIR SERIES

WHITE FIR SERIES

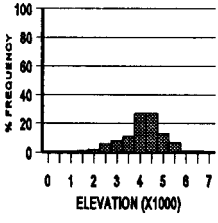
Abies concolor

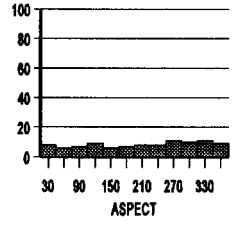
ABCO

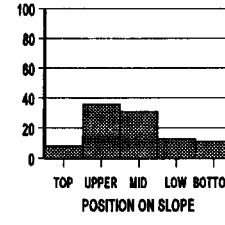
Diane E White

As a species, white fir is abundant in southwestern Oregon On the west side of the Cascade Mountains, southwestern Oregon is the approximate northern extent. White fir extends south throughout California. Grand fir (*Abies grandis*) also occurs in the area, but it interbreeds with white fir and is difficult to distinguish. Zobel (1973, 1974) has described a zone of morphological and physiological intergradation between the two species. The overlap occurs in a diagonal band extending from the Klamath Mountain Province (northwest California and southwest Oregon) through the southern Oregon Cascades into the Blue Mountains (northeast Oregon and west-central Idaho) Individuals exhibiting characteristics of both species are often referred to as *Abies grandicolor* (sic). All references in this guide will be to white fir (*A. concolor*), although some individuals in the field may exhibit more grand fir charcteristics The ecological and silvicultural differences are not significant enough to warrant any distinctions within the context of this guide.

The White Fir Series occurs on environmentally varied sites throughout southwestern Oregon It covers a wide elevational band, with an average of approximately 4300 feet. The Series occurs evenly across all aspects, and upper and middle slope positions are more common than ridge tops or bottoms. The Series includes highly productive lands, and has a high vascular plant species diversity.





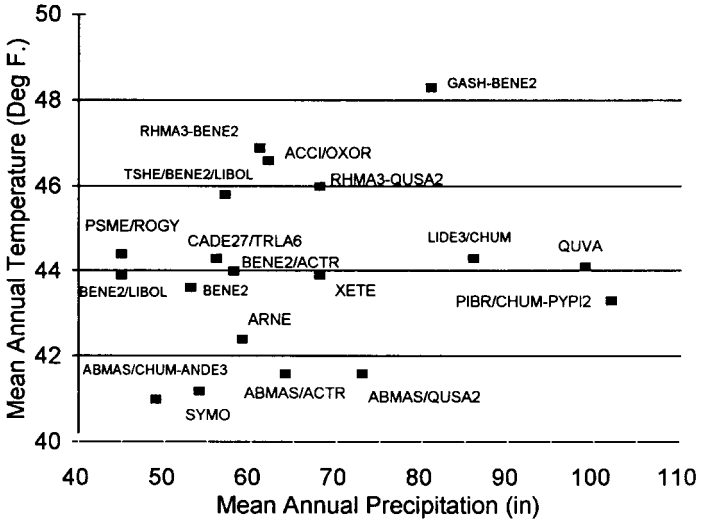


Many different soils occur in the White Fir Series. Parent material is variable, although occurrence on diorite is frequent. Soils range from shallow to deep, although moderately deep to deep are the most frequently encountered conditions. Surface textures range from sand, sandy loam, loam, and loamy sand to sand, clay loam, silt loam, and clay loam. Rock fragments range from 15 to 70 percent, and clay content ranges from 5 to 26 percent. Subsurface textures range from sand, sandy loam, loam, and loamy sand, through sandy clay loam and clay loam. Rock fragments are between 10 and 75 percent, and clay content ranges between 0 and 50 percent Soil data were collected on all plots, with a sub-sample of 75 intensively described soil pits.

The White Fir Series generally occurs on cool sites. Average annual temperature ranges from 41 degrees F in the High Cascades and Siskiyous to 48 degrees F in lower elevation areas. Average annual rainfall varies between 45 inches in drier areas of the Cascades to 102 inches near the coast.

ABCO 2

The relative environments of the plant associations are shown below. Each association is plotted by mean annual temperature and mean annual precipitation.



As a result of the frequent disturbance in southwestern Oregon, Douglas-fir, an early seral species, is the dominant overstory tree in the White Fir Series. In colder areas, Shasta red fir may be the dominant overstory pioneer species. White fir is the dominant tree species in the understory, and is particularly abundant in older stands with a low frequency of disturbance In wetter areas of the Cascades and Siskiyous, western hemlock is present, and on higher elevation, cooler areas, Pacific silver fir, mountain hemlock, Shasta red fir, and lodgepole pine may be present. In cold, dry areas of the Siskiyous, Brewer spruce may be part of the stand In the Siskiyous tanoak may be present, and in areas that tend toward ultramafic soils, Port-Orford-cedar may be common. Dwarf Oregongrape and common prince's-pine are widespread throughout the Series. Pacific rhododendron and salal are common in moist, high productivity areas Incense-cedar, golden chinquapin, ponderosa pine, and whipplevine are present on dry sites.

Average total vascular plant species richness for the White Fir Series ranges between 19 and 44. In this Series, richness is rated as very low, less than or equal to 20 species; low, 21 to 29 species; intermediate, 30 to 35 species, high, 36 to 41 species, and very high, greater than 41 species.

Upper layer tree canopy cover ranges from 55 percent in the White Fir-Shasta Red Fir/Vanillaleaf Association, to 78 percent in the White Fir/Pacific Rhododendron-Sadler Oak Association. The mid-layer tree cover ranges between 33 and 63 percent. The lower layer tree cover ranges between 8 and 68 percent. High shrub cover ranges between 1 and 60 percent, and low shrub cover ranges between 2 and 55 percent. Herb/grass cover ranges between 10 and 98 percent.

Nineteen plant associations have been classified for the Series in southwestern Oregon. They were described from 521 plots; 454 from Forest Service and 67 from Bureau of Land Management lands.

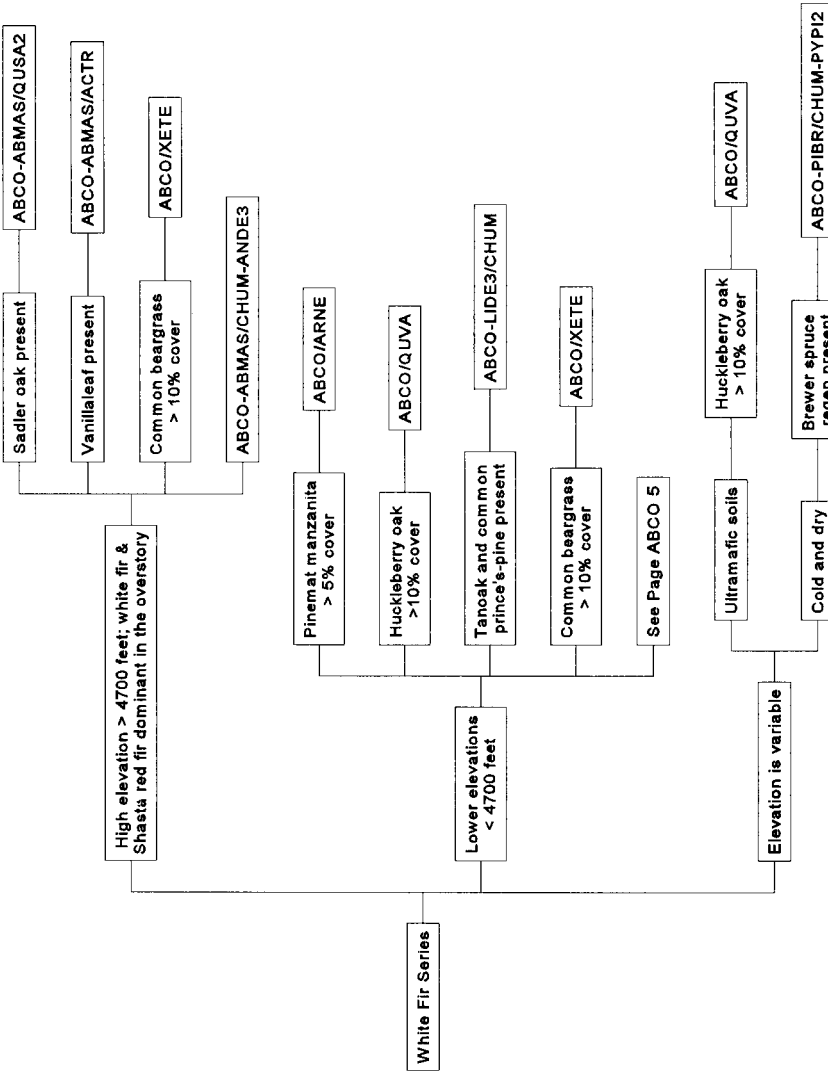
The flow chart on the following pages shows a graphical presentation of the classification and the relationships between the plant associations.

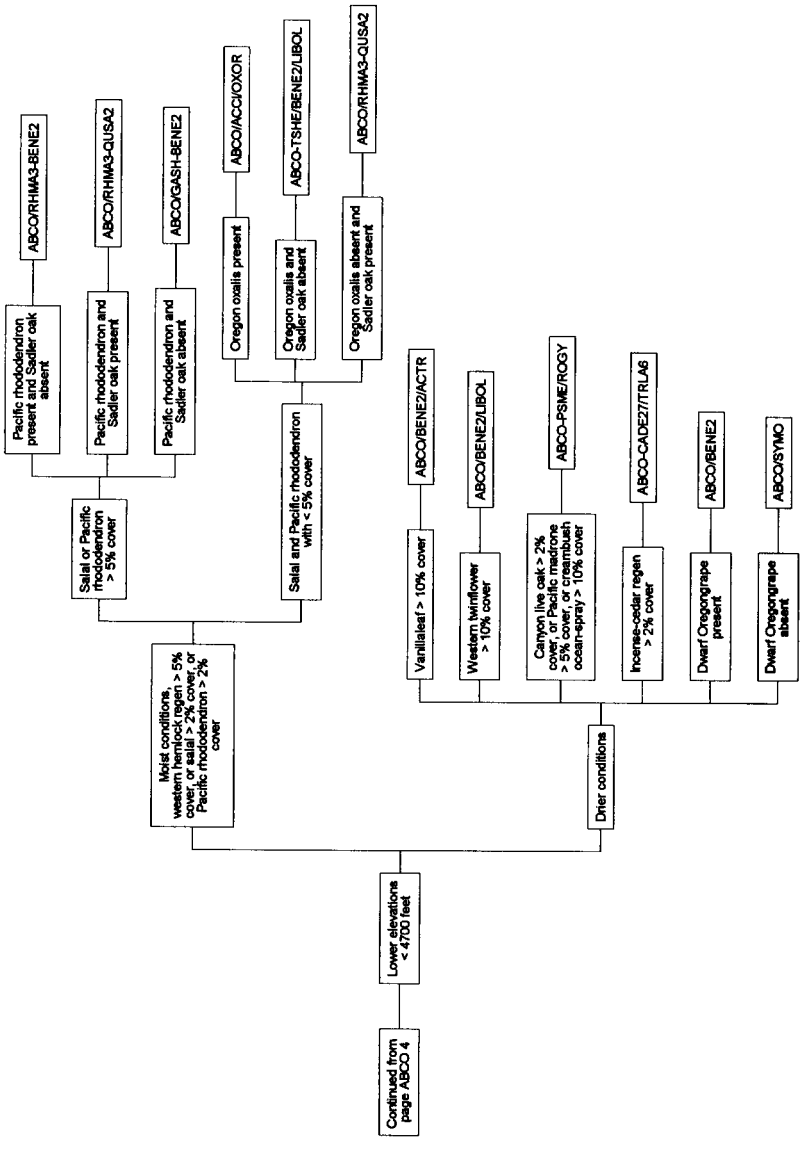
LITERATURE CITED

Zobel, D. B. 1973. Local variation in intergrading *Abies grandis-Abies concolor* populations in the central OregonCascades. I. Needle morphology and periderm color. Botanical Gazette 134(3):209-220.

Zobel, D. B. 1974. Local variation in intergrading *Abies grandis-Abies concolor* populations in the central Oregon Cascades. II. Stomatal reaction to moisture stress Botanical Gazette 135(2):200-210.

ABCO 4


White Fir Series
High elevation > 4700 feet; white fir & Shasta red fir dominant in the overstory
Sadler oak present
ABCO-ABMAS/QUSA2
Vanillaleaf present
ABCO-ABMAS/ACTR
Common beargrass > 10% cover
ABCO/XETE
ABCO-ABMAS/CHUM-ANDE3
Lower elevations < 4700 feet
Pinemat manzanita > 5% cover
ABCO/ARNE
Huckleberry oak >10% cover
ABCO/QUVA
Tanoak and common prince's-pine present
ABCO-LIDE3/CHUM
Common beargrass > 10% cover
ABCO/XETE
See Page ABCO 5
Elevation is variable
Ultramafic soils
Huckleberry oak > 10% cover
ABCO/QUVA
Cold and dry
Brewer spruce regen present
ABCO-PIBR/CHUM-PYPI2


Continued from page ABCO 4
Lower elevations < 4700 feet
Moist conditions, western hemlock regen > 5% cover, or salal > 2% cover, or Pacific rhododendron > 2% cover
Drier conditions
Salal or Pacific rhododendron > 5% cover
Salal and Pacific rhododendron with < 5% cover
Pacific rhododendron present and Sadler oak absent
Pacific rhododendron and Sadler oak present
Pacific rhododendron and Sadler oak absent
Oregon oxalis present
Oregon oxalis and Sadler oak absent
Oregon oxalis absent and Sadler oak present
ABCO/RHMA3-BENE2
ABCO/RHMA3-QUSA2
ABCO/GASH-BENE2
ABCO/ACCI/OXOR
ABCO-TSHE/BENE2/LIBOL
ABCO/RHMA3-QUSA2
Vanillaleaf > 10% cover
Western twinflower > 10% cover
Canyon live oak > 2% cover or Pacific rhododendron > 5% cover, or creambush ocean-spray > 10% cover
Incense-cedar regen > 2% cover
Dwarf Oregongrape present
Dwarf Oregongrape absent
ABCO/BENE2/ACTR
ABCO/BENE2/LIBOL
ABCO-PSME/ROGY
ABCO-CADE27/TRLA6
ABCO/BENE2
ABCO/SYMO

ABCO 6

The relationship of draft and final plant associations in the White Fir Series is shown below. The draft associations are listed, with the final associations below each, in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

ABCO-ABAM/BENE (N=3)
ABCO-CADE27/TRLA6 (33%)
ABCO/BENE2 (33%)
ABCO/BENE2/ACTR (33%)

ABCO-ABMAS/CHUM (N=25)
ABCO-ABMAS/CHUM-ANDE3 (40%)
ABCO-ABMAS/ACTR (24%)
ABCO/BENE2 (12%)
ABCO/BENE2/LIBOL (8%)
ABCO/RHMA3-BENE2 (4%)
ABCO/SYMO (4%)
ABMAS/VAME/CHUM (4%)
TSME/RHMA3/XETE (4%)

ABCO-ABMAS/RIBES (N=6)
ABCO-ABMAS/ACTR (83%)
ABCO-CADE27/TRLA6 (17%)

ABCO-ABMAS/ROGY (N=10)
ABCO-ABMAS/QUSA2 (40%)
ABCO-ABMAS/ACTR (20%)
ABCO/BENE2/ACTR (20%)
ABCO-ABMAS/CHUM-ANDE3 (10%)
ABMAS-ABCO/ROGY/PYSE (10%)

ABCO-ABMAS/SYMO (N=15)
ABCO-ABMAS/CHUM-ANDE3 (60%)
ABCO-ABMAS/QUSA2 (13%)
ABCO-CADE27/TRLA6 (13%)
ABCO/BENE2 (7%)
ABCO/SYMO (7%)

ABCO/ACCI/ACTR (N=19)
ABCO/BENE2/ACTR (40%)
ABCO/BENE2 (16%)
ABCO-TSHE/BENE2/LIBOL (10%)
ABCO/BENE2/LIBOL (10%)
ABCO/RHMA3-BENE2 (10%)
ABCO-CADE27/TRLA6 (5%)
ABCO-PSME/ROGY (5%)
ABCO/ACCI/OXOR (5%)
PSME/ACCI-BENE2 (5%)

ABCO-ACGL (N=4)
ABCO/BENE2 (50%)
ABCO-CADE27/TRLA6 (25%)
ABCO/SYMO (25%)

ABCO-ACGL/BENE (N=7)
ABCO-CADE27/TRLA6 (43%)
ABCO/BENE2 (43%)
ABCO/BENE2/LIBOL (14%)

ABCO-CHLA/DEPAUPERATE (N=3)
ABCO/BENE2/ACTR (33%)
CHLA-ABCO/BENE2 (33%)
PSME-ABCO (33%)

ABCO-CHNO (N=1)
ABCO-ABMAS/ACTR (100%)

ABCO-CADE3/BENE (N=15)
ABCO-CADE27/TRLA6 (43%)
ABCO-TSHE/BENE2/LIBOL (21%)
ABCO/BENE2/LIBOL (14%)
ABCO/BENE2/ACTR (7%)
ABCO/BENE2 (7%)
TSHE-ABCO/ACCI-BENE2 (7%)

ABCO-LIDE3 (N=19)
ABCO-LIDE3/CHUM (45%)
ABCO/BENE2 (14%)
ABCO/ARNE (9%)
PSME-ABCO (9%)
ABCO/QUVA (9%)
ABCO-PSME/ROGY (5%)
LIDE3-PSME-QUCH2/BENE2 (5%)
LIDE3-PSME-QUCH2/RHDI6 (5%)

ABCO-PIBR/CHUM (N=9)
ABCO-PIBR/CHUM-PYPI2 (44%)
ABCO/QUVA (22%)
ABCO-LIDE3/CHUM (11%)
CHLA/QUVA/XETE (11%)
PSME/ARNE-SWO (11%)

ABCO-PIBR/GAOV (N=8)
ABCO-PIBR/CHUM-PYPI2 (25%)
ABCO/QUVA (25%)
ABCO-ABMAS/QUSA2 (13%)
ABCO-LIDE3/CHUM (13%)
ABCO/BENE2/ACTR (13%)
ABMAS-ABCO/QUSA2/CHUM (13%)

ABCO-PIBR/VAME (N=7)
ABCO-PIBR/CHUM-PYPI2 (57%)
ABCO-ABMAS/QUSA2 (14%)
ABCO-LIDE3/CHUM (14%)
TSME-ABMAS/VAME/CHUM (14%)

ABCO-PICO/AMAL (N=3)
ABCO-ABMAS/CHUM-ANDE3 (33%)
ABCO/BENE2 (33%)
ABMAS-PICO/ARNE/CHUM (33%)

ABCO-PIPO (N=3)
ABCO-CADE27/TRLA6 (33%)
ABCO-PSME/ROGY (33%)
ABCO/SYMO (33%)

ABCO-PSME (N=37)
ABCO/BENE2 (38%)
ABCO-PSME/ROGY (22%)
ABCO/BENE2/ACTR (11%)
ABCO-TSHE/BENE2/LIBOL (5%)
ABCO/BENE2/LIBOL (5%)
ABCO/SYMO (5%)
ABCO/XETE (5%)
ABCO-CADE27/TRLA6 (3%)
PSME-ABCO (3%)

ABCO-PSME/BENE (N=10)
ABCO/BENE2 (50%)
ABCO-LIDE3/CHUM (10%)
ABCO-PIBR/CHUM-PYPI2 (10%)
ABCO/ARNE (10%)
ABCO/BENE2/LIBOL (10%)
LIDE3-PSME-QUCH2/BENE2 (10%)

ABCO-PSME/BEPI (N=13)
ABCO-CADE27/TRLA6 (38%)
ABCO/BENE2 (31%)
ABCO-PSME/ROGY (8%)
ABCO-TSHE/BENE2/LIBOL (8%)
PSME-ABCO (8%)
PSME-CADE27/BEPI2 (8%)

ABCO-PSME/DEPAUPERATE (N=4)
ABCO/SYMO (50%)
ABCO-PSME/ROGY (25%)
ABCO/ARNE (25%)

ABCO-PSME/HODI (N=23)
ABCO/BENE2 (45%)
ABCO-PSME/ROGY (23%)
ABCO/SYMO (18%)
ABCO/BENE2/ACTR (4%)
PSME-ABCO/SYMO (4%)
PSME-PIPO/RHDI6 (4%)

ABCO-QUSA-CACH (N=8)
ABCO-PSME/ROGY (38%)
ABCO/BENE2 (25%)
ABCO/QUVA (25%)
ABCO/SYMO (12%)

ABCO-QUSA/BENE (N=8)
ABCO/BENE2 (38%)
ABCO-CADE27/TRLA6 (25%)
ABCO-LIDE3/CHUM (25%)
ABCO-PSME/ROGY (13%)

ABCO-QUSA/BENE-PAMY (N=14)
ABCO/BENE2/ACTR (50%)
ABCO/BENE2 (21%)
ABCO-CADE27/TRLA6 (14%)
CHLA-ABCO/BENE2 (7%)
PSME-CACH6/BENE2 (7%)

ABCO-QUSA/CHUM (N=4)
ABCO-ABMAS/QUSA2 (75%)
ABCO-ABMAS/ACTR (25%)

ABCO-TABR (N=8)
ABCO/BENE2/ACTR (50%)
ABCO/BENE2/LIBOL (38%)
ABCO-TSHE/BENE2/LIBOL (12%)

ABCO-TSHE-ACCI (N=2)
ABCO-TSHE/BENE2/LIBOL (50%)
ABCO/BENE2 (50%)

ABCO-TSME/VAME (N=1)
ABCO-TSHE/BENE2/LIBOL (100%)

ABCO/AMAL/ANDE (N=7)
ABCO/BENE2 (57%)
ABCO/BENE2/LIBOL (29%)
PSME-ABCO (14%)

ABCO 8

ABCO/BENE (N=17)
ABCO-PSME/ROGY (29%)
ABCO/BENE2/ACTR (36%)
ABCO/BENE2 (14%)
ABCO-LIDE3/CHUM (7%)
ABCO-TSHE/BENE2/LIBOL (7%)
ABCO/BENE2/LIBOL (7%)

ABCO/BENE-GASH (N=21)
ABCO/RHMA3-BENE2 (71%)
ABCO/GASH-BENE2 (24%)
PSME/GASH-BENE2 (5%)

ABCO/BENE/ANDE (N=3)
ABCO/BENE2 (100%)

ABCO/CHUM/PYROLA (N=1)
ABCO/BENE2/ACTR (100%)

ABCO/COCOC-AMAL (N=3)
ABCO-CADE27/TRLA6 (33%)
ABCO-PSME/ROGY (33%)
PSME-ABCO/SYMO (33%)

ABCO/HERB (N=10)
ABCO/BENE2/ACTR (30%)
ABCO/BENE2/LIBOL (20%)
ABCO-ABMAS/ACTR (20%)
ABCO-PSME/ROGY (10%)
ABCO/ARNE (10%)
ABCO/BENE2 (10%)

ABCO/RHDI (N=4)
ABCO/GASH-BENE2 (50%)
ABCO/BENE2 (25%)
ABCO-TSHE/BENE2/LIBOL (25%)

ABCO/RUNI/ACTR (N=14)
ABCO-TSHE/BENE2/LIBOL (36%)
ABCO/BENE2/ACTR (29%)
ABCO/BENE2/LIBOL (14%)
ABCO/BENE2 (7%)
ABCO-CADE27/TRLA6 (7%)
PSME-ABCO (7%)

ABCO/SYMO (N=11)
ABCO/BENE2 (35%)
ABCO/BENE2/ACTR (17%)
ABCO-ABMAS/CHUM-ANDE3 (17%)
ABCO-PSME/ROGY (16%)
ABCO/SYMO (8%)
ABCO/BENE2/LIBOL (8%)

ABCO/VAME/ACTR (N=6)
ABCO-TSHE/BENE2/LIBOL (67%)
ABCO/BENE2/ACTR (17%)
ABCO/RHMA3-BENE2 (17%)

ABCO/VAME/LIBOL (N=10)
ABCO/BENE2/LIBOL (70%)
ABCO/BENE2 (20%)
ABCO/BENE2/ACTR (10%)

KEY TO THE WHITE FIR PLANT ASSOCIATIONS

1a	White fir (ABCO) and Shasta red fir (ABMAS) dominant in the overstory Douglas-fir (PSME) with low cover in the overstory. Elevation over 4700 feet	2
1b	Douglas-fir (PSME) overstory cover higher than white fir (ABCO) or Shasta red fir (ABMAS) Elevation less than 4700 feet	5
2a	Sadler oak (QUSA2) present	ABCO-ABMAS/QUSA2 Page ABCO 12
2b	Sadler oak (QUSA2) absent	3
3a	Vanillaleaf (ACTR) present	ABCO-ABMAS/ACTR Page ABCO 14
3b.	Vanillaleaf (ACTR) absent	4
4a	Common beargrass (XETE) greater than or equal to 10 percent cover.	ABCO/XETE Page ABCO 16
4b	Common beargrass (XETE) less than 10 percent cover	ABCO-ABMAS/CHUM-ANDE3 Page ABCO 18
5a	Shasta red fir (ABMAS) regeneration greater than 1 percent cover	6
5b	Shasta red fir (ABMAS) regeneration less than or equal to 1 percent cover	8
6a	Huckleberry oak (QUVA) greater than or equal to 10 percent cover.	ABCO/QUVA Page ABCO 20
6b	Huckleberry oak (QUVA) less than 10 percent cover	7
7a	Brewer spruce (PIBR) regeneration present	ABCO-PIBR/CHUM-PYPI2 Page ABCO 22
7b	Not as above	See ABMAS key

ABCO 10

8a	Pinemat manzanita (ARNE) greater than or equal to 5 percent cover	ABCO/ARNE Page ABCO 24
8b	Pinemat manzanita (ARNE) less than 5 percent cover.	9
9a.	Huckleberry oak (QUVA) greater than or equal to 10 percent cover.	ABCO/QUVA Page ABCO 20
9b.	Huckleberry oak (QUVA) less than 10 percent cover	10
10a.	Tanoak (LIDE3), little prince's-pine (CHME), and common prince's-pine (CHUM) present	ABCO-LIDE3/CHUM Page ABCO 26
10b	Not as above.	11
11a	Common beargrass (XETE) greater than or equal to 10 percent cover	ABCO/XETE Page ABCO 16
11b	Common beargrass (XETE) less than 10 percent cover	12
12a	Western hemlock (TSHE) regeneration at least 5 percent cover, or salal (GASH) at least 2 percent cover, or Pacific rhododendron (RHMA3) at least 2 percent cover	13
12b	Not as above.	16
13a	Salal (GASH) or Pacific rhododendron (RHMA3) greater than or equal to 5 percent cover	14
13b	Not as above.	15
14a	Pacific rhododendron (RHMA3) present and Sadler oak (QUSA2) absent	ABCO/RHMA3-BENE2 Page ABCO 28
14b	Pacific rhododendron (RHMA3) present and Sadler oak (QUSA2) present	ABCO/RHMA3-QUSA2 Page ABCO 30
14c	Pacific rhododendron (RHMA3) absent	ABCO/GASH-BENE2 Page ABCO 32

15a	Oregon oxalis (OXOR) present	ABCO/ACCI/OXOR Page ABCO 34
15b	Oregon oxalis (OXOR) absent and Sadler oak (QUSA2) absent.	ABCO-TSHE/BENE2/LIBOL Page ABCO 36
15c.	Oregon oxalis (OXOR) absent and Sadler oak (QUSA2) present	ABCO/RHMA3-QUSA2 Page ABCO 30
16a.	Vanillaleaf (ACTR) greater than or equal to 10 percent cover	ABCO/BENE2/ACTR Page ABCO 38
16b	Vanillaleaf (ACTR) with less than 10 percent cover	17
17a	Western twinflower (LIBOL) greater than or equal to 10 percent cover.	ABCO/BENE2/LIBOL Page ABCO 40
17b	Western twinflower (LIBOL) less than 10 percent cover.	18
18a	Canyon live oak (QUCH2) greater than 2 percent cover, or Pacific madrone (ARME) greater than 5 percent cover, or creambush ocean-spray (HODI) greater than or equal to 10 percent cover.	ABCO-PSME/ROGY Page ABCO 42
18b	Not as above	19
19a.	Incense-cedar (CADE27) regeneration greater than or equal to 2 percent cover.	ABCO-CADE27/TRLA6 Page ABCO 44
19b	Incense-cedar (CADE27) regeneration less than 2 percent cover.	20
20a	Dwarf Oregongrape (BENE2) present.	ABCO/BENE2 Page ABCO 46
20b	Dwarf Oregongrape (BENE2) absent	ABCO/SYMO Page ABCO 48

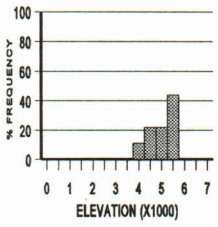
ABCO 12

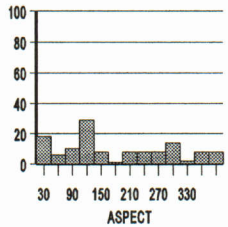
WHITE FIR-SHASTA RED FIR/SADLER OAK
Abies concolor-Abies magnifica shastensis/Quercus sadleriana
ABCO-ABMAS/QUSA2 (N=17; FS=7)

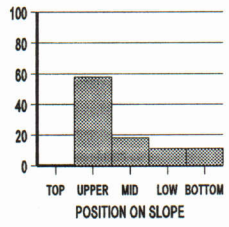
Distribution. This Association occurs on the Applegate Ranger Disrict, Rogue River National Forest and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs on cold sites at high elevations. This Association is wetter than White Fir-Shasta Red Fir/Vanillaleaf and White Fir-Shasta Red Fir/Common Prince's-pine-Threeleaf Anemone. Overstory tree canopy cover is often low.

Soils. Parent material is mostly diorite, granodiorite, and sandstone, with some quartz diorite and grabbro. Average surface rock cover is 16 percent, with 9 percent gravel, and 3 percent bare ground exposure. Soils are moderately deep to deep, with an average depth of more than 49 inches. Based on two plots sampled, surface texture is loam and sand, with 20 to 45 percent gravel, and 0 to 17 percent clay.







Subsurface texture is loam and sand, with 10 to 25 percent gravel, 20 to 75 percent cobbles, and 0 to 20 percent clay

Environment This Association averages 5220 feet in elevation and occurs on aspects that are predominantly north, east and west Slope averages 42 percent and ranges from 12 to 80 percent This Association occurs predominantly on upper third slope positions

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 30 White fir and Shasta red fir are frequent, and Douglas-fir common in the overstory White fir and Shasta red fir are present in the understory, Douglas-fir is common Hardwoods include Douglas maple, big-leaf maple, red alder, golden chinquapin, Pacific dogwood, tanoak, and canyon live oak In the shrub layer, Sadler oak is frequent Dwarf Oregongrape, baldhip rose, dwarf bramble, Pacific blackberry, Sitka mountain-ash, and creeping snowberry are common shrubs Common prince's-pine, whitevein pyrola, and one-sided pyrola are frequent in the herb/grass layer Vanillaleaf, threeleaf anemone, little prince's-pine, white-flowered hawkweed, and western false Solomon's-seal are common Moss cover is very low for the Series, averaging only 2 percent

Upper and middle layer tree covers are low to intermediate for the Series, averaging 59 and 40 percent cover, respectively Lower layer tree cover averages 14 percent cover Shrub cover is low to very low, with high shrub cover averaging 17 percent and low shrub cover 13 percent Herb/grass cover ranges from 1 to 65 percent, and averages 29 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
White fir	ABCO	100	29	
Shasta red fir	ABMAS	89	28	
Douglas-fir	PSME	56	14	
Understory trees				5
White fir	ABCO	100	23	
Shasta red fir	ABMAS	100	10	
Douglas-fir	PSME	56	3	
Incense-cedar	CADE27	50	3	
Shrubs				9
Sadler oak	QUSA2	100	16	
Baldhip rose	ROGY	67	2	
Creeping snowberry	SYMO	67	2	
Sitka mountain-ash	SOSI2	61	1	
Herbs				16
Common prince's-pine	CHUM	83	7	
Whitevein pyrola	PYPI2	83	1	
One-sided pyrola	PYSE	78	3	
White-flowered hawkweed	HIAL2	72	2	
Vanillaleaf	ACTR	61	6	
Threeleaf anemone	ANDE3	61	1	
Western false Solomon's-seal	SMST	61	1	
Little prince's-pine	CHME	56	1	

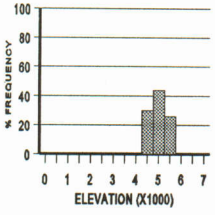
ABCO 14

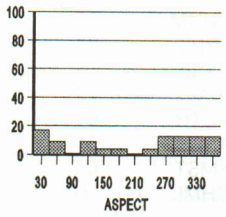
WHITE FIR-SHASTA RED FIR/VANILLALEAF
Abies concolor-Abies magnifica shastensis/Achlys triphylla
ABCO-ABMAS/ACTR (N=22; FS=22)

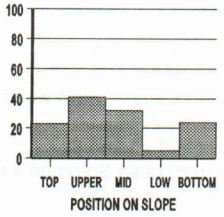
Distribution. This Association occurs on the Diamond Lake Ranger District, Umpqua National Forest, the Applegate and Prospect Ranger Districts, Rogue River National Forest, and the Illinois Valley Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs on very high elevation, cold sites. Overstory tree cover is low and herbs are abundant. This Association receives less precipitation than White Fir-Shasta Red Fir/Sadler Oak and more precipitation than White Fir-Shasta Red Fir/Common Prince's-pine-Threeleaf Anemone or White Fir/Creeping Snowberry.

Soils. Parent material is mostly a mix of igneous materials including diorite, granodiorite, granite, gabbro, andesite, and basalt. Average surface rock cover is 5 percent, with 7 percent gravel and 5 percent bare ground exposure.
Soils are moderately deep to deep, with an average depth greater than 44 inches.







Based on one plot sampled, surface textures are loam with 15 to 45 percent gravel, 40 percent cobbles, and 19 percent clay. Subsurface textures are loam with 15 percent gravel, 50 percent cobbles, and 23 percent clay.

Environment. This Association averages 5190 feet in elevation and the aspect is predominantly north and west. Slope averages 35 percent and ranges from 6 to 65 percent This Association occurs predominantly upper or middle-thirds of slopes or ridge tops.

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 44. White fir and Shasta red fir are frequent in the overstory, and Douglas-fir is common. White fir and Shasta red fir are frequent in the regeneration layer, and incense- cedar is common. Mountain hemlock occurs occasionally Hardwoods include Douglas maple, big-leaf maple, Sitka alder, Pacific dogwood, and canyon live oak Baldhip rose, creeping snowberry, and dwarf Oregongrape are common Vanillaleaf, white inside-out-flower, trail-plant, threeleaf anemone, bigleaf sandwort, Scouler's harebell, queen's cup, Oregon fairybell, woods strawberry, white-flowered hawkweed, starry false Solomon's-seal, western starflower, white trillium, and stream violet are frequent herbs. Moss cover averages 2 percent.

Upper and mid layer tree covers are low for the Series, averaging 55 and 33 percent cover, respectively. Lower layer tree cover averages 15 percent. Shrub cover is low to very low, with high shrub cover averaging 3 percent and low shrub cover 15 percent Herb/grass cover is high for the Series, ranging from 45 to 95 percent, and averaging 71 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
White fir	ABCO	100	31	
Shasta red fir	ABMAS	100	13	
Douglas-fir	PSME	61	11	
Understory trees				4
White fir	ABCO	100	21	
Shasta red fir	ABMAS	91	8	
Incense-cedar	CADE27	70	2	
Shrubs				8
Baldhip rose	ROGY	73	3	
Herbs				32
Vanillaleaf	ACTR	100	13	
Starry false Solomon's-seal	SMST	96	7	
White inside-out-flower	VAHE	96	4	
White-flowered hawkweed	HIAL2	96	2	
Trail-plant	ADBI	91	2	
Bigleaf sandwort	ARMA18	91	2	
Scouler's harebell	CASC7	87	4	
Threeleaf anemone	ANDE3	87	2	
White trillium	TROV2	87	1	
Stream violet	VIGL	83	2	
Woods strawberry	FRVEB	78	3	

ABCO 16

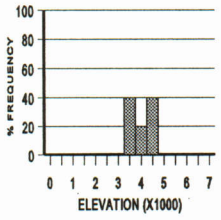
WHITE FIR/COMMON BEARGRASS
Abies concolor/Xerophyllum tenax
ABCO/XETE (N=5; BLM=5)

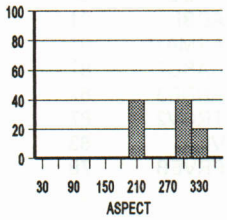
Distribution. This Association occurs on the Grants Pass and Glendale Resource Areas of the Medford District, Bureau of Land Management. It may also occur on adjacent Forest Service lands.

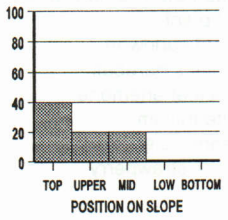
Distinguishing Characteristics. This Association occurs at moderate elevations, on moist warm sites. Common beargrass cover is high.

Soils. Parent material can be schist, serpentine, or peridotite. Average surface rock cover is 34 percent, with 28 percent gravel, and 3 percent bare ground exposure. The depth on one sample plot was 30 inches.

Environment. This Association averages 4310 feet in elevation and occurs on northwest and southwest aspects. Slope averages 26 percent and ranges from 8 to 48 percent. This Association occurs predominately on ridge top positions.







Vegetation Composition and Structure Total species richness is low for the Series, averaging 25 Douglas-fir and white fir are frequent overstory White fir is frequent in the understory and Douglas-fir is common Hardwoods may include golden chinquapin In the shrub layer, baldhip rose and dwarf Oregongrape are frequent, and creambush ocean-spray is common Common beargrass is likely present, and western fescue, white-flowered hawkweed, and snow-queen are common Moss cover is low for the Series, averaging 4 percent.

Cover of trees exceeding 10 feet tall (3 meters) averages 68 percent, while trees less than 10 feet tall average 8 percent cover Cover of shrubs greater than 20 inches tall (50 centimeters) averages only 1 percent, and cover of shrubs less than 20 inches tall averages 2 percent Herb/grass cover ranges from 30 to 85 percent, and averages 46 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	47	
White fir	ABCO	80	11	
Shasta red fir	ABMAS	40	18	
Incense-cedar	CADE27	40	10	
Understory trees				2
White fir	ABCO	100	13	
Douglas-fir	PSME	60	4	
Incense-cedar	CADE27	40	5	
Shrubs				6
Baldhip rose	ROGY	100	1	
Dwarf Oregongrape	BENE2	80	1	
Creambush ocean-spray	HODI	60	1	
Western serviceberry	AMAL2	40	1	
Pacific blackberry	RUUR	40	1	
Creeping snowberry	SYMO	40	1	
Herbs				16
Common beargrass	XETE	100	32	
Snow-queen	SYRE	60	6	
Western fescue	FEOC	60	1	
White-flowered hawkweed	HIAL2	60	1	
Scouler's harebell	CASC7	40	2	
Trail-plant	ADBI	40	1	
Common prince's-pine	CHUM	40	1	
Little prince's-pine	CHME	40	1	
Pacific coral-root	COME4	40	1	
Northwest listera	LICA10	40	1	
Alaska oniongrass	MESU	40	1	
Yampah	PEGA3	40	1	
Woodland phlox	PHAD2	40	1	
Western sword-fern	POMU	40	1	
Whitevein pyrola	PYPI2	40	1	
One-sided pyrola	PYSE	40	1	
Columbia brome	BRVU	40	1	

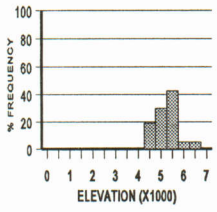
ABCO 18

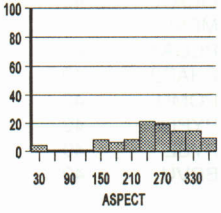
WHITE FIR-SHASTA RED FIR/COMMON PRINCE'S-PINE-THREELEAF ANEMONE
Abies concolor-Abies magnifica shastensis/Chimaphila umbellata-Anemone deltoidea
ABCO-ABMAS/CHUM-ANDE3 (N=27; FS=27)

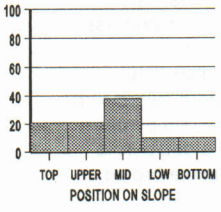
Distribution. This Association occurs on the Diamond Lake Ranger District, Umpqua National Forest, the Ashland, Applegate, and Butte Falls Ranger Districts, Rogue River National Forest, and the Illinois Valley Ranger District, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs at high elevations on cold sites. Shasta red fir is a major component of the stand. The number of herb species is about half that of the White Fir-Shasta Red Fir/Vanillaleaf Association. This Association is slightly colder and much drier than the White Fir-Shasta Red Fir/ Vanillaleaf or White Fir-Shasta Red Fir/Sadler Oak Plant Associations.

Soils. Parent material varies from andesite and basalt to diorite and granite. The average surface rock cover is 12 percent, with 9 percent surface gravel. Based on three plots sampled, soils can be shallow to deep (average depth of greater than 40







inches and very well drained The surface textures are fine loamy sand and loamy sand, with an average of 15 percent gravel and 5 percent clay. Subsurface textures are loamy sand, with an average of 21percent gravel, 5 percent cobbles, and 3 percent clay.

Environment This Association averages 5420 feet in elevation and the aspect is predominantly west to northwest Slope averages 24 percent and ranges from 3 to 50 percent. This Association occurs on ridge tops and upper and middle thirds of slopes

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 33 White fir, Shasta red fir, and Douglas-fir are frequent in the overstory and understory. Pacific yew, golden chinquapin, and lodgepole pine may have high cover Additional hardwoods include Douglas maple, red alder, and Pacific dogwood In the shrub layer, baldhip rose is frequent, and Oregon boxwood and creeping snowberry are common. Threeleaf anemone, bigleaf sandwort, Scouler's harebell, common prince's-pine, woods strawberry, white-flowered hawkweed, and whitevein pyrola are frequently encountered herbs Moss cover is very low for the Series, averaging 3 percent

Upper and mid layer tree covers are low to intermediate for the Series, averaging 56 and 44 percent, respectively Lower layer tree cover averages 21 percent Shrub cover is very low to low, with high shrub cover averaging only 2 percent and low shrub cover 23 percent Herb/grass cover ranges from 1 to 65 percent, and averages 31 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
White fir	ABCO	100	29	
Shasta red fir	ABMAS	100	19	
Douglas-fir	PSME	75	11	
Understory trees				4
White fir	ABCO	100	24	
Shasta red fir	ABMAS	93	10	
Douglas-fir	PSME	79	4	
Shrubs				6
Baldhip rose	ROGY	82	2	
Creeping snowberry	SYMO	68	4	
Herbs				21
Common prince's-pine	CHUM	96	9	
Bigleaf sandwort	ARMA18	89	2	
Threeleaf anemone	ANDE3	86	1	
Woods strawberry	FRVEB3	79	2	
Scouler's harebell	CASC7	75	2	
White-flowered hawkweed	HIAL2	75	1	
Whitevein pyrola	PYPI2	75	1	
Starry false Solomon's-seal	SMST	68	2	
One-sided pyrola	PYSE	68	1	
Rattlesnake-plantain	GOOB2	61	1	

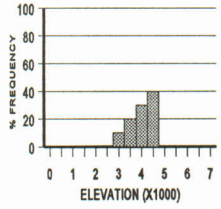
ABCO 20

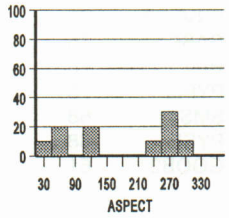
WHITE FIR/HUCKLEBERRY OAK
Abies concolor/Quercus vaccinifolia
ABCO/QUVA (N=13; FS=10, BLM=3)

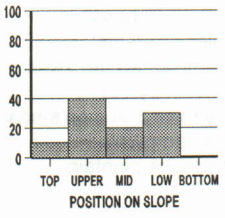
Distribution. This Association occurs on the Applegate Ranger District, Rogue River National Forest, the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and the Grants Pass Resource Area of the Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs on wet sites with ultramafic soils. Huckleberry oak is an indicator of this soil type. This Association is slightly drier and slightly warmer than the White Fir-Brewer Spruce/Common Prince's-pine-Whitevein Pyrola Association.

Soils. Parent material is mostly diorite or granite, with some andesite, sandstone, and a mix of metamorphosed volcanic materials. Average surface rock cover is 29 percent, with 22 percent gravel, and 3 to 4 percent each of bedrock and bare ground exposure. Based on one plot sampled, soils are moderately deep to deep (pit depth







was greater than 28 inches) Surface texture is sandy loam with 30 to 35 percent gravel, 25 to 30 percent cobbles, and 5 percent clay Subsurface texture is sandy loam, with 15 to 30 percent gravel, 25 to 70 percent cobbles, and 8 to 14 percent clay

Environment This Association averages 4250 feet in elevation Occurrence on south aspects is not common. Slope averages 43 percent and ranges from 20 to 75 percent This Association occurs on all slope positions, except valley bottoms

Vegetation Composition and Structure. Species richness is low for the Series, averaging 29. Douglas-fir is frequent in both the overstory and understory. Sugar pine is frequent in the overstory White fir, sugar pine, and incense-cedar are frequent in the understory, and Shasta red fir, golden chinquapin, tanoak, and brewer spruce are common Hardwoods may include vine maple, Douglas maple, Pacific madrone, Pacific dogwood, and canyon live oak In the shrub layer, dwarf Oregongrape, huckleberry oak, and baldhip rose are frequent Pinemat manzanita, Pacific blackberry, and red huckleberry are common. Common prince's-pine, little prince's-pine, rattlesnake-plantain, western sword-fern, whitevein pyrola, and whipplevine are frequent in the herb/grass layer Vanillaleaf, western twinflower, western starflower, and common beargrass are common Moss cover is intermediate for the Series, averaging 9 percent.

Upper and mid layer tree covers are low to intermediate for the Series, averaging 56 and 48 percent cover, respectively Lower layer tree cover averages 47 percent Shrub cover is low to intermediate, with high shrub cover averaging only 9 percent and low shrub cover 38 percent Herb/grass cover ranges from 7 to 60 percent, and averages 18 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	52	
Sugar pine	PILA	90	7	
Understory trees				6
White fir	ABCO	100	30	
Douglas-fir	PSME	100	7	
Sugar pine	PILA	100	2	
Incense-cedar	CADE27	80	4	
Golden chinquapin	CACH6	70	4	
Tanoak	LIDE3	60	3	
Brewer spruce	PIBR	60	3	
Shrubs				11
Huckleberry oak	QUVA	100	25	
Dwarf Oregongrape	BENE2	100	8	
Baldhip rose	ROGY	90	2	
Herbs				12
Common prince's-pine	CHUM	100	7	
Whipplevine	WHMO	90	7	
Rattlesnake-plantain	GOOB2	90	1	
Whitevein pyrola	PYPI2	90	1	
Western sword-fern	POMU	80	2	

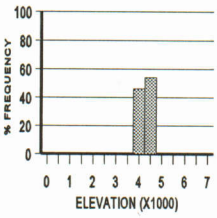
ABCO 22

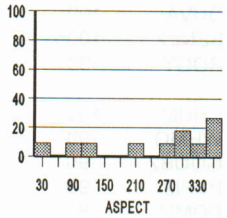
WHITE FIR-BREWER SPRUCE/COMMON PRINCE'S-PINE-WHITEVEIN PYROLA
Abies concolor-Picea breweriana/Chimaphila umbellata-Pyrola picta
ABCO-PIBR/CHUM-PYPI2 (N=11; FS=11)

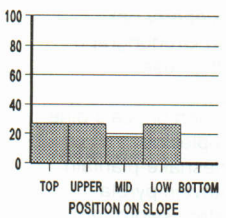
Distribution. This Association occurs on the Applegate Ranger District of the Rogue River National Forest, and the Illinois Valley Ranger District of the Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs on the coldest, wettest sites of the Series. It occurs in a narrow elevational band between 4000 and 4500 feet.

Soils. Parent material is mostly a mix of igneous materials, including diorite and gabbro, andesite, basalt, and granite. Average surface rock cover is 19 percent, with 17 percent gravel, 7 percent surface bedrock, and 3 percent bare ground exposure. Soils are shallow to deep, with an average depth of greater than 30 inches. Based on one plot sampled, surface textures are loam, with 60 percent gravel, 5 percent cobbles, and 18 percent clay. Subsurface textures are sandy loam and loamy sand, with 45 percent gravel, 5 to 10 percent cobbles, and 6 to







16 percent clay

Environment This Association averages 4490 feet in elevation and occurs on generally north aspects Slope averages 38 percent and ranges from 12 to 70 percent It occurs on all slope positions, with the exception of bottoms or valleys

Vegetation Composition and Structure Total species richness is intermediate, averaging 32. Douglas-fir is present in the overstory and understory White fir is frequent in the overstory and present in the understory Shasta red fir and Brewer spruce are also present in the understory. Golden chinquapin and incense-cedar are common Other hardwoods may include Douglas maple, red alder, tanoak, canyon live oak, and Oregon white oak. In the shrub layer, dwarf Oregongrape and Sadler oak are frequent Western serviceberry, pinemat manzanita, baldhip rose, and red huckleberry are common Common prince's-pine is present in the herb layer, whitevein pyrola and rattlesnake-plantain are frequent. Western twinflower, one-sided pyrola, little prince's-pine, whipplevine, and common beargrass are common Moss cover is low, averaging 4 percent.

Upper and middle layer tree covers are intermediate to high, averaging 63 and 56 percent cover, respectively Lower layer tree cover averages 51 percent Shrub cover is very low to intermediate, with high shrub cover averaging only 5 percent and low shrub cover 36 percent. Herb cover ranges from 1 to 70 percent, and averages 25 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	34	
White fir	ABCO	82	13	
Sugar pine	PILA	55	12	
Shasta red fir	ABMAS	55	3	
Understory trees				8
White fir	ABCO	100	29	
Shasta red fir	ABMAS	100	6	
Brewer spruce	PIBR	100	5	
Douglas-fir	PSME	100	4	
Golden chinquapin	CACH6	64	4	
Incense-cedar	CADE27	64	3	
Sugar pine	PILA	55	1	
Western white pine	PIMO3	55	1	
Shrubs				10
Sadler oak	QUSA2	82	15	
Dwarf Oregongrape	BENE2	82	7	
Pinemat manzanita	ARNE	73	19	
Red huckleberry	VAPA	73	5	
Baldhip rose	ROGY	64	2	
Herbs				14
Common prince's-pine	CHUM	100	5	
Whitevein pyrola	PYPI2	91	1	
Rattlesnake-plantain	GOOB2	82	1	
Little prince's-pine	CHME	73	1	

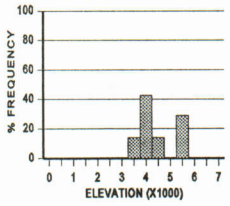
ABCO 24

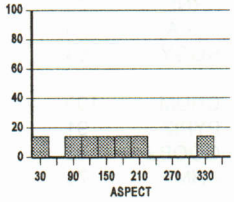
WHITE FIR/PINEMAT MANZANITA
Abies concolor/Arctostaphylos nevadensis
ABCO/ARNE (N=7; FS=7)

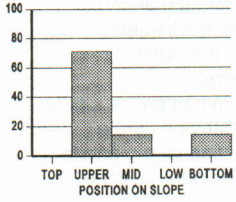
Distribution. This Association occurs on the Butte Falls and Ashland Ranger Districts, Rogue River National Forest and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs at intermediate elevations and on cool sites with moderate amounts of precipitation. Sugar pine and Douglas-fir are well represented. Soils are well drained.

Soils. Parent material is highly variable. The Association occurs over granitic and quartz diorite, gabbro, rhyolite, metamorphosed schist, slate, and siltstone. Average surface rock cover is 10 percent, with 12 percent gravel. Based on seven plots sampled, soils are moderately deep to deep (average depth 35 inches) and well drained to very well drained. The surface textures are mostly loamy sand or sandy loam, with some loam. Surface horizons have an average of 33 percent gravel, 33







percent cobbles and stone, and 13 percent clay Subsurface texture is mostly sand, with some sandy loam and loam Subsurface horizons have an average of 34 percent gravel, 26 percent cobbles or stones, and 14 percent clay Soil temperature regime can be either mesic or frigid, and the soil moisture regime is probably xeric

Environment. This Association averages 4740 feet in elevation and occurs on all aspects except perhaps west Slope averages 31 percent and ranges from 20 to 40 percent This Association occurs predominantly on upper third slope positions

Vegetation Composition and Structure Total species richness is very low for the Series, averaging 19. Douglas-fir, sugar pine, and white fir are frequent in the overstory and in the understory. Hardwoods that may be present include golden chinquapin, tanoak, and canyon live oak In the shrub layer, pinemat manzanita is frequent. Dwarf Oregongrape is common Rattlesnake-plantain and common prince's-pine are frequent, and little prince's-pine, white-flowered hawkweed, western twinflower, one-sided pyrola, and whitevein pyrola are common in the herb/ gasss layer Moss cover is very low for the Series, averaging 2 percent

Upper and mid layer tree covers are intermediate for the Series, averaging 65 and 49 percent cover, respectively. Lower layer tree cover averages 43 percent Shrub cover is very low to low, with high shrub cover averaging only 2 percent and low shrub cover 25 percent Herb/grass cover ranges from 1 to 60 percent, and averages 23 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	33	
Sugar pine	PILA	100	10	
White fir	ABCO	86	15	
Understory trees				6
White fir	ABCO	100	34	
Douglas-fir	PSME	86	7	
Sugar pine	PILA	86	2	
Golden chinquapin	CACH6	71	4	
Shrubs				5
Pinemat manzanita	ARNE	100	13	
Dwarf Oregongrape	BENE2	71	5	
Herbs				8
Common prince's-pine	CHUM	100	5	
Rattlesnake-plantain	GOOB2	86	1	
Whitevein pyrola	PYPI2	71	1	
Little prince's-pine	CHME	57	1	
White-flowered hawkweed	HIAL2	57	1	
Western twinflower	LIBOL	57	1	
One-sided pyrola	PYSE	57	1	

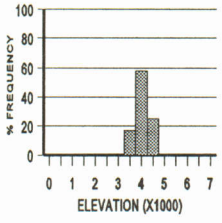
ABCO 26

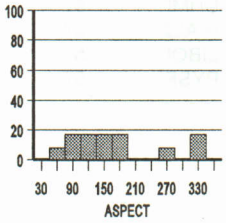
WHITE FIR-TANOAK/COMMON PRINCE'S-PINE
Abies concolor-Lithocarpus densiflorus/Chimaphila umbellata
ABCO-LIDE3/CHUM (N=17; FS=7)

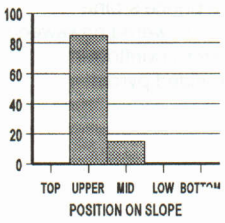
Distribution. This Association occurs on the Galice, Gold Beach, and Illinois Valley Ranger Districts, Siskiyou National Forest.

Distinguishing Characteristics. This Association occurs at moderate elevations on moderately steep, wet, warm sites. It is exceeded only by White Fir/Huckleberry Oak and White Fir-Brewer Spruce/Common Prince's-pine-Whitevein Pyrola in annual rainfall.

Soils. Parent material is variable, including granite and diorite, andesite and basalt, with some siltstone and sandstone. Average surface rock cover is 9 percent, with 21 percent gravel, and 3 percent bare ground exposure. Soils are shallow to moderately deep, with an average depth of greater than 36 inches. Based on three plots, surface texture is sandy loam, with 30 to 65 percent gravel, 10 to 15 percent cobbles, and 10 to 17 percent clay. Subsurface texture is sandy loam and loam, with







30 to 75 percent gravel, 0 to 30 percent cobbles, and 12 to 17 percent clay.

Environment. This Association averages 4170 feet in elevation and occurs predominantly on south and east aspects. Slope averages 42 percent and ranges from 20 to 62 percent. This Association frequently occurs on upper third slope positions.

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 24. White fir and Douglas-fir are frequent in the overstory and understory Sugar pine is common in the overstory. Tanoak is frequent in the understory, and canyon live oak and incense-cedar are common. Other hardwoods may include vine maple, Douglas maple, big-leaf maple, red alder, Pacific madrone, golden chinquapin, and Pacific dogwood In the shrub layer, dwarf Oregongrape and baldhip rose are frequent, and Pacific blackberry and creeping snowberry are common. Little prince's-pine, common prince's-pine, vanillaleaf, rattlesnake-plantain, and whitevein pyrola are frequent in the herb/grass layer; and Scouler's harebell, whipplevine, and Oregon fairybell are common Moss cover is intermediate for the Series, averaging 12 percent.

Upper and mid layer tree covers are intermediate to low for the Series, averaging 68 and 33 percent cover, respectively. Lower layer tree cover also averages 33 percent cover Shrub cover is very low, with high shrub cover averaging only 3 percent and low shrub cover 13 percent Herb/grass cover ranges from 2 to 76 percent, but averages only 15 percent.

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	55	
White fir	ABCO	76	10	
Sugar pine	PILA	65	5	
Understory trees				6
Douglas-fir	PSME	100	7	
Tanoak	LIDE3	100	6	
White fir	ABCO	94	28	
Canyon live oak	QUCH2	65	6	
Shrubs				8
Dwarf Oregongrape	BENE2	88	5	
Baldhip rose	ROGY	88	2	
Pacific blackberry	RUUR	71	1	
Creeping snowberry	SYMO	65	1	
Herbs				10
Little prince's-pine	CHME	100	1	
Common prince's-pine	CHUM	94	5	
Rattlesnake-plantain	GOOB2	82	1	
Whitevein pyrola	PYPI2	82	1	
Vanillaleaf	ACTR	76	2	
Whipplevine	WHMO	71	5	
Oregon fairybell	DIHOO	65	1	

ABCO 28

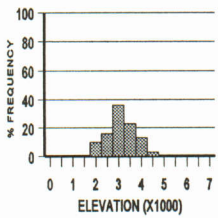
WHITE FIR/PACIFIC RHODODENDRON-DWARF OREGONGRAPE
Abies concolor/Rhododendron macrophyllum-Berberis nervosa
ABCO/RHMA3-BENE2 (N=31; FS=31)

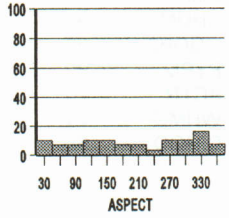
Distribution. This Association occurs on all Ranger Districts of the Umpqua National Forest. It may also occur on adjacent Bureau of Land Management lands.

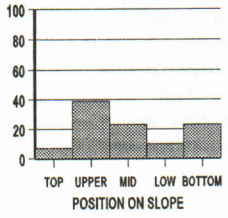
Distinguishing Characteristics. This Association occurs at moderate elevations on very warm, moderately wet sites. This Association has dense shrub cover. It is environmentally similar to White Fir/Vine Maple/Oregon Oxalis.

Soils. Parent material is mostly andesite, basalt, diorite, or granite, with some welded tuff and pumice. Average surface rock cover is 9 percent, with 13 percent gravel. Soils are mostly moderately deep to deep, with an average depth of greater than 43 inches.

Environment. Elevation averages 3350 feet. This Association occurs on all aspects. Slope averages 34 percent and ranges from 9 to 69 percent. This Association







occurs on all slope positions, although ridge tops are less common

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 36. Douglas-fir is frequent in the overstory, and white fir and sugar pine are common. White fir, Douglas-fir, western hemlock, and Pacific yew are frequent, and incense-cedar and golden chinquapin are common in the understory. Other hardwoods may include vine maple, Douglas maple, big-leaf maple, red alder, Pacific madrone, canyon live oak, and Pacific dogwood. In the shrub layer, dwarf Oregongrape, Pacific rhododendron, baldhip rose and Pacific blackberry are frequent. Vine maple, salal, creambush ocean-spray, creeping snowberry, and red huckleberry are common Salal may be dense in some areas Vanillaleaf, common prince's-pine, rattlesnake-plantain, western sword-fern, round-leaved violet, western twinflower and whipplevine are frequent herbs Moss cover is highest for the Series, averaging 19 percent.

Upper and mid layer tree covers are high and intermediate for the Series, averaging 71 and 48 percent cover, respectively. Lower layer tree cover averages 33 percent. Shrub cover is intermediate to high, with high shrub cover averaging 27 percent and low shrub cover 55 percent. Herb/grass cover ranges from 5 to 85 percent, and averages 28 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	58	
White fir	ABCO	55	5	
Sugar pine	PILA	52	6	
Understory trees				7
White fir	ABCO	97	21	
Douglas-fir	PSME	87	9	
Western hemlock	TSHE	84	8	
Pacific yew	TABR2	77	5	
Incense-cedar	CADE27	74	8	
Golden chinquapin	CACH6	74	7	
Shrubs				11
Pacific rhododendron	RHMA3	100	23	
Dwarf Oregongrape	BENE2	100	15	
Baldhip rose	ROGY	100	2	
Pacific blackberry	RUUR	90	2	
Creeping snowberry	SYMO	74	2	
Salal	GASH	71	33	
Herbs				18
Western twinflower	LIBOL	90	8	
Vanillaleaf	ACTR	90	5	
Rattlesnake-plantain	GOOB2	87	1	
Common prince's-pine	CHUM	84	4	
Round-leaved violet	VIOR	81	1	
Western sword-fern	POMU	77	4	
Whipplevine	WHMO	77	2	
Oregon fairybell	DIHOO	74	1	

ABCO 30

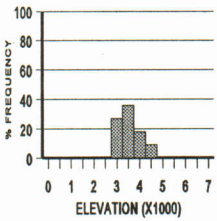
WHITE FIR/PACIFIC RHODODENDRON-SADLER OAK
Abies concolor/Rhododendron macrophyllum-Quercus sadleriana
ABCO/RHMA3-QUSA2 (N=13; BLM=13)

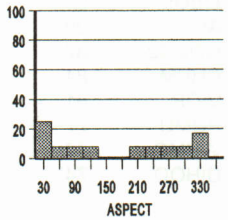
Distribution. This Association occurs on the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may also occur on adjacent Bureau of Land Management lands.

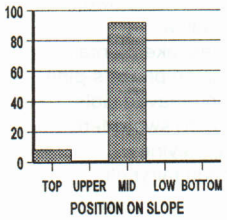
Distinguishing Characteristics. This Association occurs on warm, moist sites with gentle slopes. It is similar to White Fir/Pacific Rhododendron-Dwarf Oregongrape, with the inclusion of Sadler oak.

Soils. This Association may occur on many types of parent material including mixed sediments and intrusives, intrusive volcanics, gabbro, granodiorite, and metasediments. Soils are generally moderately deep to deep. Textures are sandy loams. Total coarse fragments average 43 percent.

Environment. This Association averages 3790 feet in elevation and occurs on all







aspects Slope averages 36 percent and ranges from 12 to 62 percent. This Association occurs predominantly on middle slope positions

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 19. Douglas-fir and sugar pine are frequent in the overstory. White fir is frequent in the understory, and golden chinquapin, sugar pine, Douglas-fir, and western hemlock are common. Golden chinquapin may be dense in some areas. Other hardwoods may include vine maple, Pacific madrone, and canyon live oak. In the shrub layer, Sadler oak, dwarf Oregongrape, Pacific rhododendron, and red huckleberry are frequent. Salal may be dense in some areas. Common prince's-pine and western twinflower are frequent, while other herb/grass species are transient. Moss cover is lowest of the Series, averaging less than 1 percent.

Cover of trees exceeding 10 feet tall (3 meters) is very high, averaging 78 percent. Cover of trees less than 10 feet tall is low, averaging 20 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 60 percent, the highest for the Series, and cover of shrubs less than 20 inches tall averages 39 percent. Herb/grass cover ranges from 1 to 30 percent, and averages 20 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	50	
Sugar pine	PILA	83	12	
White fir	ABCO	42	29	
Understory trees				4
White fir	ABCO	100	12	
Golden chinquapin	CACH6	62	10	
Douglas-fir	PSME	62	2	
Sugar pine	PILA	62	1	
Shrubs				7
Sadler oak	QUSA2	100	29	
Dwarf Oregongrape	BENE2	100	6	
Pacific rhododendron	RHMA3	95	45	
Red huckleberry	VAPA	92	4	
Salal	GASH	50	54	
Slender salal	GAOV	50	8	
Oregon boxwood	PAMY	50	4	
Baldhip rose	ROGY	42	2	
Herbs				7
Common prince's-pine	CHUM	85	5	
Western twinflower	LIBOL	83	3	
Rattlesnake-plantain	GOOB2	67	1	
Common beargrass	XETE	58	5	
Little prince's-pine	CHME	50	1	
Whitevein pyrola	PYPI2	50	1	
Whipplevine	WHMO	42	2	
Western starflower	TRLA6	42	1	

ABCO 32

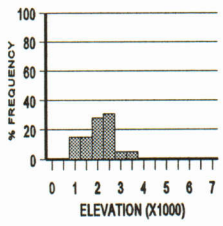
WHITE FIR/SALAL-DWARF OREGONGRAPE
Abies concolor/Gaultheria shallon-Berberis nervosa
ABCO/GASH-BENE2 (N=41; BLM=31, FS=10)

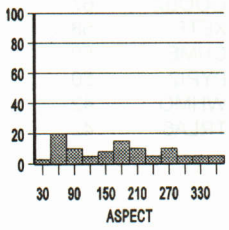
Distribution. This Association occurs on the Tiller and North Umpqua Ranger Districts, Umpqua National Forest, the Swiftwater and South River Resource Areas, Roseburg District, Bureau of Land Management, and may occur on adjacent lands.

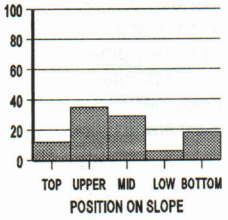
Distinguishing Characteristics. This Association occurs at low elevations with high amounts of precipitation. It occurs on the warmest sites of the Series.

Soils. Parent material is variable, including granite, gabbro, dacite, andesite, and basalt, welded tuff, ash, and sandstone. Average surface rock cover is 8 percent, with 8 percent gravel. Soils are shallow to deep, with an average depth of greater than 35 inches. Based on one plot sampled, surface and subsurface texture is sand, with 20 to 40 percent gravel, and 2 to 7 percent clay.

Environment. The elevation of this Association averages 2300 feet and the







Association occurs on all aspects Slope averages 33 percent and ranges from 3 to 65 percent This Association occurs predominantly on upper and middle slope positions

Vegetation Composition and Structure Total species richness is high for the Series, averaging 41. Douglas-fir is frequent in the overstory and understory. White fir and incense-cedar are frequent in the overstory and present in the understory In the understory, golden chinquapin and Pacific madrone are frequent, and sugar pine is common. Other hardwoods may include vine maple, big-leaf maple, red alder, Pacific dogwood, tanoak, canyon live oak, and California black oak In the shrub layer, dwarf Oregongrape, creeping snowberry, salal, hairy honeysuckle, baldhip rose, and Pacific blackberry are frequent Piper's Oregongrape is common Fairy-slipper, Oregon fairybell, catchweed bedstraw, rattlesnake-plantain, white-flowered hawkweed, western twinflower, whipplevine, white inside-out-flower, trail-plant, western starflower, and round-leaved violet are frequent Moss cover is high for the Series, averaging 17 percent

Upper and mid layer tree covers are high to intermediate for the Series, averaging 77 and 48 percent cover, respectively. Lower layer tree cover averages 25 percent cover Shrub cover is low to high, with high shrub cover averaging only 8 percent and low shrub cover 53 percent Herb/grass cover is between 1 and 50 percent, and averages 22 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	48	
Incense-cedar	CADE27	80	14	
White fir	ABCO	80	6	
Sugar pine	PILA	60	14	
Understory trees				7
White fir	ABCO	100	24	
Douglas-fir	PSME	100	12	
Golden chinquapin	CACH6	100	3	
Incense-cedar	CADE27	80	9	
Pacific madrone	ARME	80	8	
Sugar pine	PILA	70	1	
Shrubs				11
Dwarf Oregongrape	BENE2	100	14	
Creeping snowberry	SYMO	100	2	
Salal	GASH	90	29	
Baldhip rose	ROGY	90	2	
Hairy honeysuckle	LOHI2	80	1	
Pacific blackberry	RUUR	80	1	
Herbs				23
Whipplevine	WHMO	90	5	
Trail-plant	ADBI	90	1	
Rattlesnake-plantain	GOOB2	90	1	
Western starflower	TRLA6	90	1	
Oregon fairybell	DIHOO	80	1	

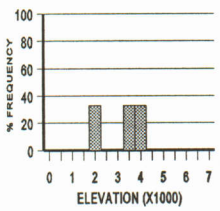
ABCO 34

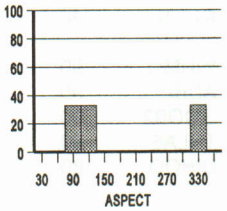
WHITE FIR/VINE MAPLE/OREGON OXALIS
Abies concolor/Acer circinatum/Oxalis oregana
ABCO/ACCI/OXOR (N=3; FS=3)

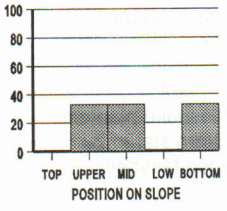
Distribution. This Association occurs on the North Umpqua Ranger District, Umpqua National Forest and may occur on the Swiftwater Resource Area of the Roseburg District, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs at intermediate elevations, on warm sites with moderate amounts of precipitation. Western hemlock regeneration is nearly equal to that of white fir. Western sword-fern may be abundant. This is a transition plant association between the White Fir and Western Hemlock Series.

Soils. Parent material can be rhyolite and basalt. Average surface rock cover is 3 percent, with 12 percent gravel. The average depth on three plots is greater than 43 inches.







Environment. This Association averages 3250 feet in elevation and occurs on aspects that are predominantly east and north Slope averages 32 percent and ranges from 1 to 75 percent. This Association occurs on upper, middle third, and valley bottom slope positions.

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 37. Douglas-fir and white fir are frequent in the overstory. Western hemlock is common White fir, Pacific yew, and western hemlock are frequent in the understory. Big-leaf maple and Douglas-fir are common. Other hardwoods include vine maple, Pacific dogwood and red alder. In the shrub layer, dwarf Oregongrape, baldhip rose, vine maple, and Pacific blackberry are frequent Snow bramble and red huckleberry are common. Trail-plant, Oregon fairybell, Oregon oxalis, and starry false Solomon's-seal are frequent herbs. Moss cover is high for the Series, averaging 18 percent

Upper and mid layer tree covers are high to very high for the Series, averaging 73 and 63 percent, respectively. Lower layer tree cover averages 68 percent. Shrub cover is very low to low, with high shrub cover averaging only 2 percent and low shrub cover 23 percent. Herb/grass cover ranges between 90 and 95 percent, and averages 92 percent, the highest for the Series.

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	52	
White fir	ABCO	100	12	
Western hemlock	TSHE	67	2	
Understory trees				7
White fir	ABCO	100	18	
Western hemlock	TSHE	100	13	
Pacific yew	TABR2	100	2	
Big-leaf maple	ACMA3	67	7	
Douglas-fir	PSME	67	4	
Shrubs				7
Vine maple	ACCI	100	65	
Dwarf Oregongrape	BENE2	100	13	
Baldhip rose	ROGY	100	2	
Pacific blackberry	RUUR	100	2	
Snow bramble	RUNI2	67	2	
Red huckleberry	VAPA	67	1	
Herbs				23
Oregon oxalis	OXOR	100	63	
Trail-plant	ADBI	100	3	
Starry false Solomon's-seal	SMST	100	3	
Oregon fairybell	DIHOO	100	2	
Western sword-fern	POMU	67	16	
Western twinflower	LIBOL	67	3	
Cutleaf goldthread	COLA3	67	2	
Coolwort foamflower	TITRU	67	2	
White trillium	TROV2	67	2	
Stream violet	VIGL	67	2	

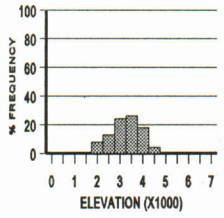
ABCO 36

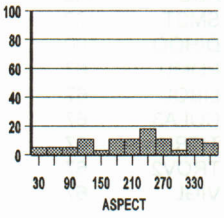
WHITE FIR-WESTERN HEMLOCK/DWARF OREGONGRAPE/WESTERN TWINFLOWER
Abies concolor-Tsuga heterophylla/Berberis nervosa/Linnaea borealis longiflora
ABCO-TSHE/BENE2/LIBOL (N=38; FS=38)

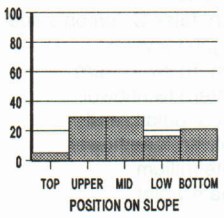
Distribution. This Association occurs on all Ranger Districts of the Umpqua National Forest, the Applegate, Prospect, and Butte Falls Ranger Districts, Rogue River National Forest, and the Galice Ranger District, Siskiyou National Forest. It may also occur on the Butte Falls Resource Area of the Medford District, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs on moist sites, often in the transition between the Western Hemlock and White Fir Series.

Soils. Parent material is variable, including andesite, basalt, diorite, pumice, sandstone, and welded tuff. Average surface rock cover is 10 percent, with 13 percent gravel, and 3 percent surface bedrock. Soils can be shallow to deep, with an average depth of greater than 37 inches. Based on four plots sampled, surface texture is loam and sandy loam, with 0 to 65 percent gravel, 0 to 5 percent cobbles, and 10 to 26 percent clay. Subsurface texture is clay loam, sandy loam, and loamy







sand, with 5 to 65 percent gravel, 0 to 30 percent cobbles, and 3 to 32 percent clay

Environment This Association occurs at an average elevation of 3610 feet and may occur on any aspect Slope averages 35 percent and ranges from 0 to 77 percent This Association is commonly on upper to middle third slope positions

Vegetation Composition and Structure Total species richness is high for the Series, averaging 39. Douglas-fir is frequent in the overstory, and white fir is common. White fir, Douglas-fir, golden chinquapin, incense-cedar, western hemlock, and Pacific yew are frequent in the understory. Vine maple may be dense in some areas Other hardwoods may include Douglas maple, big-leaf maple, Pacific madrone, Pacific dogwood, and canyon live oak. In the shrub layer, dwarf Oregongrape, baldhip rose, Pacific blackberry, and creeping snowberry are frequent In the herb/grass layer, vanillaleaf, trail-plant, common prince's-pine, rattlesnake-plantain, western twinflower, western starflower, and white inside-out-flower are frequent Moss cover is intermediate for the Series, averaging 13 percent

Upper layer tree cover is high for the Series, averaging 71 percent. Mid layer tree cover averages 48 percent, and lower layer tree cover averages 36 percent High shrub cover is low, averaging 12 percent, and low shrub cover is intermediate, averaging 36 percent Herb/grass cover ranges from 5 to 85 percent, and averages 41 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	53	
White fir	ABCO	74	9	
Understory trees				7
White fir	ABCO	100	25	
Douglas-fir	PSME	100	7	
Golden chinquapin	CACH6	82	10	
Pacific yew	TABR2	82	10	
Western hemlock	TSHE	79	9	
Incense-cedar	CADE27	79	6	
Shrubs				11
Dwarf Oregongrape	BENE2	100	15	
Baldhip rose	ROGY	95	2	
Pacific blackberry	RUUR	87	3	
Creeping snowberry	SYMO	82	3	
Herbs				23
Western twinflower	LIBOL	92	10	
Common prince's-pine	CHUM	89	5	
Vanillaleaf	ACTR	84	11	
Rattlesnake-plantain	GOOB2	84	1	
Western starflower	TRLA6	82	2	
White inside-out-flower	VAHE	76	2	
Trail-plant	ADBI	76	1	
Whipplevine	WHMO	74	5	
White-flowered hawkweed	HIAL2	74	1	

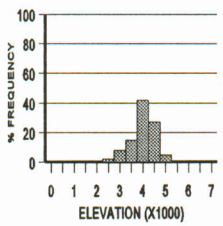
ABCO 38

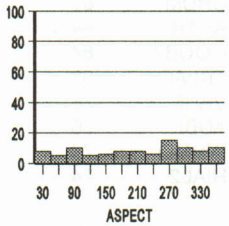
WHITE FIR/DWARF OREGONGRAPE/VANILLALEAF
Abies concolor/Berberis nervosa/Achlys triphylla
ABCO/BENE2/ACTR (N=67; FS=49, BLM=18)

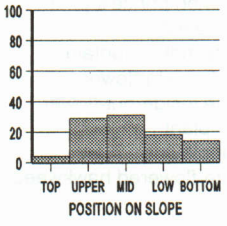
Distribution. This Association occurs on the Tiller, Diamond Lake, and North Umpqua Ranger Districts, Umpqua National Forest, the Applegate and Prospect Ranger Districts, Rogue River National Forest, and the Illinois Valley Ranger District, Siskiyou National Forest. It also occurs on the Swiftwater and South River Resource Areas, Bureau of Land Management.

Distinguishing Characteristics. This Association occurs at intermediate elevations on sites with moderate amounts of precipitation. This Association receives more precipitation than the White Fir/Dwarf Oregongrape Association, which is reflected by the presence of vanillaleaf.

Soils. Parent material can be variable, from mixed metavolcanics and diorite, to andesite, basalt, schist, and gabbro. The average surface rock cover is 8 percent, with 11 percent surface gravel. Based on nine plots sampled, soils are moderately







deep to deep (average depth of greater than 40 inches), and well drained to very well drained. Surface textures are loams, with 37 percent gravel, 14 percent cobbles and stones, and 14 percent clay. Subsurface textures are mostly loams and sandy loams, with two occurences of clay and clay loam. Subsurface horizons have 32 percent gravel, 23 percent cobbles, and 18 percent clay.

Environment. This Association averages 4310 feet in elevation and occurs on all aspects. Slope averages 35 percent and ranges from 0 to 65 percent. This Association occurs on all slope positions.

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 40. Douglas-fir and white fir are frequent in the overstory and understory. Incense-cedar and golden chinquapin are common in the understory Other hardwoods may include vine maple, Douglas maple, big-leaf maple, red alder, Pacific madrone, Pacific dogwood, tanoak, and canyon live oak In the shrub layer, dwarf Oregongrape, baldhip rose, Pacific blackberry, and creeping snowberry are frequent. California hazel and creambush ocean-spray are common. In the herb/grass layer vanillaleaf, trail-plant, threeleaf anemone, common prince's-pine, Oregon fairybell, rattlesnake-plantain, western starflower, and white inside-out-flower are frequent Moss cover is low for the Series, averaging 6 percent.

Upper and mid layer tree covers are high and low for the Series, averaging 73 and 38 percent cover, respectively. Lower layer tree cover averages 23 percent. Shrub cover is very low to low, with high shrub cover averaging only 7 percent and low shrub cover 25 percent. Herb/grass cover is between 25 and 95 percent, and averages 55 percent

Common name	Code	Constancy	Cover	Avg. Richness
Overstory trees				3
Douglas-fir	PSME	100	46	
White fir	ABCO	84	24	
Understory trees				6
White fir	ABCO	100	28	
Douglas-fir	PSME	98	5	
Incense-cedar	CADE27	69	4	
Shrubs				10
Dwarf Oregongrape	BENE2	90	13	
Baldhip rose	ROGY	90	4	
Creeping snowberry	SYMO	86	3	
Pacific blackberry	RUUR	84	2	
Herbs				24
Vanillaleaf	ACTR	100	22	
White inside-out-flower	VAHE	96	3	
Rattlesnake-plantain	GOOB2	96	1	
Trail-plant	ADBI	84	2	
Oregon fairybell	DIHOO	84	2	
Common prince's-pine	CHUM	82	10	
Western starflower	TRLA6	82	3	
Threeleaf anemone	ANDE3	82	2	

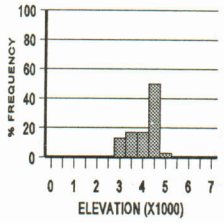
ABCO 40

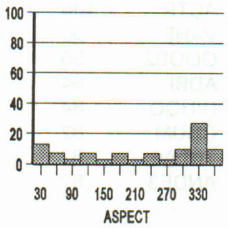
WHITE FIR/DWARF OREGONGRAPE/WESTERN TWINFLOWER
Abies concolor/Berberis nervosa/Linnaea borealis longiflora
ABCO/BENE2/LIBOL (N=30; FS=30)

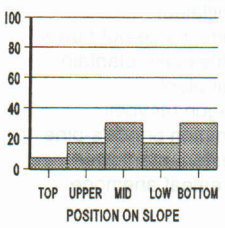
Distribution. This Association occurs on the North Umpqua Ranger District, Umpqua National Forest, and on all Ranger Districts, Rogue River National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs at intermediate elevations. It is drier than the White Fir/Dwarf Oregongrape and White Fir/Dwarf Oregongrape/ Vanillaleaf Associations.

Soils. Parent material varies from andesite, basalt, and pumice, to granite and schist. The average surface rock cover is 9 percent, with 8 percent surface gravel. Based on four plots sampled, soils are moderately deep to deep (average depth of greater than 45 inches) and well drained. Surface textures include sand, sandy loam, and sandy clay loam, with 10 to 35 percent gravel, 5 percent cobbles, and 17 percent clay. Subsurface textures include loamy sand, sand, and sandy clay loam,







with 20 to 30 percent gravel, 3 to 20 percent cobbles and stones, and 22 percent clay

Environment This Association averages 4300 feet in elevation and occurs on all aspects, with northwest being the most common aspect Slope averages 21 percent and ranges from 1 to 65 percent. This Association commonly occurs on middle third and valley bottom slope positions.

Vegetation Composition and Structure Total species richness is high for the Series, averaging 39 Douglas-fir and white fir are frequent in the overstory present In the understory, white fir, golden chinquapin, Douglas-fir, and Pacific yew are frequent Other hardwoods may include vine maple, Douglas maple, big-leaf maple, Pacific madrone, Pacific dogwood, and California black oak In the shrub layer, dwarf Oregongrape, Oregon boxwood, baldhip rose, and creeping snowberry are frequent Western twinflower is frequent in the herb/grass layer Trail-plant, threeleaf anemone, common prince's-pine, queen's cup, rattlesnake-plantain, white-flowered hawkweed, mountain sweet-root, western false Solomon's-seal, snow-queen, western starflower, and white trillium are also frequent Moss cover is intermediate for the Series, averaging 13 percent

Upper and mid layer tree covers are intermediate and low for the Series, averaging 69 and 36 percent cover, respectively Lower layer tree cover averages 24 percent Shrub cover is low to intermediate, with high shrub cover averaging 8 percent and low shrub cover 40 percent Herb/grass cover ranges from 10 to 90 percent, and averages 56 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	32	
White fir	ABCO	97	27	
Understory trees				6
White fir	ABCO	100	21	
Golden chinquapin	CACH6	90	8	
Pacific yew	TABR2	77	10	
Douglas-fir	PSME	67	4	
Shrubs				10
Dwarf Oregongrape	BENE2	100	13	
Baldhip rose	ROGY	90	3	
Creeping snowberry	SYMO	83	6	
Oregon boxwood	PAMY	80	2	
Herbs				23
Western twinflower	LIBOL	100	21	
Threeleaf anemone	ANDE3	93	3	
Common prince's-pine	CHUM	90	6	
Western starflower	TRLA6	90	3	
Rattlesnake-plantain	GOOB2	90	1	
Snow-queen	SYRE	83	2	
Trail-plant	ADBI	83	2	
Western false Solomon's-seal	SMST	80	2	
White trillium	TROV2	80	1	

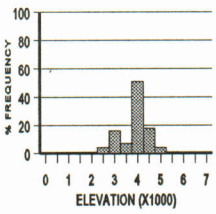
ABCO 42

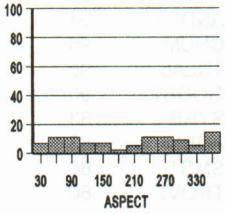
WHITE FIR-DOUGLAS-FIR/BALDHIP ROSE
Abies concolor-Pseudotsuga menziesii/Rosa gymnocarpa
ABCO-PSME/ROGY (N=45; FS=45)

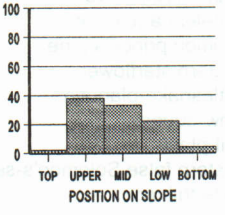
Distribution. This Association occurs on the North Umpqua Ranger District, Umpqua National Forest, the Applegate, Ashland, and Prospect Ranger Districts, Rogue River National Forest, and the Illinois Valley Ranger District, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs at moderate elevations on dry sites. It has significant levels of Douglas-fir regeneration and is a transitional plant association between the White Fir and Douglas-fir Series. The White Fir/Dwarf Oregongrape/Western Twinflower Association occurs on equally dry sites, however, the White Fir-Douglas-fir/Baldhip Rose Association occurs on warmer sites. These two associations are the driest of the Series.

Soils. Parent material is mostly schist with some basalt, andesite, and granodiorite. Average surface rock cover is 23 percent, with 18 percent gravel, and 6 percent







exposed bedrock. Based on seven plots sampled, soils are moderately deep to deep (average depth 39 inches), and well drained The surface textures are loam, sandy loam, and loamy sand, with 10 to 50 percent gravel and cobbles, and 10 percent clay. Subsurface textures are sandy loam and loam, with some clay loam and sand. Subsurface horizons have an average of 20 to 40 percent gravel, 10 to 70 percent cobbles, and 16 percent clay.

Environment. This Association averages 4090 feet in elevation and occurs on all aspects Slope averages 52 percent and ranges from 0 to 84 percent. This Association commonly occurs on upper, middle, and lower third slope positions.

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 37. Douglas-fir is frequent in the overstory, and white fir, sugar pine, and ponderosa pine are common. White fir, Douglas-fir and Pacific madrone are frequent in the understory. Golden chinquapin, incense-cedar, and canyon live oak are common. Other hardwoods may include vine maple, Douglas maple, big-leaf maple, red alder, Pacific dogwood, tanoak, and California black oak. In the shrub layer, dwarf Oregongrape, creambush ocean-spray, baldhip rose, and creeping snowberry are frequent. Western serviceberry, Piper's Oregongrape, and Pacific blackberry are common. Rattlesnake-plantain and western starflower are frequent herbs. Trail-plant, common prince's-pine, Oregon fairybell, woods strawberry, white-flowered hawkweed, western false Solomon's-seal, snow-queen, whipplevine, and white trillium are common herbs. Moss cover is intermediate for the Series, averaging 10 percent.

Upper and mid layer tree covers are intermediate for the Series, averaging 64 and 45 percent cover, respectively Lower layer tree cover averages 23 percent Shrub cover is low, with high shrub cover averaging 12 percent and low shrub cover 29 percent. Herb/grass cover ranges between 0 and 70 percent, and averages 26 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	100	42	
White fir	ABCO	69	20	
Ponderosa pine	PIPO	60	6	
Sugar pine	PILA	58	6	
Understory trees				7
White fir	ABCO	100	18	
Douglas-fir	PSME	98	10	
Pacific madrone	ARME	82	12	
Golden chinquapin	CACH6	56	5	
Canyon live oak	QUCH2	53	11	
Shrubs				10
Baldhip rose	ROGY	93	2	
Dwarf Oregongrape	BENE2	87	12	
Creambush ocean-spray	HODI	87	8	
Creeping snowberry	SYMO	82	6	
Herbs				20
Rattlesnake-plantain	GOOB2	78	1	

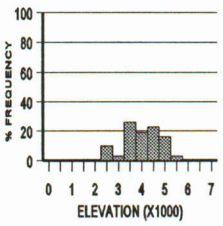
ABCO 44

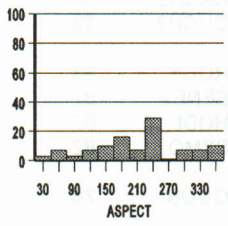
WHITE FIR-INCENSE-CEDAR/WESTERN STARFLOWER
Abies concolor-Calocedrus decurrens/Trientalis latifolia
ABCO-CADE27/TRLA6 (N=31; FS=31)

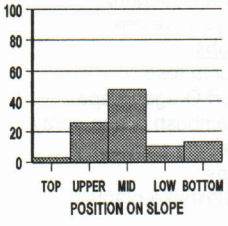
Distribution. This Association occurs on the North Umpqua, Diamond Lake, and Tiller Ranger Districts, Umpqua National Forest, all Ranger Districts of the Rogue River National Forest, and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also be present on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs at intermediate elevations on sites that receive moderate amounts of precipitation.

Soils. Parent material is variable, including andesite, basalt, granodiorite, diorite, and gabbro, with some schist, rhyolite, and breccia, and, rarely serpentine. Average surface rock cover is 12 percent, with 13 percent gravel, 6 percent bare ground exposure, and 3 percent surface bedrock. Based on three plots sampled, surface texture is sandy loam and loam, with 20 to 39 percent gravel, 0 to 10 percent







cobbles, and 10 to 18 percent clay. Subsurface texture is sandy loam, sandy clay, loam and clay loam, with 10 to 42 percent gravel, 0 to 20 percent cobbles, and 18 to 35 percent clay.

Environment This Association averages 4230 feet in elevation and occurs on predominantly north, east, and west aspects. Slope averages 35 percent and ranges from 3 to 60 percent. This Association occurs on all slope positions

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 35. Douglas-fir, white fir, and incense-cedar are frequent in the overstory, and sugar pine common White fir, incense-cedar, and Douglas-fir are frequent in the understory Hardwoods may include vine maple, Douglas maple, big-leaf maple, Pacific madrone, golden chinquapin, Pacific dogwood, canyon live oak, Oregon white oak, and California black oak In the shrub layer, dwarf Oregongrape, baldhip rose, and creeping snowberry are frequent, and California hazel, creambush ocean-spray, and Pacific blackberry are common Western starflower is frequent in the herb/grass layer, and vanillaleaf, trail-plant, threeleaf anemone, bigleaf sandwort, Scouler's harebell, common prince's-pine, woods strawberry, catchweed bedstraw, rattlesnake-plantain, white-flowered hawkweed, whipplevine, braken, and starry false Solomon's-seal are common. Moss cover is low for the Series, averaging 5 percent

Upper and mid layer tree covers are high and intermediate for the Series, averaging 72 and 46 percent cover, respectively. Lower layer tree cover averages 18 percent Shrub cover is low, with high shrub cover averaging only 10 percent and low shrub cover 24 percent. Herb/grass cover ranges from 3 to 75 percent, and averages 32 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				4
Douglas-fir	PSME	100	36	
White fir	ABCO	87	17	
Incense-cedar	CADE27	77	12	
Sugar pine	PILA	61	5	
Understory trees				6
White fir	ABCO	100	19	
Incense-cedar	CADE27	100	8	
Douglas-fir	PSME	84	7	
Shrubs				9
Baldhip rose	ROGY	87	2	
Dwarf Oregongrape	BENE2	77	8	
Creeping snowberry	SYMO	77	3	
Pacific blackberry	RUUR	68	3	
Herbs				21
Western starflower	TRLA6	84	2	
Woods strawberry	FRVEB	74	1	
Rattlesnake-plantain	GOOB2	74	1	
White-flowered hawkweed	HIAL2	74	1	
Trail-plant	ADBI	65	2	
Scouler's harebell	CASC7	65	1	

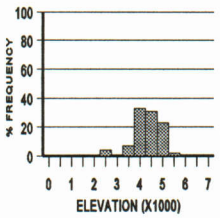
ABCO 46

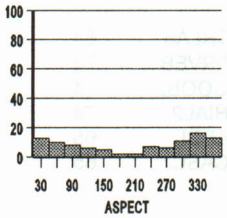
WHITE FIR/DWARF OREGONGRAPE
Abies concolor/Berberis nervosa
ABCO/BENE2 (N=84; FS=84)

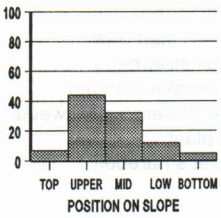
Distribution. This Association occurs on the Cottage Grove, North Umpqua, and Tiller Ranger Districts, Umpqua National Forest, all Ranger Districts of the Rogue River National Forest, and the Galice, Gold Beach, and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs over a wide range of elevations. It is found on drier sites with moderate temperatures. The presence of dwarf Oregongrape suggests higher productivity.

Soils. Parent material is highly variable. This Association occurs over granitics, quartz diorite, andesite, basalt, sandstone, and schist. Surface rock cover averages 12 percent, with 11 percent gravel. Soils are moderately deep to deep, with an average depth of greater than 40 inches. Based on 25 plots sampled, surface







texture is mostly loamy sand or sandy loam, with some loam and sandy clay loam Surface horizons have 15 to 40 percent gravel and cobbles, and 13 percent clay Subsurface horizons have 20 to 60 percent gravel and cobbles, and 14 percent clay Soil temperature regime can be either mesic or frigid, and the soil moisture regime is probably xeric.

Environment. This Association averages 4570 feet in elevation and occurs on all aspects, although slightly more frequently on north aspects. Slope averages 40 percent and ranges from 7 to 75 percent. This Association is common on upper and middle third slope positions.

Vegetation Composition and Structure. Species richness is intermediate for the Series, averaging 35. White fir and Douglas-fir are almost always present in the overstory. White fir and Douglas-fir are present in the understory. Vine maple may be dense in some areas. Other hardwoods may include Douglas maple, big-leaf maple, red alder, Pacific madrone, golden chinquapin, Pacific dogwood, tanoak, canyon live oak, and California black oak. In the shrub layer, dwarf Oregongrape, baldhip rose, and creeping snowberry are frequent, and creambush ocean-spray and Pacific blackberry are common. Threeleaf anemone, rattlesnake-plantain, and western starflower are frequently encountered in the herb/grass layer; common prince's-pine and little prince's-pine are common. Moss cover is low for the Series, averaging 6 percent

Upper and mid layer tree covers are high and low for the Series, averaging 72 and 37 percent cover, respectively. Lower layer tree cover averages 18 percent Shrub cover is low, with high shrub cover averaging 10 percent and low shrub cover 24 percent Herb/grass cover ranges from 2 to 85 percent, and averages 30 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
Douglas-fir	PSME	95	50	
White fir	ABCO	93	29	
Understory trees				4
White fir	ABCO	99	25	
Douglas-fir	PSME	87	6	
Shrubs				9
Dwarf Oregongrape	BENE2	100	10	
Creeping snowberry	SYMO	88	4	
Baldhip rose	ROGY	88	2	
Herbs				22
Rattlesnake-plantain	GOOB2	83	1	
Threeleaf anemone	ANDE3	82	2	
Western starflower	TRLA6	80	2	
Trail-plant	ADBI	73	2	
Common prince's-pine	CHUM	70	3	
False starry Solomon's-seal	SMST	69	2	
Little prince's-pine	CHME	69	1	
White trillium	TROV2	69	1	
Scouler's harebell	CASC7	65	2	
Woods strawberry	FRVEB3	64	2	

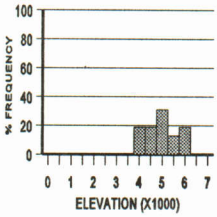
ABCO 48

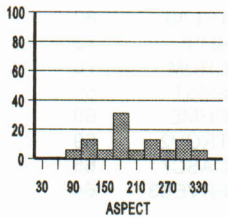
WHITE FIR/CREEPING SNOWBERRY
Abies concolor/Symphoricarpus mollis
ABCO/SYMO (N=16; FS=16)

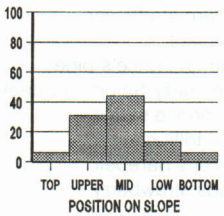
Distribution. This Association occurs on the Diamond Lake Ranger District, Umpqua National Forest, the Applegate and Ashland Ranger Districts, Rogue River National Forest, and the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. This Association occurs on high elevation sites. It is exceeded only by White Fir-Shasta Red Fir/Common Prince's-pine-Threeleaf Anemone in cold, dry conditions. Shasta red fir is not dominant in the stand as it is in the White Fir-Shasta Red Fir/Common Prince's-pine-Threeleaf Anemone Association.

Soils. Occurrence of this Association is most often on granodiorite, but it may also occur on gabbro or mixed metamorphosed volcanics. Soils are generally deep.







Environment This Association averages 5180 feet in elevation and occurs on predominately east, south, and west aspects Occurrence on north aspects is not likely Slope averages 40 percent and ranges from 18 to 65 percent This Association occurs commonly on upper and middle third slope positions

Vegetation Composition and Structure Total species richness is low for the Series, averaging 28 In the overstory, white fir and Douglas-fir are frequent Ponderosa pine is common in the overstory White fir, Douglas-fir, and golden chinquapin are frequent in the understory Other hardwoods may include vine maple, Douglas maple, Pacific madrone, Pacific dogwood, canyon live oak, and California black oak In the shrub layer, creeping snowberry and baldhip rose are frequent, and western serviceberry, creambush ocean-spray, and Oregon boxwood are common In the herb/grass layer, Scouler's harebell and little prince's-pine are frequent, and trail-plant, threeleaf anemone, bigleaf sandwort, common prince's-pine, woods strawberry, rattlesnake-plantain, white-flowered hawkweed, mountain sweet-root, whitevein pyrola, starry false Solomon's-seal, western starflower, and white trillium are common Moss cover is very low for the Series, averaging 2 percent

Upper and mid layer tree covers are intermediate and low for the Series, averaging 68 and 36 percent cover, respectively Lower layer tree cover averages 14 percent Shrub cover is very low, with high shrub cover averaging only 4 percent and low shrub cover 12 percent Herb/grass cover ranges from 0 to 95 percent, and averages 19 percent

Common name	Code	Constancy	Cover	Avg Richness
Overstory trees				3
White fir	ABCO	100	35	
Douglas-fir	PSME	94	24	
Ponderosa pine	PIPO	56	19	
Understory trees				3
White fir	ABCO	94	23	
Douglas-fir	PSME	88	8	
Golden chinquapin	CACH6	50	2	
Shrubs				7
Creeping snowberry	SYMO	94	4	
Baldhip rose	ROGY	81	2	
Western serviceberry	AMAL2	69	3	
Creambush ocean-spray	HODI	50	3	
Herbs				18
Little prince's-pine	CHME	75	2	
Scouler's harebell	CASC7	75	2	
Common prince's-pine	CHUM	69	2	
Whitevein pyrola	PYPI2	69	1	
Bigleaf sandwort	ARMA18	69	1	
Woods strawberry	FRVEB3	63	2	
White-flowered hawkweed	HIAL2	63	1	
White trillium	TROV2	56	1	
Western starflower	TRLA6	56	1	
Mountain sweet-root	OSCH	56	1	

LODGEPOLE PINE SERIES

LODGEPOLE PINE SERIES

Pinus contorta

PICO

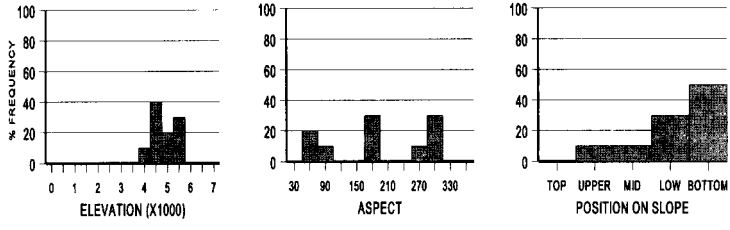
Lisa A McCrimmon

Lodgepole pine grows throughout the western United States in a wide variety of environments. In the southern Oregon Cascades it occurs as a pioneer on young soils developed from deep pumice in cold environments Lodgepole pine is usually succeeded by more tolerant species, such as white fir, as the increasing canopy ameliorates the frosty conditions. In areas with deep pumice soils, cold air ponding and frequent frosts, lodgepole pine remains the dominant climax tree species due to its tolerance of cold temperatures, resistance to drought, and minimal need for mineralized elements

The Lodgepole Pine Series is found on the Mt. Mazama pumice and ash deposits in the broad, flat valley bottoms surrounding Diamond Lake and the Rogue River and its major tributaries east of Prospect. Around Diamond Lake the Series is more continuous, but along the Rogue River it is fragmented, found only in the areas of greatest cold air accumulation and deepest pumice The Series also occurs on higher elevation flats adjacent to Crater Lake National Park and in isolated frost pockets. Without the cold air accumulation of the valley bottoms and flats, the Lodgepole Pine Series is replaced at lower elevations by the White Fir or Western Hemlock Series, and at upper elevations, by the Shasta Red Fir or Mountain Hemlock Series

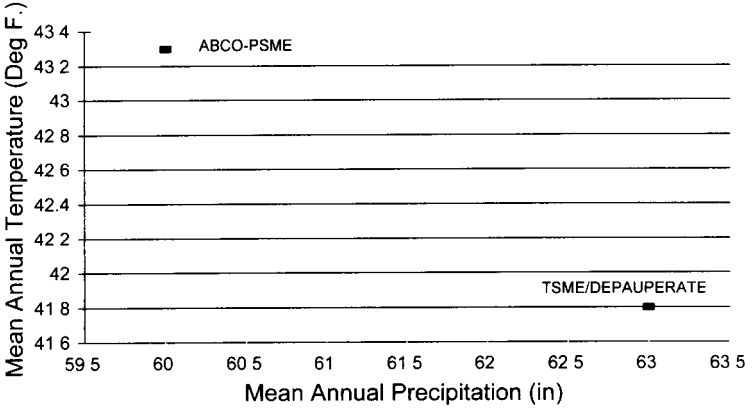
In the Siskiyous there are only a few small scattered sites where lodgepole pine continues to succeed itself Areas with shallow soils, or standing water through most of the growing season, keep other species from regenerating Due to the uniqueness and small acreage of each site, plant associations were not developed for lodgepole pine in the Siskiyous.

Elevation ranges from approximately 4400 feet to 5800 feet in the Cascades Most aspects are represented and slopes are flat, ranging from 1 to 7 percent, though occasionally may be as steep as 15 percent Due to the flat or gentle slopes, aspect does little to change the environmental conditions of the sites, so it is of lesser importance in this Series in differentiating between plant associations. Topographic position is mostly bottoms (valley bottoms and flats), but this Series can also be found higher on the slope when the slopes are gentle.



PICO 2

The Lodgepole Pine Series generally occurs in areas that are relatively cold and wet for the Cascades. Average annual temperature ranges from 41 degrees F to 44 degrees F with an average of 43 degrees F Average annual precipitation ranges from 40 inches to 70 inches with an average of 61 inches The relative environments of the plant associations are shown below. Each association is plotted by average annual temperature and average annual precipitation Climate data for Lodgepole Pine/Thin-leaved Huckleberry-Grouse Huckleberry is unavailable



Parent material is pumice and ash Samples include two soil pits. Soils range from shallow to deep Average surface rock cover is 2 percent with 15 percent gravel Surface texture is sandy loam with 10 to 15 percent cobbles. Subsurface texture is also sandy loam with 15 to 90 percent cobbles. Pumice soils are generally young, shallow, infertile, and droughty. With time, organic matter accumulates, decomposes, and physical structure changes resulting in increases in soil fertility and water holding capacity, and changes in thermal properties

Surface gravel cover ranges from 1 to 85 percent, with an average of 15 percent. Surface rock cover ranges from 0 to 5 percent, with an average of 2 percent. Exposed bedrock cover is 0 percent Bare ground ranges from 1 to 2 percent, with an average of 1 percent Litter cover ranges from 93 to 99 percent, with an average of 96 percent. Moss cover, however, is low, ranging from 0 to 20 percent, with an average of 4 percent. This reflects the cold, dry soil conditions typical of the Series.

Lodgepole pine is the dominant species in the overstory of the Lodgepole Pine Series Lodgepole pine is also abundant in the understory On warmer sites, white fir and/or western hemlock are present and on cooler sites, mountain hemlock and/or Shasta red fir are present. Grouse huckleberry and pinemat manzanita occur frequently throughout the Series with western serviceberry common

Total species richness (the number of species of vascular plants) is calculated for each Association. The average total species richness for the Lodgepole Pine Series ranges between six and 24 Very low richness is six to nine species, low, 10 to 13

species, intermediate, 14 to 17 species, high, 18 to 21 species, and very high, 22 to 24 species

Estimates of total cover by vegetation layer were made for wildlife interpretations Upper layer tree cover ranges from 26 percent in Lodgepole Pine-White Fir-Douglas-fir to 45 percent in Lodgepole Pine-Mountain Hemlock/Depauperate and averages 34 percent for the Series Mid-layer tree cover ranges from 19 to 33 percent and averages 27 percent Lower layer tree cover averages 30 percent High shrub cover ranges from 0 to 3 percent and averages 1 percent Low shrub cover ranges from 0 to 26 percent and averages 15 percent Herb/grass layer cover ranges from 1 to 20 percent and averages 12 percent

Three final plant associations have been identified for the Series in southwestern Oregon. They were described from 10 plots· seven Forest Service plots and three Sky Lakes Wilderness plots The following shows the relationship of draft and final plant associations The draft associations are listed, with final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

PICO-TSME/CAPE5 (N=4)
PICO-TSME/DEP (75%)
PICO-ABCO-PSME (25%)

PICO/ARNE/LUPIN (N=3)
PICO-ABCO-PSME (100%)

KEY TO THE LODGEPOLE PINE PLANT ASSOCIATIONS

1a	White fir (ABCO) and/or Douglas-fir (PSME) present	PICO-ABCO-PSME Page PICO 4
1b	White fir (ABCO) and Douglas-fir (PSME) absent	2
2a	Shrub/herb/grass layer with greater than 10 percent cover	PICO/VAME-VASC Page PICO 6
2b	Shrub/herb/grass layer with less than 3 percent total cover	PICO-TSME/DEP Page PICO 8

PICO 4

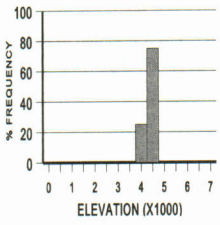
LODGEPOLE PINE-WHITE FIR-DOUGLAS-FIR
Pinus contorta-Abies concolor-Pseudotsuga menziesii
PICO-ABCO-PSME (N=4; FS=4)

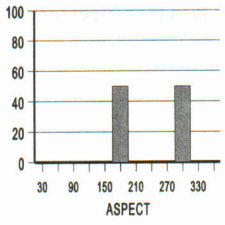
Distribution. Lodgepole Pine-White Fir-Douglas-fir occurs on the Diamond Lake Ranger District, Umpqua National Forest, and the Prospect, Ashland, and, likely, the Butte Falls Ranger Districts, Rogue River National Forest.

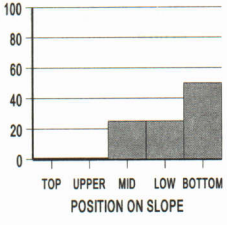
Distinguishing Characteristics. Lodgepole Pine-White Fir-Douglas-fir is the warmest association of the Series. The presence of white fir and Douglas-fir in the understory and the relatively rich shrub and herb layers indicate these warmer conditions.

Soils. Parent material is pumice or andesite. Soils are shallow to deep, with an average depth of greater than 38 inches. Average surface rock cover and gravel cover is 2 percent each. Based on one plot sampled, surface texture is sandy loam with 10 percent cobbles. Subsurface texture is sandy loam with 80 to 90 percent cobbles.

Environment. Elevation averages 4610 feet. Lodgepole Pine-White Fir-Douglas-fir







likely occurs on all aspects Slope averages 4 percent and ranges from 1 to 5 percent Slope positions range from middle one-third to valley bottom

Vegetation Composition and Structure Total species richness is very high for the Series, averaging 24 species. Overstory tree layer is dominated by lodgepole pine, with occasional Shasta red fir, Douglas-fir, and western white pine Lodgepole pine dominates the understory, with white fir, Douglas-fir, and western white pine occurring frequently with low covers. Shasta red fir and mountain hemlock occur commonly with low covers Pinemat manzanita, squaw carpet, and western serviceberry occur frequently in the shrub layer, with grouse huckleberry, squaw currant, green rabbit-brush, and Oregon boxwood occurring commonly. In the herb/grass layer, common prince's-pine, bottlebrush squirreltail, white-flowered hawkweed, and fireweed occur frequently, and woods strawberry, whitevein pyrola, woodland pinedrops, and bigleaf sandwort are common. Moss cover averages 6 percent

Upper layer tree cover, low for the Series, averages 26 percent. Mid-layer tree cover is high, averaging 33 percent, and lower layer tree cover is intermediate, averaging 30 percent High and low shrub cover are both high, averaging 3 and 26 percent, respectively. Herb/grass cover is high, ranging from 1 to 40 percent, with an average of 20 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Lodgepole pine	PICO	100	29	
Shasta red fir	ABMAS	25	5	
Douglas-fir	PSME	25	5	
Western white pine	PIMO3	25	2	
Understory trees				5
Lodgepole pine	PICO	100	40	
White fir	ABCO	100	6	
Douglas-fir	PSME	100	6	
Western white pine	PIMO3	75	2	
Shasta red fir	ABMAS	50	8	
Mountain hemlock	TSME	50	4	
Shrubs				6
Pinemat manzanita	ARNE	75	16	
Squaw carpet	CEPR	75	4	
Western serviceberry	AMAL2	75	2	
Grouse huckleberry	VASC	50	8	
Squaw currant	RICE	50	3	
Green rabbit-brush	CHVI8	50	2	
Oregon boxwood	PAMY	50	2	
Herbs				11
Common prince's-pine	CHUM	75	5	
Bottlebrush squirreltail	SIHY	75	2	
White-flowered hawkweed	HIAL2	75	1	
Fireweed	EPAN2	75	1	
Woods strawberry	FRVEB3	50	5	
Sedge species	CAREX	50	2	
Whitevein pyrola	PYPI2	50	1	

PICO 6

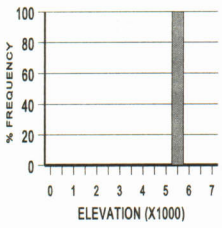
LODGEPOLE PINE/THIN-LEAVED HUCKLEBERRY-GROUSE HUCKLEBERRY
Pinus contorta/Vaccinium membranaceum-Vaccinium scoparium
PICO/VAME-VASC (N=3; Sky Lakes=3)

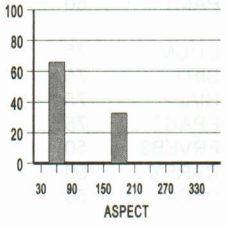
Distribution. Lodgepole Pine/Thin-leaved Huckleberry-Grouse Huckleberry occurs in the Sky Lakes Wilderness and may also occur on the Prospect and Butte Falls Ranger Districts, Rogue River National Forest.

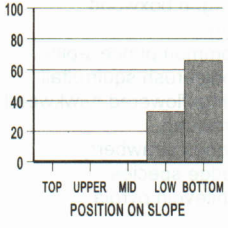
Distinguishing Characteristics. Lodgepole Pine/Thin-leaved Huckleberry-Grouse Huckleberry is present at high elevations on cold flats with cold air drainage. Similar to Lodgepole Pine-Mountain Hemlock/Depauperate, Lodgepole Pine/Thin-leaved Huckleberry-Grouse Huckleberry has lower cover and constancy of mountain hemlock, and increased shrub and herb layers with high covers of thin-leaved huckleberry and grouse huckleberry, indicating it is a relatively warmer association.

Soils. Soil data are not available.

Environment. Elevation averages 5660 feet. Lodgepole Pine/Thin-leaved Huckleberry-Grouse Huckleberry occurs on northeast and south aspects, but likely







occurs on all aspects Slope averages 8 percent and ranges from 1 to 15 percent Lower one-third and valley bottom slope positions predominate

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 15 species Overstory tree layer is dominated by lodgepole pine Understory is dominated by lodgepole pine, with mountain hemlock occurring commonly, and western white pine, Shasta red fir, and golden chinquapin occurring occasionally In the shrub layer, thin-leaved huckleberry and grouse huckleberry occur frequently with moderate to high covers Pinemat manzanita, subalpine spirea, and western serviceberry occur commonly. Pinemat manzanita may have moderate covers In the herb/grass layer, sickle-keeled lupine, long-stalked clover, and spreading phlox occur commonly. Moss cover averages 2 percent

Vegetation layer cover data are not available.

Common name	Code	Constancy	Cover	Richness
Overstory trees				1
Lodgepole pine	PICO	100	47	
Understory trees				3
Lodgepole pine	PICO	100	29	
Mountain hemlock	TSME	67	5	
Western white pine	PIMO3	33	1	
Shasta red fir	ABMAS	33	1	
Golden chinquapin	CACH6	33	1	
Shrubs				4
Thin-leaved huckleberry	VAME	100	33	
Grouse huckleberry	VASC	100	27	
Pinemat manzanita	ARNE	67	12	
Subalpine spirea	SPDE	67	2	
Western serviceberry	AMAL2	67	1	
Greenleaf manzanita	ARPA6	33	1	
Herbs				7
Sickle-keeled lupine	LUAL3	67	3	
Long-stalked clover	TRLO	67	2	
Spreading phlox	PHDI3	67	1	
Woods strawberry	FRVEB3	33	3	
Queen's cup	CLUN2	33	3	
Common dogbane	APCA	33	3	
Long stolon sedge	CAPE6	33	3	
American vetch	VISP2	33	1	
Arrowleaf groundsel	SETR	33	1	
Nuttall's violet	VINU2	33	1	
Leafy lousewort	PERA	33	1	
White coiled-beak lousewort	PECO	33	1	
Fireweed	EPAN2	33	1	
One-sided pyrola	PYSE	33	1	
Threeleaf anemone	ANDE3	33	1	

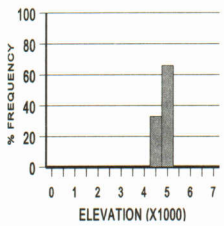
PICO 8

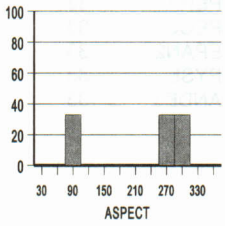
LODGEPOLE PINE-MOUNTAIN HEMLOCK/DEPAUPERATE
Pinus contorta-Tsuga mertensiana/Depauperate
PICO-TSME/DEP (N=3; FS=3)

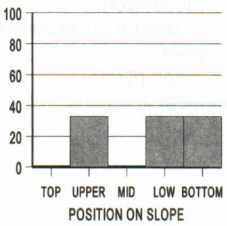
Distribution. Lodgepole Pine-Mountain Hemlock/Depauperate occurs on the Diamond Lake Ranger District, Umpqua National Forest, and may also occur on the Prospect or Butte Falls Ranger Districts, Rogue River National Forest.

Distinguishing Characteristics. Lodgepole Pine-Mountain Hemlock/Depauperate occurs on pumice/ash flats above 4500 feet in elevation or in depressions, at lower elevations, that collect cold air. Lodgepole Pine-Mountain Hemlock/Depauperate is the coldest association of the Series. Lodgepole pine and mountain hemlock in the regeneration layer and the lack of, or minimal, shrub and/or herb/grass layers indicate the cold conditions of this Association.

Soils. Parent material is pumice. Soils are moderately deep to deep, with an average depth of greater than 32 inches. Average surface rock cover is 1 percent, with 32 percent gravel. Based on one plot sampled, surface texture is sandy loam with 15 percent cobbles. Subsurface texture is sandy loam with 15 to 25 percent







cobbles

Environment Elevation averages 5170 feet. Lodgepole Pine-Mountain Hemlock/ Depauperate occurs on northeast and west aspects but it is likely to occur on any aspect. Slope averages 4 percent and ranges from 2 to 7 percent. Lower slope positions predominate

Vegetation Composition and Structure Total species richness is very low for the Series, averaging six species. Lodgepole pine dominates the overstory with occasional Shasta red fir and mountain hemlock, both with low covers Lodgepole pine dominates the understory and mountain hemlock occurs frequently with low cover. Shasta red fir and western white pine occur occasionally Shrub richness is very low for the Series with grouse huckleberry occurring occasionally Herb/grass richness is also very low for the Series with long stolon sedge, velvet lupine, two-colored lupine, and slender hairgrass occurring occasionally with very low covers Moss cover averages less than 1 percent.

Upper layer tree cover is high for the Series, averaging 45 percent Mid-layer tree cover is low, averaging 19 percent. Lower layer tree cover is intermediate, averaging 30 percent High shrub, low shrub, and herb covers are all low for the Series, averaging 0, less than 1, and 1 percent, respectively

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Lodgepole pine	PICO	100	27	
Shasta red fir	ABMAS	33	5	
Mountain hemlock	TSME	33	2	
Understory trees				3
Lodgepole pine	PICO	100	45	
Mountain hemlock	TSME	100	4	
Shasta red fir	ABMAS	33	10	
Western white pine	PIMO3	33	2	
Shrubs				0
Grouse huckleberry	VASC	33	1	
Herbs				2
Long stolon sedge	CAPE6	33	1	
Velvet lupine	LULE3	33	1	
Two-colored lupine	LUBI	33	1	
Slender hairgrass	DEEL	33	1	
Sedge species	CAREX	33	1	

SHASTA RED FIR SERIES

SHASTA RED FIR SERIES

Abies magnifica shastensis

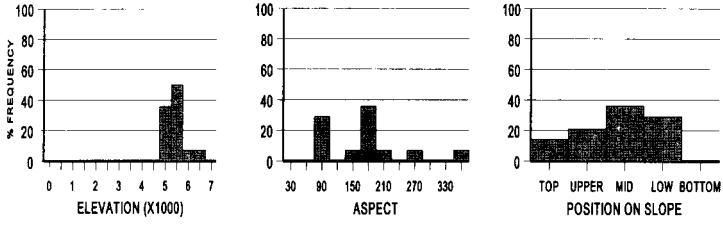
ABMAS

Lisa A McCrimmon

Shasta red fir (*Abies magnifica* A Murr. var *shastensis* Lemm) is a variety of California red fir (*Abies magnifica* A Murr) that is found in southwest Oregon and northern California It is interfertile with noble fir (*Abies procera* Rehd) and California red fir Morphological and genetic characteristics of the trio are similar, thus complicating identification in southwest Oregon Populations north of the McKenzie River are recognizable as noble fir and south of Mt Lassen as California red fir Shasta red fir is generally found at high elevations where the climate is cool to cold and moist, however, it is able to tolerate summer dry spells common to the Mediterranean environment of southwest Oregon

The Shasta Red Fir Series occurs in a narrow elevational band centered around 5700 feet It is replaced by the White Fir Series at lower elevations and the Mountain Hemlock Series at higher elevations. The flowchart on page ABMAS 2 shows a graphical presentation of the classification and the relationships between plant associations in the Shasta Red Fir Series.

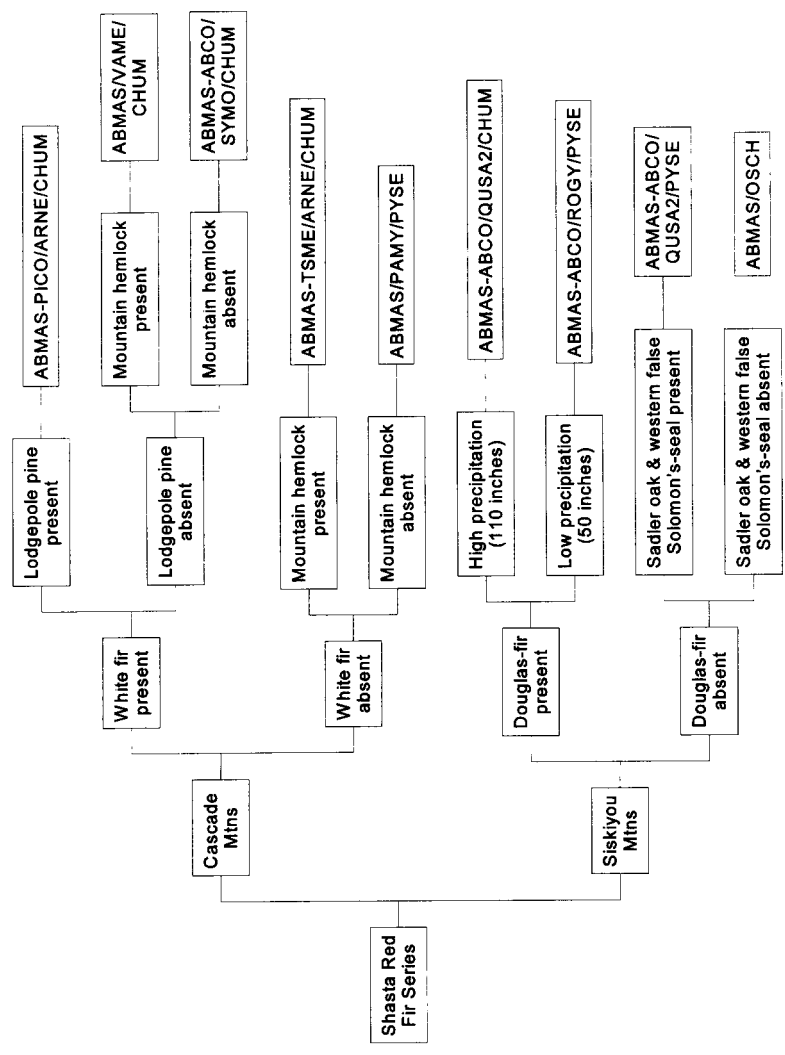
Elevation ranges from approximately 4000 feet to 6900 feet All aspects are represented with fewer occurrences on the southwest and west Slope can range from flat to very steep Topographic position ranges from ridge tops to valley bottoms, but the Series is most frequently found between upper and lower one-third slope positions

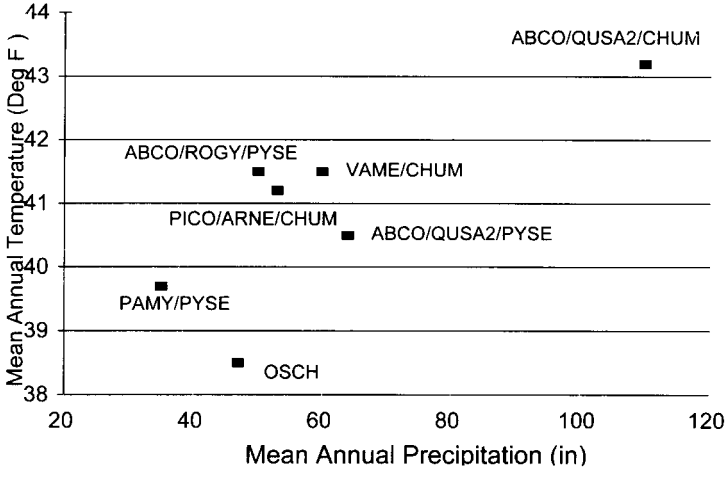


The Shasta Red Fir Series generally occurs in areas that are cool to cold and moist Average annual temperature ranges from 37 degrees F to 44 degrees F, averaging 40 degrees F Average annual precipitation varies between 35 inches and 120 inches and averages 60 inches The relative environments of the plant associations are shown on page ABMAS 3 Each association is plotted by average annual temperature and average annual precipitation Climate data is not available for Shasta Red Fir-White Fir/Creeping Snowberry/Common Prince's-pine and Shasta Red Fir-Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine

Parent material is highly variable, but most often is composed of igneous materials Soils range from shallow to deep. Surface rock cover ranges from 5 to 38 percent,

ABMAS 2


Shasta Red Fir Series
Cascade Mtns
Siskiyou Mtns
White fir present
White fir absent
Douglas-fir present
Douglas-fir absent
Lodgepole pine present
Lodgepole pine absent
Mountain hemlock present
Mountain hemlock absent
Mountain hemlock present
Mountain hemlock absent
High precipitation (110 inches)
Low precipitation (50 inches)
Sadler oak & western false Solomon's-seal present
Sadler oak & western false Solomon's-seal absent
ABMAS-PICO/ARNE/CHUM
ABMAS/VAME/CHUM
ABMAS-ABCO/SYMO/CHUM
ABMAS-TSME/ARNE/CHUM
ABMAS/PAMY/PYSE
ABMAS-ABCO/QUSA2/CHUM
ABMAS-ABCO/ROGY/PYSE
ABMAS-ABCO/QUSA2/PYSE
ABMAS/OSCH



with an average of 15 percent. Surface gravel cover ranges from 3 to 18 percent, with an average of 8 percent. Exposed bedrock cover ranges from 0 to 2 percent , with an average of 1 percent. Bare ground ranges from 1 to 5 percent, with an average of 2 percent. Litter cover ranges from 50 to 99 percent, with an average of 84 percent Moss cover ranges from 1 to 10 percent, with an average of 2 percent

Shasta red fir is generally the dominant tree in the overstory of the Shasta Red Fir Series and is abundant in the understory. On warmer sites, white fir is present, and on cooler sites, mountain hemlock is present.

Total species richness (the number of species of vascular plants) is calculated for each association The average total species richness for the Shasta Red Fir Series ranges from 15 to 34 Richness is rated as very low, 15 to 18 species, low, 19 to 22 species; intermediate, 23 to 26 species; high, 27 to 30 species; and very high, 31 to 34 species

Estimates of total cover by vegetation layer were made for wildlife interpretations Upper-layer tree cover ranges from 39 percent in Shasta Red Fir-Lodgepole Pine/ Pinemat Manzanita/Common Prince's-pine to 72 percent in Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine and averages 58 percent for the Series Mid-layer tree cover ranges from 25 to 47 percent and averages 34 percent. Lower layer tree cover ranges from 15 to 67 percent and averages 23 percent. High shrub cover ranges from 0 and 19 percent and averages 4 percent Low shrub cover ranges from 6 to 48 percent and averages 18 percent Herb/grass layer cover ranges from 6 to 45 percent and averages 30 percent

Nine final plant associations have been identified for the Series in southwestern Oregon They were described from 97 plots: 50 Forest Service plots, 33 Sky Lakes Wilderness plots, 8 Bureau of Land Management plots, and 6 Curry County Natural

ABMAS 4

Resources Conservation Service plots. The following shows the relationship of draft and final plant associations The draft associations are listed, with final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section).

ABMAS-QUSA (N=16)
ABMAS-ABCO/QUSA2/PYSE (31%)
ABCO-ABMAS/QUSA2 (25%)
ABMAS-ABCO/QUSA2/CHUM (13%)
ABMAS-ABCO/ROGY/PYSE (13%)
TSME-ABMAS/RULA2/PYSE (13%)
ABMAS/OSCH (6%)

ABMAS/POPU (N=15)
ABMAS/OSCH (100%)

ABMAS/SYMO (N=8)
ABMAS/OSCH (50%)
ABCO-ABMAS/CHUM-ANDE3 (13%)
ABCO/BENE2 (13%)
ABMAS-ABCO/ROGY/PYSE (13%)
ABMAS-PICO/ARNE/CHUM (13%)

ABMAS/VAME (N=9)
ABMAS/VAME/CHUM (67%)
ABMAS-PICO/ARNE/CHUM (22%)
ABCO-ABMAS/CHUM-ANDE3 (11%)

KEY TO THE SHASTA RED FIR PLANT ASSOCIATIONS

1a	Siskiyou Mountain Province	2
1b	Cascade Province	6
2a	Douglas-fir (PSME) present in overstory and/or understory	3
2b	Douglas-fir (PSME) absent	5
3a	Pinemat manzanita (ARNE) present	ABMAS/OSCH Page ABMAS 8
3b	Pinemat manzanita (ARNE) absent If present, Sadler oak (QUSA2) also present	4
4a	Baldhip rose (ROGY), one-sided pyrola (PYSE), and rattlesnake-plantain (GOOB2) present	ABMAS-ABCO/ROGY/PYSE Page ABMAS 10
4b	At least one of the following absent baldhip rose (ROGY), one-sided pyrola (PYSE), or rattlesnake-plantain (GOOB2)	ABMAS-ABCO/QUSA2/CHUM Page ABMAS 12
5a	Sadler oak (QUSA2) and western false Solomon's-seal (SMRA) present	ABMAS-ABCO/QUSA2/PYSE Page ABMAS 14
5b	Sadler oak (QUSA2) and/or western false Solomon's-seal (SMRA) absent	ABMAS/OSCH Page ABMAS 8
6a	White fir (ABCO) present	7
6b	White fir (ABCO) absent	13
7a	Lodgepole pine (PICO) present	8
7b	Lodgepole pine (PICO) absent	15

8a.	Pinemat manzanita (ARNE) present.	9
8b.	Pinemat manzanita (ARNE) absent.	ABMAS-ABCO/SYMO/CHUM Page ABMAS 16
9a.	Woods strawberry (FRVEB3) present.	10
9b.	Woods strawberry (FRVEB3) absent.	11
10a.	Dwarf bramble (RULA2) present.	ABMAS/VAME/CHUM Page ABMAS 18
10b.	Dwarf bramble (RULA2) absent.	ABMAS-PICO/ARNE/CHUM Page ABMAS 20
11a.	Long stolon sedge (CAPE6) present.	ABMAS-TSME/ARNE/CHUM Page ABMAS 22
11b.	Long stolon sedge (CAPE6) absent.	12
12a.	Oregon boxwood (PAMY) present.	ABMAS-PICO/ARNE/CHUM Page ABMAS 20
12b	Oregon boxwood (PAMY) absent	ABMAS-TSME/ARNE/CHUM Page ABMAS 22
13a.	Mountain hemlock (TSME) present.	14
13b.	Mountain hemlock (TSME) absent.	ABMAS/PAMY/PYSE Page ABMAS 24
14a	Queen's cup (CLUN2) and white-flowered hawkweed (HIAL2) present.	ABMAS/VAME/CHUM Page ABMAS 18
14b.	Queen's cup (CLUN2) and/or white-flowered hawkweed (HIAL2) absent.	ABMAS-TSME/ARNE/CHUM Page ABMAS 22
15a.	Mountain hemlock (TSME) present.	16
15b.	Mountain hemlock (TSME) absent	18

16a. Dwarf bramble (RULA2) present. ABMAS/VAME/CHUM
Page ABMAS 18

16b. Dwarf bramble (RULA2) absent. 17

17a. Threeleaf anemone (ANDE3) and rattlesnake-plantain (GOOB2) present. ABMAS-ABCO/SYMO/CHUM
Page ABMAS 16

17b Threeleaf anemone (ANDE3) and/or rattlesnake-plantain (GOOB2) absent. ABMAS/VAME/CHUM
Page ABMAS 18

18a. Dwarf bramble (RULA2) present. ABMAS/VAME/CHUM
Page ABMAS 18

18b. Dwarf bramble (RULA2) absent. ABMAS-ABCO/SYMO/CHUM
Page ABMAS 16

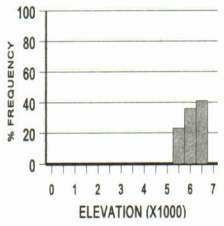
ABMAS 8

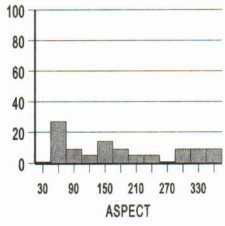
SHASTA RED FIR/MOUNTAIN SWEET-ROOT
Abies magnifica shastensis/Osmorhiza chilensis
ABMAS/OSCH (N=22; FS=22)

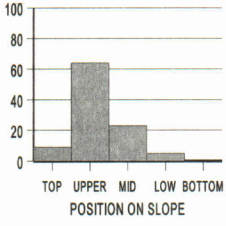
Distribution. Shasta Red Fir/Mountain Sweet-root occurs in the Siskiyou Mountains on the Ashland and Applegate Ranger Districts, Rogue River National Forest. It may also occur on the Illinois Valley Ranger District, Siskiyou National Forest, and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Shasta Red Fir/Mountain Sweet-root is found at cool temperatures and low precipitation relative to other associations in the Series. Shasta red fir dominates both the overstory and understory, with white fir the only other commonly occurring tree species. The shrub layer is sparse, but the herb layer is rich with a wide variety of species, few having a constancy greater than 75 percent.

Soils. Parent material is mostly one of a variety of igneous materials - granite, granodiorite, diorite, or gabbro, with some slate or schist. Soils are mostly







moderately deep to deep, with an average depth of 39 inches Average surface rock cover is 6 percent, with 10 percent gravel and 5 percent bare ground exposure Based on six plots sampled, surface texture is sandy loam or loamy sand, with 15 to 40 percent gravel or cobbles Subsurface texture is loamy sand, sand, or sandy loam, with 25 to 50 percent gravel and cobbles

Environment Elevation averages 6360 feet Shasta Red Fir/Mountain Sweet-root occurs on all aspects Slope averages 30 percent and ranges from 1 to 45 percent Upper and middle one-third slope positions predominate

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 26 species Overstory and understory are dominated by Shasta red fir, with white fir occurring occasionally in the overstory and commonly in the understory. The shrub layer is sparse, with creeping snowberry and mountain balm occurring commonly, and Siskiyou gooseberry, sticky currant, and greenleaf manzanita occurring occasionally, all at low covers Herb/grass richness is very high for the Series, however, few species occur with regularity White-flowered hawkweed and mountain sweet-root occur frequently, with bigleaf sandwort, whitevein pyrola, one-sided pyrola, stream violet, Sitka valerian, and starry false Solomon's-seal occurring commonly, all at low covers Moss cover averages 1 percent

Upper layer tree cover is high for the Series, averaging 64 percent. Mid-layer and lower layer tree covers are low, averaging 28 and 18 percent, respectively High shrub cover is low, averaging 1 percent, as is low shrub cover, averaging 6 percent Herb/grass cover is high for the Series, ranging from 1 to 90 percent, with an average of 38 percent

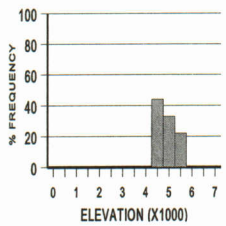
Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Shasta red fir	ABMAS	100	57	
White fir	ABCO	36	12	
Understory trees				2
Shasta red fir	ABMAS	100	28	
White fir	ABCO	50	7	
Shrubs				4
Creeping snowberry	SYMO	64	5	
Mountain balm	MOOD	50	2	
Herbs				18
White-flowered hawkweed	HIAL2	77	1	
Mountain sweet-root	OSCH	77	1	
Bigleaf sandwort	ARMA18	73	1	
Whitevein pyrola	PYPI2	64	1	
One-sided pyrola	PYSE	59	1	
Stream violet	VIGL	59	1	
Sitka valerian	VASI	55	1	
Starry false Solomon's-seal	SMST	55	2	
Leafy lousewort	PERA	45	2	
Skunk-leaved polemonium	POPU3	41	7	
Baneberry	ACRU2	41	2	
Scouler's harebell	CASC7	41	2	

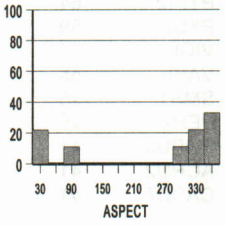
ABMAS 10

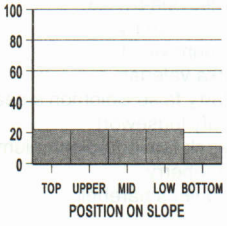
SHASTA RED FIR-WHITE FIR/BALDHIP ROSE/ONE-SIDED PYROLA
Abies magnifica shastensis-Abies concolor/Rosa gymnocarpa/Pyrola secunda
ABMAS-ABCO/ROGY/PYSE (N=9; FS=6, BLM=3)

Distribution. Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola occurs in the Siskiyou Mountains on the Ashland Ranger District, Rogue River National Forest, the Illinois Valley Ranger District, Siskiyou National Forest, and the Grants Pass Resource Area, Medford District, Bureau of Land Management. It may also occur on the Applegate Ranger District, Rogue River National Forest.

Distinguishing Characteristics. Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola is very similar to Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine. Both have Douglas-fir present in the overstory and/or understory. Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola is found in areas with an average annual precipitation of 50 inches and has a greater constancy and cover of one-sided pyrola. Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine is found in areas with an average annual precipitation of 110 inches and has a greater constancy and cover of Sadler oak.







Soils. Parent material is mostly granodiorite, quartz diorite, or diorite Soils are shallow to moderately deep, with an average depth of greater than 27 inches Average surface rock cover is 8 percent, with 4 percent gravel

Environment. Elevation averages 5150 feet Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola occurs mostly on west, north, and east aspects and rarely on south aspects. Slope averages 32 percent and ranges from 8 to 53 percent Slope positions range from ridge tops to valley bottoms

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 32 species. Overstory and understory tree layers are dominated by Shasta red fir, with Douglas-fir and white fir frequently occurring In the understory, golden chinquapin, western white pine, and Pacific yew occur occasionally In the shrub layer, baldhip rose occurs frequently, and thin-leaved huckleberry and dwarf Oregongrape commonly. Herb/grass richness is very high for the Series. One-sided pyrola and common prince's-pine occur frequently, and rattlesnake-plantain, white-flowered hawkweed, whitevein pyrola, queen's cup, threeleaf anemone, and white trillium occur commonly. Moss cover averages 3 percent.

On Forest Service sites, upper layer tree cover is intermediate for the Series, averaging 51 percent. Mid-layer tree cover is high, averaging 44 percent. Lower layer tree cover is low, averaging 27 percent High shrub cover is high, averaging 19 percent, and low shrub cover is intermediate, averaging 28 percent. Herb/grass cover is high, ranging from 10 to 70 percent, with an average of 45 percent

On Bureau of Land Management sites, tree cover exceeding 10 feet tall (3 meters) averages 83 percent, while cover for tree species less than 10 feet tall averages 6 percent. Cover for shrubs greater than 20 inches tall (50 centimeters) averages 8 percent, and cover for shrubs less than 20 inches tall averages 38 percent Herb cover ranges from 3 to 30 percent, with an average of 18 percent

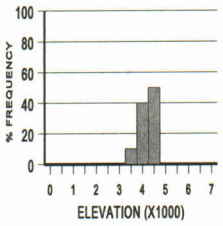
Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Shasta red fir	ABMAS	100	29	
Douglas-fir	PSME	89	17	
White fir	ABCO	89	14	
Understory trees				4
Shasta red fir	ABMAS	100	19	
White fir	ABCO	100	14	
Douglas-fir	PSME	78	2	
Shrubs				7
Baldhip rose	ROGY	78	4	
Thin-leaved huckleberry	VAME	56	4	
Dwarf Oregongrape	BENE2	56	2	
Herbs				17
One-sided pyrola	PYSE	100	2	
Common prince's-pine	CHUM	89	11	
Rattlesnake-plantain	GOOB2	67	1	
White-flowered hawkweed	HIAL2	67	1	
Whitevein pyrola	PYPI2	67	1	

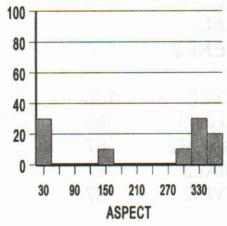
ABMAS 12

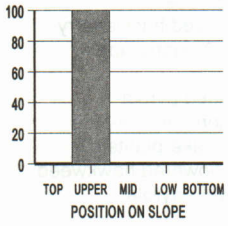
SHASTA RED FIR-WHITE FIR/SADLER OAK/COMMON PRINCE'S-PINE
Abies magnifica shastensis-Abies concolor/Quercus sadleriana/Chimaphila umbellata
ABMAS-ABCO/QUSA2/CHUM (N=10; NRCS=6, FS=4)

Distribution. Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine occurs in the Siskiyou Mountains on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest, and in Curry County. It may also occur on the Chetco and Gold Beach Ranger Districts, Siskiyou National Forest, and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine is very similar to Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola. Both have Douglas-fir present in the overstory and/or understory. Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine is found in areas with an average annual precipitation of 110 inches and has a greater constancy and cover of Sadler oak. Shasta Red Fir-White Fir/Baldhip Rose/One-sided Pyrola is found in areas with an average annual precipitation of 50 inches and has a greater constancy and cover of one-sided pyrola.







Soils Parent material can be granodiorite, andesite, or sandstone Soils are shallow to deep, with an average depth of 23 inches Average surface rock cover is 38 percent, with 22 percent gravel

Environment Elevation averages 4500 feet, the lowest of the Series Shasta Red Fir-White Fir/Sadler Oak/Common Prince's-pine occurs mostly on northwest to northeast aspects, though this may be due to the sampling bias to north aspects for the Natural Resources Conservation Service plots Slope averages 44 percent and ranges from 30 to 60 percent Upper one-third slope positions predominate

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 26 species Overstory tree layer is dominated by Douglas-fir, with Shasta red fir occurring frequently and white fir commonly Understory is dominated by Shasta red fir, with white fir occurring frequently Douglas-fir occurs commonly, and Pacific yew, canyon live oak, Brewer spruce, golden chinquapin, and sugar pine occur occasionally In the shrub layer, Sadler oak occurs frequently at high covers, and dwarf Oregongrape, thin-leaved huckleberry, and baldhip rose occur commonly In the herb/grass layer, common prince's-pine, vanillaleaf, and common beargrass occur frequently Toothleaf pyrola, whitevein pyrola, little prince's-pine, Oregon fairybell, rattlesnake-plantain, and white-flowered hawkweed occur commonly Moss cover averages 5 percent

Upper layer tree cover is high for the Series, averaging 72 percent Mid-layer and lower layer tree covers are both high, averaging 41 and 67 percent, respectively High shrub cover is absent (Sadler oak was included in the lower layer tree cover), with low shrub cover low, averaging 15 percent Herb/grass cover is also low for the Series, ranging from 2 to 25 percent, with an average of 9 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Shasta red fir	ABMAS	100	8	
Douglas-fir	PSME	90	49	
White fir	ABCO	60	8	
Understory trees				5
Shasta red fir	ABMAS	100	28	
White fir	ABCO	100	13	
Douglas-fir	PSME	50	2	
Shrubs				8
Sadler oak	QUSA2	90	48	
Dwarf Oregongrape	BENE2	70	9	
Thin-leaved huckleberry	VAME	60	3	
Herbs				9
Common prince's-pine	CHUM	100	13	
Vanillaleaf	ACTR	80	6	
Common beargrass	XETE	80	3	
Toothleaf pyrola	PYDE	70	2	
Whitevein pyrola	PYPI2	70	1	
Little prince's-pine	CHME	60	2	
Oregon fairybell	DIHOO	60	1	
Rattlesnake-plantain	GOOB2	60	1	
White-flowered hawkweed	HIAL2	50	1	

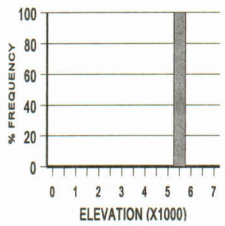
ABMAS 14

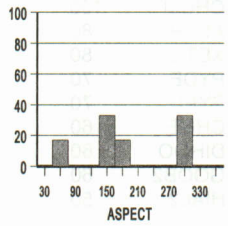
SHASTA RED FIR-WHITE FIR/SADLER OAK/ONE-SIDED PYROLA
Abies magnifica shastensis-Abies concolor/Quercus sadleriana/Pyrola secunda
ABMAS-ABCO/QUSA2/PYSE (N=6; FS=6)

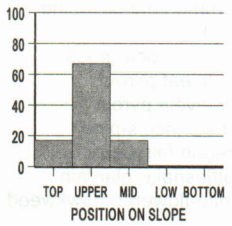
Distribution. Shasta Red Fir-White Fir/Sadler Oak/One-sided Pyrola occurs in the Siskiyou Mountains on the Applegate Ranger District, Rogue River National Forest, and the Illinois Valley Ranger District, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Shasta Red Fir-White Fir/Sadler Oak/One-sided Pyrola is found at moderate temperatures and precipitation for the Series. It is characterized by the absence of Douglas-fir in the overstory and understory, and the presence of Sadler oak.

Soils. Parent material is mostly one of a variety of igneous materials - granodiorite, gabbro, diorite, or granite. Soils are moderately deep to deep, with an average depth of greater than 42 inches. Average surface rock cover is 5 percent, with 7 percent gravel, and 6 percent bare ground exposure.







Environment Elevation averages 5720 feet. Shasta Red Fir-White Fir/Sadler Oak/ One-sided Pyrola likely occurs on all aspects. Slope averages 42 percent and ranges from 30 to 55 percent. Upper one-third slope positions predominate

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 33 species Overstory and understory tree layers are both dominated by Shasta red fir, with white fir occurring frequently Incense-cedar is frequently present in the understory. The shrub layer is dominated by Sadler oak, with dwarf bramble and Sitka mountain-ash occurring frequently. Creeping snowberry, gummy gooseberry, purple-flowered honeysuckle, baldhip rose, sticky currant, and thimbleberry commonly occur. Herb/grass richness is very high for the Series with one-sided pyrola, white-flowered hawkweed, western false Solomon's-seal, whitevein pyrola, common prince's-pine, and catchweed bedstraw occurring frequently. Columbia brome, vanillaleaf, coffee fern, spotted coral-root, threeleaf anemone, little prince's-pine, Scouler's harebell, white inside-out-flower, and bigleaf sandwort occur commonly. Moss cover averages 2 percent

Upper layer tree cover is low for the Series, averaging 47 percent. Mid-layer tree cover is high, averaging 41 percent, and lower layer tree cover is low, averaging 24 percent. High and low shrub cover are low, averaging 6 and 9 percent, respectively. Sadler oak was included in the lower layer tree cover. Herb/grass cover is low for the Series, ranging from 3 to 50 percent, with an average of 27 percent.

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Shasta red fir	ABMAS	100	42	
White fir	ABCO	100	14	
Understory trees				4
Shasta red fir	ABMAS	100	27	
White fir	ABCO	100	17	
Incense-cedar	CADE27	83	2	
Shrubs				8
Sadler oak	QUSA2	100	9	
Dwarf bramble	RULA2	83	9	
Sitka mountain-ash	SOSI2	83	1	
Creeping snowberry	SYMO	67	2	
Gummy gooseberry	RILO	67	2	
Purple-flowered honeysuckle	LOCO5	67	1	
Herbs				19
One-sided pyrola	PYSE	100	3	
White-flowered hawkweed	HIAL2	100	2	
Western false Solomon's-seal	SMRA	100	1	
Whitevein pyrola	PYPI2	100	1	
Common prince's-pine	CHUM	83	8	
Catchweed bedstraw	GAAP2	83	2	
Columbia brome	BRVU	67	7	
Vanillaleaf	ACTR	67	6	
Coffee fern	PEAN	67	4	
Spotted coral-root	COMA4	67	1	
Threeleaf anemone	ANDE3	67	1	
Little prince's-pine	CHME	67	1	

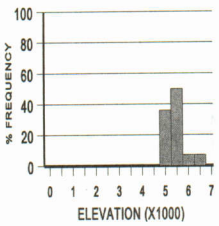
ABMAS 16

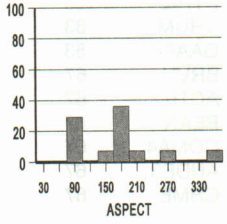
SHASTA RED FIR-WHITE FIR/CREEPING SNOWBERRY/COMMON PRINCE'S-PINE
Abies magnifica shastensis-Abies concolor/Symphoricarpos mollis/Chimaphila umbellata
ABMAS-ABCO/SYMO/CHUM (N=14; Sky Lakes=14)

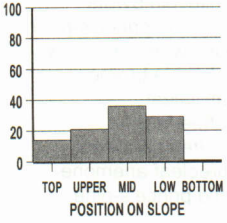
Distribution. Shasta Red Fir-White Fir/Creeping Snowberry/Common Prince's-pine occurs in the southern Oregon Cascades in the Sky Lakes Wilderness. It may also occur on the Butte Falls or Prospect Ranger Districts, Rogue River National Forest.

Distinguishing Characteristics. Shasta Red Fir-White Fir/Creeping Snowberry/ Common Prince's-pine is found at high elevations. Shasta red fir and white fir are frequently present in the understory, and mountain hemlock and lodgepole pine are usually absent.

Soils. Soil data are not available.







Environment. Elevation averages 5740 feet. Shasta Red Fir-White Fir/Creeping Snowberry/Common Prince's-pine occurs on most aspects, although rarely on southwest to northeast aspects Slope averages 14 percent and ranges from 2 to 33 percent. Slope positions range from ridge tops to lower one-third

Vegetation Composition and Structure. Total species richness is low for the Series, averaging 20 species. Overstory tree layer is dominated by Shasta red fir, with white fir occurring frequently, and western white pine and Douglas-fir commonly. The understory is dominated by Shasta red fir, with white fir frequent. Golden chinquapin and western white pine occur commonly and Douglas-fir occasionally Shrub richness is very low for the Series, with creeping snowberry and Oregon boxwood occurring commonly. In the herb/grass layer, common prince's-pine and long stolon sedge occur frequently, and whitevein pyrola, one-sided pyrola, and starry false Solomon's-seal occur commonly. Moss cover averages less than 1 percent.

Vegetation layer cover data are not available.

Common name	Code	Constancy	Cover	Richness
Overstory trees				4
Shasta red fir	ABMAS	100	30	
White fir	ABCO	79	17	
Western white pine	PIMO3	57	2	
Douglas-fir	PSME	50	9	
Ponderosa pine	PIPO	21	9	
Mountain hemlock	TSME	21	8	
Lodgepole pine	PICO	21	2	
Understory trees				4
Shasta red fir	ABMAS	100	28	
White fir	ABCO	93	20	
Golden chinquapin	CACH6	71	11	
Western white pine	PIMO3	57	2	
Douglas-fir	PSME	36	5	
Mountain hemlock	TSME	21	4	
Shrubs				4
Creeping snowberry	SYMO	57	2	
Oregon boxwood	PAMY	50	2	
Herbs				8
Common prince's-pine	CHUM	86	7	
Long stolon sedge	CAPE6	79	6	
Whitevein pyrola	PYPI2	71	1	
One-sided pyrola	PYSE	57	1	
Starry false Solomon's-seal	SMST	50	2	
California brome	BRCA5	43	5	
Threeleaf anemone	ANDE3	43	1	
Rattlesnake-plantain	GOOB2	43	1	
Little prince's-pine	CHME	43	1	
White-flowered hawkweed	HIAL2	36	2	
Northwest listera	LICA10	36	1	
Queen's cup	CLUN2	21	2	

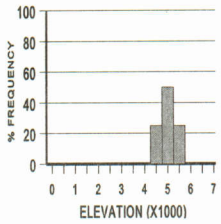
ABMAS 18

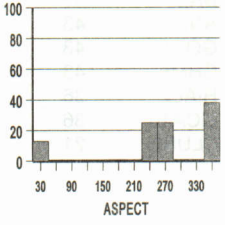
SHASTA RED FIR/THIN-LEAVED HUCKLEBERRY/COMMON PRINCE'S-PINE
Abies magnifica shastensis/Vaccinium membranaceum/Chimaphila umbellata
ABMAS/VAME/CHUM (N=8; FS=8)

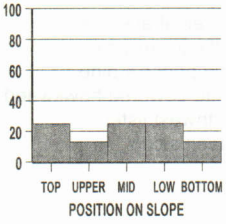
Distribution. Shasta Red Fir/Thin-leaved Huckleberry/Common Prince's-pine occurs in the southern Oregon Cascades on the Butte Falls and Prospect Ranger Districts, Rogue River National Forest, and on the Diamond Lake and North Umpqua Ranger Districts, Umpqua National Forest.

Distinguishing Characteristics. Shasta Red Fir/Thin-leaved Huckleberry/Common Prince's-pine is found at moderate temperatures and precipitation relative to the other plant associations in the Series. White fir and mountain hemlock are usually present and lodgepole pine is mostly absent. Thin-leaved huckleberry, common prince's-pine, queen's cup, and white-flowered hawkweed are usually present.

Soils. Parent material is mostly andesite or basalt, with some tephra. Soils are moderately deep to deep, with an average depth of greater than 41 inches. Average surface rock cover is 10 percent, with 3 percent gravel.







Environment Elevation averages 5250 feet. Shasta Red Fir/Thin-leaved Huckleberry/Common Prince's-pine generally occurs on southwest to north aspects Slope averages 21 percent and ranges from 5 to 30 percent. It is found on all slope positions

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 34 species Overstory tree layer is dominated by Shasta red fir, with Douglas-fir and western white pine common Shasta red fir dominates the understory, with mountain hemlock and white fir occurring frequently Golden chinquapin and western white pine occur commonly, and Douglas-fir and western hemlock occur occasionally Shrub richness is very high for the Series. Thin-leaved huckleberry dominates the shrub layer with high covers common Dwarf bramble and dwarf Oregongrape occur frequently. Oregon boxwood, pinemat manzanita, and creeping snowberry occur commonly Herb/grass richness is high for the Series, with common prince's-pine, queen's cup, white-flowered hawkweed, one-sided pyrola, threeleaf anemone, and rattlesnake-plantain occurring frequently. Vanillaleaf, western twinflower, leafy lousewort, round-leaved violet, bigleaf sandwort, and starry false Solomon's-seal occur commonly. Moss cover averages 4 percent.

Upper layer tree cover is intermediate for the Series, averaging 55 percent. Mid-layer and lower layer tree covers are low, averaging 25 and 15 percent, respectively. High shrub cover is low, averaging 1 percent, however, low shrub cover is high averaging 48 percent. Herb/grass cover is intermediate for the Series, ranging from 8 to 70 percent, with an average of 22 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Shasta red fir	ABMAS	88	29	
Douglas-fir	PSME	50	31	
Western white pine	PIMO3	50	4	
Understory trees				5
Shasta red fir	ABMAS	100	23	
Mountain hemlock	TSME	88	15	
White fir	ABCO	88	11	
Golden chinquapin	CACH6	63	2	
Western white pine	PIMO3	50	5	
Shrubs				10
Thin-leaved huckleberry	VAME	100	30	
Dwarf bramble	RULA2	88	2	
Dwarf Oregongrape	BENE2	75	5	
Oregon boxwood	PAMY	63	5	
Pinemat manzanita	ARNE	63	2	
Creeping snowberry	SYMO	50	2	
Herbs				16
Common prince's-pine	CHUM	100	7	
Queen's cup	CLUN2	100	3	
White-flowered hawkweed	HIAL2	100	2	
One-sided pyrola	PYSE	88	2	
Threeleaf anemone	ANDE3	75	1	
Rattlesnake-plantain	GOOB2	75	1	
Vanillaleaf	ACTR	63	9	

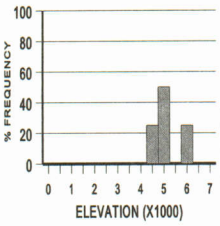
ABMAS 20

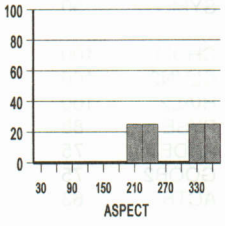
SHASTA RED FIR-LODGEPOLE PINE/PINEMAT MANZANITA/COMMON PRINCE'S-PINE
Abies magnifica shastensis-Pinus contorta/Arctostaphylos nevadensis/Chimaphila umbellata
ABMAS-PICO/ARNE/CHUM (N=4; FS=4)

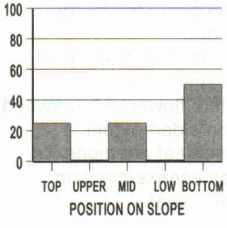
Distribution. Shasta Red Fir-Lodgepole Pine/Pinemat Manzanita/Common Prince's-pine occurs in the southern Oregon Cascades on the Ashland Ranger District, Rogue River National Forest, and on the Diamond Lake Ranger District, Umpqua National Forest. It may also occur on the Butte Falls and Prospect Ranger Districts, Rogue River National Forest, and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Shasta Red Fir-Lodgepole Pine/Pinemat Manzanita/Common Prince's-pine is found at moderate temperatures and precipitation relative to the other plant associations in the Series. The slopes are relatively flat, averaging 5 percent. The presence of lodgepole pine in the understory indicates cold air accumulation.

Soils. Parent material is mostly pumice or andesite. Soils are shallow to deep, with an average depth of greater than 26 inches. Average surface rock cover is 5 percent, with 3 percent gravel.







Environment Elevation averages 5390 feet Shasta Red Fir-Lodgepole Pine/ Pinemat Manzanita/Common Prince's-pine probably occurs on all aspects Slope averages 5 percent and ranges from 0 to 12 percent Slope positions are mostly valley bottoms, though may also be ridge top or middle one-third of gentle slopes

Vegetation Composition and Structure Total species richness is intermediate for the Series, averaging 25 species Overstory tree layer is dominated by Shasta red fir, with western white pine occurring frequently Lodgepole pine and Douglas-fir are also common in the overstory White fir and mountain hemlock occur occasionally Shasta red fir dominates the understory, with lodgepole pine, white fir, and western white pine occurring frequently, and mountain hemlock commonly Douglas-fir, Pacific silver fir, and golden chinquapin occur occasionally In the shrub layer, pinemat manzanita and Oregon boxwood occur frequently. Western serviceberry and thin-leaved huckleberry occur commonly In the herb/grass layer, common prince's-pine, woods strawberry, queen's cup, and one-sided pyrola occur frequently Moss cover averages 2 percent

Upper layer tree cover is low for the Series, averaging 39 percent. Mid-layer tree cover is high, averaging 47 percent Lower layer tree and high shrub covers are low, averaging 20 and 1 percent, respectively. Low shrub cover is intermediate, averaging 20 percent Herb/grass cover is low for the Series, ranging from 5 to 8 percent, with an average of 6 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Shasta red fir	ABMAS	100	23	
Western white pine	PIMO3	75	7	
Lodgepole pine	PICO	50	13	
Douglas-fir	PSME	50	3	
Understory trees				5
Shasta red fir	ABMAS	100	29	
Lodgepole pine	PICO	100	10	
White fir	ABCO	100	8	
Western white pine	PIMO3	75	7	
Mountain hemlock	TSME	50	5	
Shrubs				5
Pinemat manzanita	ARNE	100	9	
Oregon boxwood	PAMY	100	4	
Western serviceberry	AMAL2	50	4	
Thin-leaved huckleberry	VAME	50	3	
Herbs				11
Common prince's-pine	CHUM	75	3	
Woods strawberry	FRVEB3	75	1	
Queen's cup	CLUN2	75	1	
One-sided pyrola	PYSE	75	1	
Sedge species	CAREX	50	2	
Leafy lousewort	PERA	50	1	
California brome	BRCA5	50	1	
Starry false Solomon's-seal	SMST	50	1	
Whitevein pyrola	PYPI2	50	1	
Rattlesnake-plantain	GOOB2	50	1	

ABMAS 22

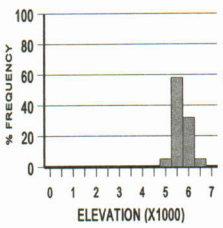
SHASTA RED FIR-MOUNTAIN HEMLOCK/PINEMAT MANZANITA/COMMON PRINCE'S-PINE
Abies magnifica shastensis-Tsuga mertensiana/Arctostaphylos nevadensis/Chimaphila umbellata
ABMAS-TSME/ARNE/CHUM (N=19; Sky Lakes=19)

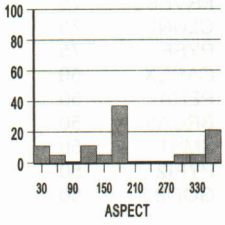
Distribution. Shasta Red Fir-Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine occurs in the southern Oregon Cascades in the Sky Lakes Wilderness. It may also occur on the Butte Falls or Prospect Ranger Districts, Rogue River National Forest, or the Diamond Lake Ranger District, Umpqua National Forest.

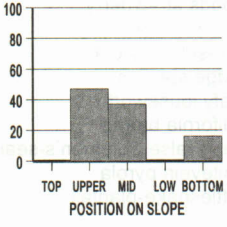
Distinguishing Characteristics. Shasta Red Fir-Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine occurs at high elevations and is one of the coldest of the Shasta Red Fir Series. Mountain hemlock is present in the understory and white fir is generally absent, both indicating the cold environment.

Soils. Soil data are not available.

Environment. Elevation averages 6050 feet. Shasta Red Fir-Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine occurs on most aspects, although rarely on southwest and west aspects. Slope averages 16 percent and ranges from 1 to







35 percent. Upper and middle one-third slope positions predominate, although Shasta Red Fir-Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine can also occur in the valley bottoms

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 15 species Overstory and understory tree layers are dominated by Shasta red fir, with mountain hemlock occurring frequently, lodgepole pine commonly, and western white pine occasionally In the understory, golden chinquapin occurs occasionally. Shrub richness is very low for the Series, with pinemat manzanita occurring commonly, and grouse huckleberry occasionally. Herb/grass richness is also very low for the Series, with common prince's-pine and long stolon sedge occurring frequently, and one-sided pyrola commonly. Moss cover averages 1 percent

Vegetation layer cover data is not available

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Shasta red fir	ABMAS	84	32	
Mountain hemlock	TSME	79	13	
Lodgepole pine	PICO	68	15	
Western white pine	PIMO3	32	6	
Subalpine fir	ABLA	16	1	
White fir	ABCO	11	1	
Engelmann spruce	PIEN	11	1	
Understory trees				4
Shasta red fir	ABMAS	100	26	
Mountain hemlock	TSME	100	9	
Lodgepole pine	PICO	53	4	
Golden chinquapin	CACH6	42	11	
Western white pine	PIMO3	37	2	
White fir	ABCO	16	1	
Shrubs				3
Pinemat manzanita	ARNE	68	17	
Grouse huckleberry	VASC	32	15	
Oregon boxwood	PAMY	21	1	
Thin-leaved huckleberry	VAME	16	29	
Greenleaf manzanita	ARPA6	16	2	
Red huckleberry	VAPA	11	3	
Herbs				5
Common prince's-pine	CHUM	89	4	
Long stolon sedge	CAPE6	79	5	
One-sided pyrola	PYSE	53	2	
Whitevein pyrola	PYPI2	21	2	
Drummond's rush	JUDR	16	1	
Starry false Solomon's-seal	SMST	16	1	
Pacific bleedingheart	DIFO	16	1	
Sickle-keeled lupine	LUAL3	11	5	
Skunk-leaved polemonium	POPU3	11	2	
Arrowleaf groundsel	SETR	11	2	
Long-stalked clover	TRLO	11	2	

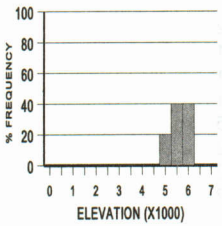
ABMAS 24

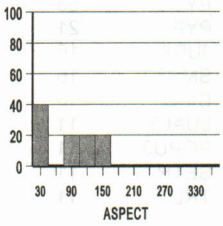
SHASTA RED FIR/OREGON BOXWOOD/ONE-SIDED PYROLA
Abies magnifica shastensis/Pachistima myrsinites/Pyrola secunda
ABMAS/PAMY/PYSE (N=5; BLM=5)

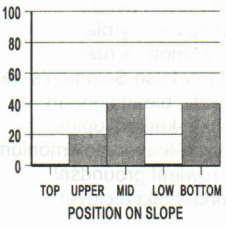
Distribution. Shasta Red Fir/Oregon Boxwood/One-sided Pyrola occurs in the southern Oregon Cascades on the Ashland Resource Area, Medford District, and the Klamath Falls Resource Area, Lakeview District, Bureau of Land Management. It may also occur on the Butte Falls and Ashland Ranger Districts, Rogue River National Forest.

Distinguishing Characteristics. Shasta Red Fir/Oregon Boxwood/One-sided Pyrola is found at cool temperatures and low precipitation relative to the other plant associations in the Series. Shasta red fir is generally the only species found in the overstory and the dominant species in the understory, with golden chinquapin occurring commonly, and sugar pine and western white pine rarely.

Soils. Parent material is mostly andesite or basalt. Based on five plots sampled, soil textures are loam or silty loam. Average rock fragment content is 18 percent, most of which is gravel (average 12 percent).







Environment Elevation averages 5910 feet Shasta Red Fir/Oregon Boxwood/One-sided Pyrola generally occurs on north, east, and southeast aspects Slope averages 17 percent and ranges from 2 to 28 percent Slope positions include upper, middle one-third, and valley bottom

Vegetation Composition and Structure Total species richness is low for the Series, averaging 20 species Overstory and understory tree layers are dominated by Shasta red fir Golden chinquapin occurs commonly in the understory The shrub layer is very low in richness for the Series, with Oregon boxwood occurring commonly. In the herb/grass layer, sticky starwort and one-sided pyrola occur frequently Common prince's-pine, northwest listera, threeleaf anemone, California brome, starry false Solomon's-seal, white trillium, Pacific bleedingheart, and white-flowered hawkweed occur commonly Moss cover averages 2 percent

Tree cover exceeding 10 feet tall (3 meters) averages 75 percent while cover for tree species less than 10 feet tall averages 20 percent Cover for shrubs greater than 20 inches tall (50 centimeters) averages 10 percent and cover for shrubs less than 20 inches tall averages 16 percent Herb cover ranges from 2 to 99 percent, with an average of 24 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				1
Shasta red fir	ABMAS	100	52	
Understory trees				2
Shasta red fir	ABMAS	100	35	
Golden chinquapin	CACH6	60	10	
Western white pine	PIMO3	20	2	
Sugar pine	PILA	20	1	
Shrubs				3
Oregon boxwood	PAMY	60	1	
Thin-leaved huckleberry	VAME	40	15	
Dwarf bramble	RULA2	20	5	
Herbs				12
Sticky starwort	STJA3	80	1	
One-sided pyrola	PYSE	80	1	
Common prince's-pine	CHUM	60	9	
Northwest listera	LICA10	60	1	
Threeleaf anemone	ANDE3	60	1	
California brome	BRCA5	60	1	
Starry false Solomon's-seal	SMST	60	1	
White trillium	TROV	60	1	
Pacific bleedingheart	DIFO	60	1	
White-flowered hawkweed	HIAL2	60	1	
Little prince's-pine	CHME	40	1	
Pacific coral-root	COME4	40	1	
Queen's cup	CLUN2	40	1	
Whitevein pyrola	PYPI2	40	1	
Snow-queen	SYRE	40	1	
Braken	PTAQ	20	85	
Woods strawberry	FRVEB3	20	5	
Sedge species	CAREX	20	3	

PACIFIC SILVER FIR SERIES

PACIFIC SILVER FIR SERIES

Abies amabilis

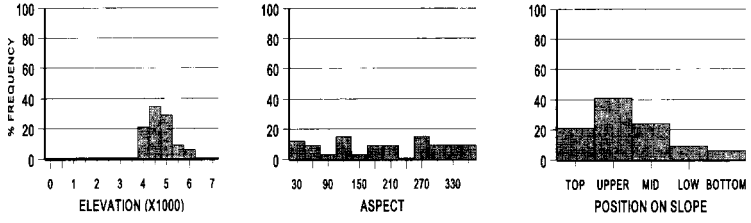
ABAM

Lisa A McCrimmon

Pacific silver fir grows along the Pacific coast from southeastern Alaska to the northern Oregon Coast Range It is also found in the upper elevations of the Washington and Oregon Cascades In the Cascades, Pacific silver fir reaches its southern limits near the Prospect and Butte Falls Ranger Districts of the Rogue River National Forest and the Sky Lakes Wilderness. Isolated stands, relics from the Ice-age, are found in cirques in the Klamath Geological Province of southern Oregon and northern California Pacific silver fir is likely limited by the Mediterranean environment of southwestern Oregon, its droughty summers, and frequent fires

The Pacific Silver Fir Series extends through the higher elevations of the Umpqua National Forest, ending in the northeastern corner of the Prospect Ranger District of the Rogue River National Forest Its topographical and vegetational characteristics overlap with other Series. At lower elevations, the Pacific Silver Fir Series is replaced by the Western Hemlock and White Fir Series, and at higher elevations by the Shasta Red Fir and Mountain Hemlock Series.

Elevation for the Pacific Silver Fir Series ranges from approximately 4000 feet to 6150 feet in the southern Oregon Cascades. All aspects are represented and slopes range from flat to very steep Topographical position ranges from ridge tops to the valley bottoms, but the Series is most frequently found between ridge tops and the middle one-third of the slope

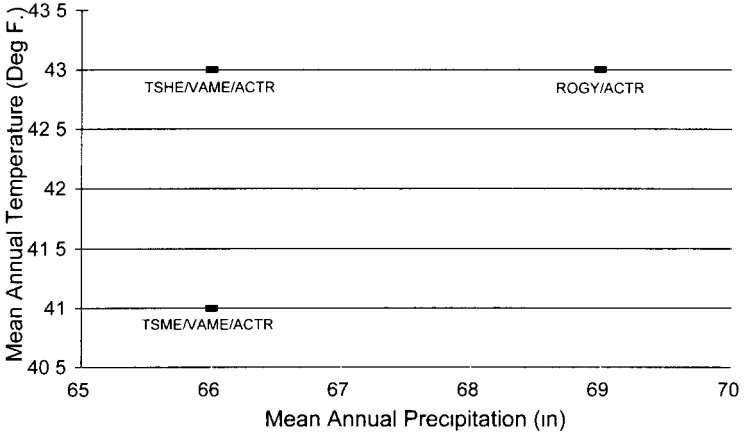


The Pacific Silver Fir Series generally occurs in areas that are cool and wet Average annual temperature ranges from 39 degrees F to 45 degrees F with an average of 42 degrees F. Average annual precipitation varies between 60 inches and 80 inches with an average of 68 inches. The relative environments of the plant associations are shown on page ABAM 2. Each association is plotted by average annual temperature and average annual precipitation.

Parent material is highly variable Although andesite and basalt are the most common, diorite, pumice, ash, and tephra are occasionally found Soils range from moderately deep to deep

Surface gravel cover ranges from 0 to 50 percent, with an average of 7 percent Surface rock cover ranges from 0 to 25 percent, with an average of 5 percent

ABAM 2



Exposed bedrock cover ranges from 0 to 15 percent, with an average of 2 percent Bare ground ranges from 0 to 7 percent, with an average of 1 percent Litter cover ranges from 85 to 99 percent, with an average of 98 percent Moss cover ranges from 1 to 20 percent, with an average of 5 percent.

Due to frequent disturbance regimes in southwest Oregon, Douglas-fir, an early seral species, is the dominant tree in the overstory of the Pacific Silver Fir Series Pacific silver fir regeneration is abundant in the understory. On warmer sites, western hemlock is present, and on cooler sites, mountain hemlock is present Dwarf bramble and thin-leaved huckleberry occur frequently throughout the Series, with baldhip rose, dwarf Oregongrape, and Pacific blackberry common.

Total species richness (number of species of vascular plants) was calculated for each association The average total species richness for the Pacific Silver Fir Series ranges between 25 and 36 species Richness is rated as very low, 25 to 26 species; low, 27 to 29 species, intermediate, 30 to 31 species; high, 32 to 34 species, and very high, 35 to 36 species

Estimates of total cover by vegetation layer were made for wildlife interpretations. Upper layer tree cover ranges from 62 percent in Pacific Silver Fir-Mountain Hemlock/Thin-leaved Huckleberry/Vanillaleaf to 74 percent in Pacific Silver Fir-Western Hemlock/Thin-leaved Huckleberry/Vanillaleaf and averages 70 percent for the Series. Mid-layer tree cover ranges from 32 to 38 percent and averages 35 percent Lower layer tree cover ranges from 30 to 41 percent and averages 32 percent. High shrub cover ranges from 1 to 10 percent and averages 5 percent Low shrub cover ranges from 14 to 19 percent and averages 16 percent Herb/grass cover ranges from 25 to 37 percent and averages 29 percent

Three final plant associations have been identified for the Series in southwestern Oregon They were described from 34 Forest Service plots. The following shows the relationship between draft and final plant associations The draft associations are listed, with final associations below, each in order of most to least common, with

the percentage of plots that make up each association (refer to Methods section)

ABAM-ACCI/TITR (N=14)
ABAM/ROGY/ACTR (86%)
ABAM-TSHE/VAME/ACTR (7%)
ABCO/BENE2/ACTR (7%)

ABAM-TSHE/CLUN (N=6)
ABAM-TSHE/VAME/ACTR (67%)
ABAM-TSME/VAME/ACTR (17%)
TSHE-ABAM (17%)

ABAM/VAME-RULA (N=15)
ABAM-TSME/VAME/ACTR (60%)
ABAM/ROGY/ACTR (33%)
TSME-ABMAS/VAME/CHUM (7%)

KEY TO THE PACIFIC SILVER FIR PLANT ASSOCIATIONS

1a. Mountain hemlock (TSME) present. 2

1b Mountain hemlock (TSME) absent. 3

2a. Mountain hemlock (TSME) present in understory with usually 15 percent or greater cover. Golden chinquapin (CACH6) and Douglas maple (ACGL) absent. Three or less of the following present: baldhip rose (ROGY), vanillaleaf (ACTR), western twinflower (LIBOL), starry false Solomon's-seal (SMST), or rattlesnake-plantain (GOOB2) ABAM-TSME/VAME/ACTR
Page ABAM 6

2b. Mountain hemlock (TSME) present in understory with usually 10 percent or less cover. Golden chinquapin (CACH6) and/or Douglas maple (ACGL) present Four or more of the following present: baldhip rose (ROGY), vanillaleaf (ACTR), western twinflower (LIBOL), starry false Solomon's-seal (SMST), or rattlesnake-plantain (GOOB2). ABAM/ROGY/ACTR
Page ABAM 8

3a Western hemlock (TSHE) present with greater than 20 percent cover (overstory and understory combined). 4

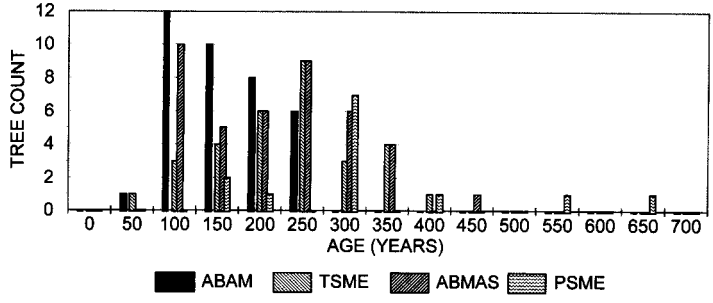
3b. Western hemlock (TSHE) present with less than 15 percent cover (overstory and understory combined). ABAM/ROGY/ACTR
Page ABAM 8

4a. Thin-leaved huckleberry (VAME), vanillaleaf (ACTR), coolwort foamflower (TITRU), western twinflower (LIBOL), and rattlesnake-plantain (GOOB2) present. ABAM-TSHE/VAME/ACTR
Page ABAM 10

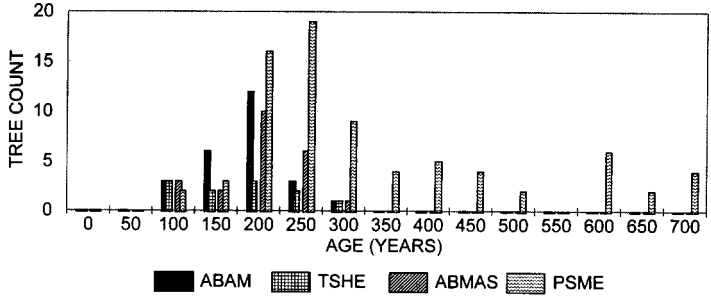
4b. At least one or more of the following species absent. thin-leaved huckleberry (VAME), vanillaleaf (ACTR), coolwort foamflower (TITRU), western twinflower (LIBOL), or rattlesnake-plantain (GOOB2). ABAM/ROGY/ACTR
Page ABAM 8

Ecology plot data that seemed vaguely interesting and filled this page.

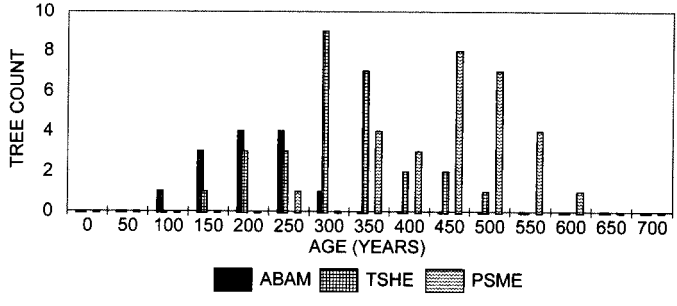
ABAM-TSME/VAME/ACTR



ABAM/ROGY/ACTR



ABAM-TSHE/VAME/ACTR



ABAM 6

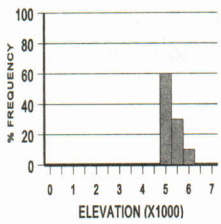
PACIFIC SILVER FIR-MOUNTAIN HEMLOCK/THIN-LEAVED HUCKLEBERRY/VANILLALEAF
Abies amabilis-Tsuga mertensiana/Vaccinium membranaceum/Achlys triphylla
ABAM-TSME/VAME/ACTR (N=10; FS=10)

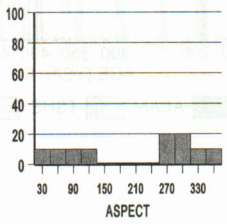
Distribution. Pacific Silver Fir-Mountain Hemlock/Thin-leaved Huckleberry/ Vanillaleaf occurs on the Diamond Lake and North Umpqua Ranger Districts, Umpqua National Forest, and the Prospect Ranger District, Rogue River National Forest.

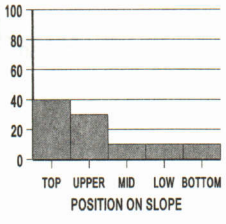
Distinguishing Characteristics. Pacific Silver Fir-Mountain Hemlock/Thin-leaved Huckleberry/Vanillaleaf is present at the highest elevations and the coldest temperatures of the Series. Mountain hemlock and thin-leaved huckleberry are frequently present, both indicators of the cold environment.

Soils. Parent material is most commonly basalt and andesite, pumice or tephra. Soils are moderately deep to deep, with an average depth of greater than 40 inches. Average surface rock cover is 4 percent, with 6 percent gravel.

Environment. Elevation averages 5390 feet. Pacific Silver Fir-Mountain Hemlock/







Thin-leaved Huckleberry/Vanillaleaf occurs predominantly on west, north, and east aspects and rarely on south aspects Slope averages 25 percent and ranges from 6 to 48 percent Ridge top and upper one-third slope positions predominate

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging 25 species Shasta red fir generally dominates the overstory, with Pacific silver fir frequent, mountain hemlock and western white pine common, and Douglas-fir occasional Pacific silver fir dominates the understory, with mountain hemlock occurring frequently with low to moderate covers. Shasta red fir occurs frequently in the understory, with western white pine common, and white fir occasional Shrub richness is very low for the Series. Thin-leaved huckleberry and dwarf bramble are found frequently, with baldhip rose and Oregon boxwood occasional In the herb/grass layer, vanillaleaf and queen's cup occur frequently One-sided pyrola, white inside-out-flower, northwest listera, starry false Solomon's-seal, common prince's-pine, leafy lousewort, and whitevein pyrola occur commonly Moss cover averages 4 percent

Upper layer tree cover is low for the Series, averaging 62 percent Mid-layer and lower layer tree covers are both low, averaging 32 and 30 percent, respectively High shrub cover is low, averaging 1 percent, but low shrub cover is high, averaging 19 percent Herb/grass cover is also low, ranging from 0 to 60 percent, and averaging 25 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				4
Shasta red fir	ABMAS	90	39	
Pacific silver fir	ABAM	90	10	
Mountain hemlock	TSME	70	13	
Western white pine	PIMO3	70	5	
Douglas-fir	PSME	40	13	
Understory trees				4
Pacific silver fir	ABAM	100	33	
Mountain hemlock	TSME	100	13	
Shasta red fir	ABMAS	80	8	
Western white pine	PIMO3	50	2	
Shrubs				4
Thin-leaved huckleberry	VAME	90	10	
Dwarf bramble	RULA2	80	5	
Herbs				14
Vanillaleaf	ACTR	80	9	
Queen's cup	CLUN2	80	5	
One-sided pyrola	PYSE	70	2	
White inside-out-flower	VAHE	70	2	
Northwest listera	LICA10	70	1	
Starry false Solomon's-seal	SMST	60	2	
Common prince's-pine	CHUM	60	2	
Leafy lousewort	PERA	50	1	
Whitevein pyrola	PYPI2	50	1	
Common beargrass	XETE	40	6	
Coolwort foamflower	TITRU	40	3	
Round-leaved violet	VIOR	40	3	

ABAM 8

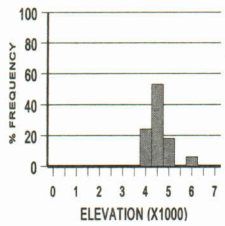
PACIFIC SILVER FIR/BALDHIP ROSE/VANILLALEAF
Abies amabilis/Rosa gymnocarpa/Achlys triphylla
ABAM/ROGY/ACTR (N=17; FS=17)

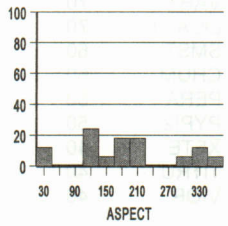
Distribution. Pacific Silver Fir/Baldhip Rose/Vanillaleaf occurs on all Ranger Districts of the Umpqua National Forest and may also occur on the Prospect Ranger District, Rogue River National Forest.

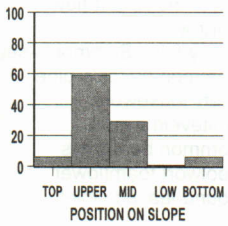
Distinguishing Characteristics. Pacific Silver Fir/Baldhip Rose/Vanillaleaf is found at warm temperatures and high precipitation relative to the other plant associations in the Series. Douglas-fir and white fir are frequently found in the understory, with western hemlock and mountain hemlock occurring occasionally and only with low covers. Western hemlock indicates warmer sites and mountain hemlock cooler sites.

Soils. Parent materials are commonly andesite or tephra, with some diorite. Soils are moderately deep to deep, with an average depth of greater than 45 inches. Average surface rock cover is 6 percent, with 6 percent gravel.

Environment. Elevation averages 4830 feet. Pacific Silver Fir/Baldhip Rose/







Vanillaleaf occurs on most aspects, although rarely on east and west aspects Slope averages 39 percent and ranges from 19 to 65 percent Upper and middle one-third slope positions predominate

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 36 species. Overstory tree layer is dominated by Douglas-fir, with Pacific silver fir and white fir common. Western white pine, Shasta red fir, and western hemlock occur occasionally. Pacific silver fir dominates the understory with Douglas-fir and white fir occurring frequently, and western hemlock, Shasta red fir, and Pacific yew occasionally. Vine maple occurs commonly, and often in abundance. Baldhip rose, dwarf Oregongrape, dwarf bramble, and Pacific blackberry frequently occur in the shrub layer. Vanillaleaf, western twinflower, starry false Solomon's-seal, rattlesnake-plantain, white inside-out-flower, threeleaf anemone, queen's cup, common prince's-pine, and Oregon fairybell are frequently occurring herbs. Moss cover averages 5 percent.

Upper layer tree cover is high for the Series, averaging 73 percent. Mid-layer tree cover is also high, averaging 38 percent, and lower layer tree cover is low, averaging 30 percent. High shrub cover is intermediate, averaging 6 percent, and low shrub cover is low, averaging 14 percent. Herb/grass cover is intermediate for the Series, ranging from 5 to 95 percent, with an average of 28 percent.

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Douglas-fir	PSME	100	38	
Pacific silver fir	ABAM	53	16	
White fir	ABCO	53	7	
Understory trees				6
Pacific silver fir	ABAM	100	35	
Douglas-fir	PSME	88	8	
White fir	ABCO	82	6	
Vine maple	ACCI	71	23	
Shrubs				8
Baldhip rose	ROGY	100	1	
Dwarf Oregongrape	BENE2	76	5	
Dwarf bramble	RULA2	76	2	
Pacific blackberry	RUUR	76	2	
Thin-leaved huckleberry	VAME	59	3	
Herbs				18
Vanillaleaf	ACTR	94	8	
Western twinflower	LIBOL	88	3	
Starry false Solomon's-seal	SMST	88	2	
Rattlesnake-plantain	GOOB2	88	1	
White inside-out-flower	VAHE	82	2	
Threeleaf anemone	ANDE3	82	1	
Queen's cup	CLUN2	82	1	
Common prince's-pine	CHUM	76	4	
Oregon fairybell	DIHOO	76	2	
White trillium	TROV2	71	1	
Coolwort foamflower	TITRU	65	2	
Scouler's harebell	CASC7	65	2	

ABAM 10

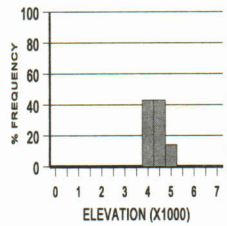
PACIFIC SILVER FIR-WESTERN HEMLOCK/THIN-LEAVED HUCKLEBERRY/VANILLALEAF
Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum/Achlys triphylla
ABAM-TSHE/VAME/ACTR (N=7; FS=7)

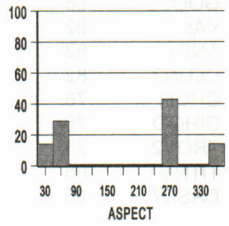
Distribution. Pacific Silver Fir-Western Hemlock/Thin-leaved Huckleberry/Vanillaleaf occurs on the Cottage Grove and Diamond Lake Ranger Districts, and likely, the North Umpqua Ranger District, Umpqua National Forest.

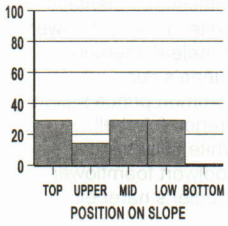
Distinguishing Characteristics. Pacific Silver Fir-Western Hemlock/Thin-leaved Huckleberry/Vanillaleaf is the lowest in elevation and one of the warmer associations of the Series. Western hemlock is frequently present at moderate covers in both the overstory and understory, indicating relatively warm conditions.

Soils. Parent material is mostly andesite, with some diorite and ash. Soils are moderately deep to deep, with an average depth of greater than 47 inches. Average surface rock cover is 6 percent, with 10 percent gravel.

Environment. Elevation averages 4600 feet. Pacific Silver Fir-Western Hemlock/ Thin-leaved Huckleberry/Vanillaleaf occurs on west and north aspects and rarely







on south aspects Slope averages 28 percent and ranges from 3 to 50 percent Slope position ranges from ridge top down to the lower one-third slope

Vegetation Composition and Structure Total species richness is high for the Series, averaging 33 species Overstory tree layer is dominated by Douglas-fir, with western hemlock occurring frequently, and Pacific silver fir commonly White fir, western white pine, and Engelmann spruce occur occasionally Understory is dominated by Pacific silver fir, with western hemlock occurring frequently at low covers Pacific yew, Douglas-fir, white fir, and western white pine occur occasionally Vine maple, though occasional, may be dense in some areas In the shrub layer, thin-leaved huckleberry and dwarf bramble occur frequently In the herb/grass layer, vanillaleaf, coolwort foamflower, western twinflower, rattlesnake-plantain, common prince's-pine, white trillium, and Oregon fairybell occur frequently Moss cover averages 7 percent

Upper layer tree cover is high for the Series, averaging 74 percent Mid-layer tree cover is low, averaging 33 percent Lower layer tree, high shrub, and low shrub covers are all high, averaging 41, 10, and 18 percent, respectively Herb/grass cover is also high for the Series, ranging from 3 to 90 percent, with an average of 37 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				4
Douglas-fir	PSME	100	39	
Western hemlock	TSHE	86	22	
Pacific silver fir	ABAM	71	14	
Understory trees				4
Pacific silver fir	ABAM	100	39	
Western hemlock	TSHE	100	23	
Shrubs				9
Thin-leaved huckleberry	VAME	100	5	
Dwarf bramble	RULA2	86	2	
Dwarf Oregongrape	BENE2	71	2	
Pacific blackberry	RUUR	71	1	
Pacific rhododendron	RHMA3	57	15	
Herbs				17
Vanillaleaf	ACTR	100	5	
Coolwort foamflower	TITRU	100	4	
Western twinflower	LIBOL	100	3	
Rattlesnake-plantain	GOOB2	100	1	
Common prince's-pine	CHUM	86	3	
White trillium	TROV2	86	1	
Oregon fairybell	DIHOO	86	1	
Starry false Solomon's-seal	SMST	71	13	
Bunchberry	COCA13	71	6	
Queen's cup	CLUN2	71	1	
Cutleaf goldthread	COLA3	57	4	
White inside-out-flower	VAHE	57	3	
Western wild ginger	ASCA2	57	1	
Round-leaved violet	VIOR	57	1	
Little prince's-pine	CHME	57	1	
White-flowered hawkweed	HIAL2	57	1	

WESTERN WHITE PINE SERIES

WESTERN WHITE PINE SERIES

Pinus monticola

PIMO3

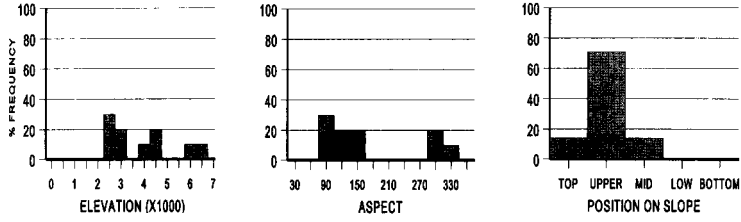
Lisa A McCrimmon

Western white pine grows along the Pacific coast from coastal British Columbia southward through Washington and Oregon to the Siskiyou Mountains along the Coast It also grows from the Washington Cascades to the Sierra Nevada In the Siskiyou Mountains and the southern Oregon Cascades, western white pine occurs occasionally in many stands

The Western White Pine Series is found in the Siskiyou Mountains primarily on ultramafic soils. Its occurrences are rare, disjunct, and generally limited in acreage. Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass is intermixed with the Tanoak Series and Western White Pine-Jeffrey Pine/Huckleberry Oak/Common Beargrass is intermixed with the Jeffrey Pine Series Western White Pine/Common Beargrass grades into the Shasta Red Fir Series. The combination of western white pine blister rust, mountain pine beetles, drought, and fire suppression may result in the reduction or loss of western white pine as a dominant climax species in parts of the Siskiyous

In the southern Oregon Cascades, western white pine is only found as an association in stands and not as a dominant species in the regeneration layer, so there are no associations described.

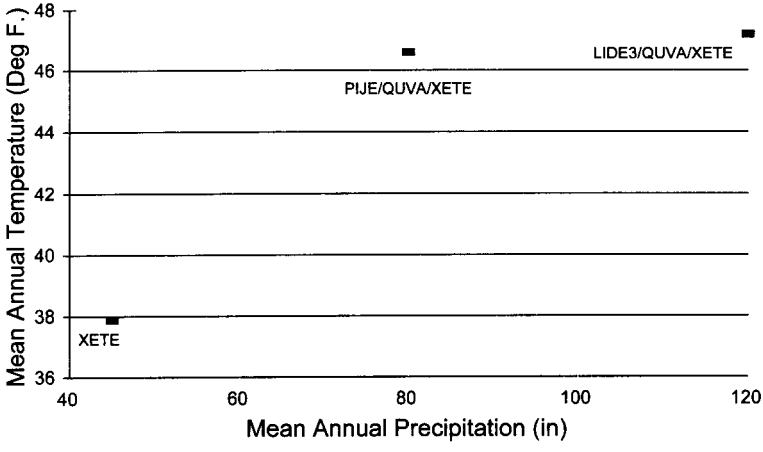
Elevation ranges from approximately 2640 feet to 6680 feet in the Siskiyous All aspects are represented, and slope ranges from flat to steep. Position ranges from ridge tops to the middle one-third of the slope.



The Western White Pine Series can occur in a variety of climates ranging from warm/wet to cool/dry Average annual temperature ranges from 38 degrees F to 49 degrees F and averages 44 degrees F. Average annual precipitation ranges from 45 inches to 130 inches and averages 90 inches. The relative environments of the plant associations are shown on page PIMO3 2. Each association is plotted by average annual temperature and average annual precipitation.

Parent material is serpentine, peridotite, hornblend, or basalt Soils range from shallow to moderately deep Surface gravel cover ranges from 0 to 30 percent, averaging 11 percent Surface rock cover ranges from 5 to 80 percent, averaging

PIMO3 2



41 percent. Exposed bedrock cover ranges from 0 to 7 percent, averaging 4 percent. Bare ground ranges from 0 to 10 percent, averaging 3 percent. Litter cover ranges from 40 to 99 percent, averaging 81 percent. Moss cover ranges from 0 to 20 percent, averaging 4 percent.

Either western white pine or Jeffrey pine may be the dominant species in the overstory of the Western White Pine Series. Western white pine regeneration is abundant in the understory. On warmer, wetter sites, tanoak is present, and on warmer, drier sites, tanoak is absent. On the cooler, drier sites, Shasta red fir and white fir are present. Huckleberry oak, red huckleberry, pinemat manzanita, pygmy Oregongrape, and box-leaved silk-tassel occur frequently throughout the Series on warmer sites, with pinemat manzanita and western serviceberry occurring frequently on cooler sites. Common beargrass occurs frequently on all associations.

Total species richness (the number of species of vascular plants) is calculated for each Association. The average total species richness for the Western White Pine Series ranges between 29 and 34, with an average of 32 species. Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass and Western White Pine/ Beargrass both have an average total species richness of 34 species Western White Pine-Jeffrey Pine/Huckleberry Oak/Common Beargrass has an average total species richness of 29 species.

Estimates of total cover by vegetation layer were made for wildlife interpretations. Upper layer tree cover ranges from 10 percent in Western White Pine-Tanoak/ Huckleberry Oak/Common Beargrass to 30 percent in Western White Pine/ Beargrass and averages 17 percent for the Series. Mid-layer tree cover ranges from 23 to 35 percent and averages 30 percent. Lower layer tree cover ranges from 10 to 73 percent and averages 49 percent. High shrub cover ranges from 0 to 28 percent and averages 14 percent. Low shrub cover ranges from 3 to 45 percent and averages 28 percent. Herb/grass layer cover ranges from 13 to 88 percent and averages 37 percent.

Three final plant associations have been identified for the Series in the Siskiyous They were described from 10 Forest Service plots The following shows the relationship of draft and final plant associations The draft associations are listed, with final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

PIMO/XETE (N=4)
PIMO3/XETE (50%)
ABCO/XETE (25%)
TSME-ABMAS/VAME/CHUM (25%)

KEY TO THE WESTERN WHITE PINE PLANT ASSOCIATIONS

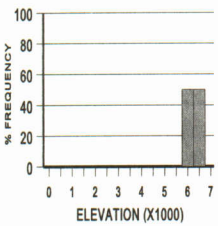
1a	Huckleberry oak (QUVA) present Shasta red fir (ABMAS) absent	2
1b	Huckleberry oak (QUVA) absent Shasta red fir (ABMAS) present	PIMO3/XETE Page PIMO3 4
2a	Tanoak (LIDE3) present	PIMO3-LIDE3/QUVA/XETE Page PIMO3 6
2b	Tanoak (LIDE3) absent	PIMO3-PIJE/QUVA/XETE Page PIMO3 8

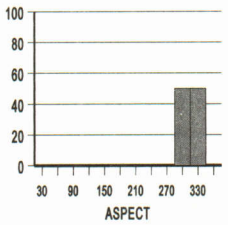
WESTERN WHITE PINE/COMMON BEARGRASS
Pinus monticola/Xerophyllum tenax
PIMO3/XETE (N=2; FS=2)

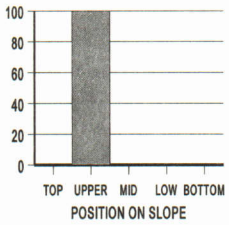
Distribution. Western White Pine/Common Beargrass occurs on Red Mountain on the Applegate Ranger District, Rogue River National Forest, and may also occur on outcrops of peridotite in the Siskiyou Mountains.

Distinguishing Characteristics. Western White Pine/Common Beargrass is found at low temperatures and low precipitation relative to other associations in the Series. Western white pine dominates the overstory and understory with Shasta red fir present, and common beargrass dominates the shrub/herb/grass layer with covers averaging 60 percent.

Soils. Parent material is usually peridotite. Soils are shallow to moderately deep, with an average depth of 18 inches. Average surface rock cover is 27 percent, with 6 percent gravel. Bare ground exposure and surface bedrock both average 5 percent on two plots.







Environment Elevation averages 6580 feet Western White Pine/Common Beargrass occurs on west to northwest aspects, but may occur on other aspects Slope averages 40 percent and ranges from 23 to 57 percent Upper one-third slope positions predominate

Vegetation Composition and Structure Total species richness averages 34 species Overstory and understory are dominated by western white pine In the overstory, Shasta red fir occurs commonly, and in the understory, white fir and Shasta red fir occur frequently Mountain hemlock, Douglas-fir, and incense-cedar are common Shrub richness is very low for the Series, with western serviceberry and pinemat manzanita frequently occurring with low covers Herb/grass richness is very high for the Series Common beargrass, sedge species, common yarrow, leafy pedicularis, and mountain monardella frequently occur Common beargrass has high cover, averaging 60 percent Moss cover averages 1 percent

Upper layer tree cover is high for the Series, averaging 30 percent Mid-layer and lower layer tree covers are low, averaging 23 and 10 percent, respectively High shrub cover is absent, and low shrub cover is low at 3 percent Herb/grass cover is high, ranging from 80 to 95 percent, with an average of 88 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Western white pine	PIMO3	100	35	
Shasta red fir	ABMAS	50	2	
Understory trees				5
Western white pine	PIMO3	100	11	
White fir	ABCO	100	2	
Shasta red fir	ABMAS	100	2	
Mountain hemlock	TSME	50	1	
Douglas-fir	PSME	50	1	
Incense-cedar	CADE27	50	1	
Shrubs				3
Western serviceberry	AMAL2	100	2	
Pinemat manzanita	ARNE	100	2	
Herbs				26
Common beargrass	XETE	100	60	
Sedge species	CAREX	100	11	
Common yarrow	ACMI2	100	3	
Leafy pedicularis	PERA	100	2	
Mountain monardella	MOOD	100	2	
Rush species	JUNCU	50	30	
Wild ginger	ASCA2	50	15	
Applegate's paintbrush	CAAP4	50	10	
Fescue species	FESTU	50	10	
Balloon milk-vetch	ASWH	50	10	
Sulpher buckwheat	ERUM	50	6	
Nevada cinquefoil	POGLN2	50	5	
Buttercup species	RANUN	50	5	
Showy aster	ASCO3	50	5	
Micromeria species	MICRO13	50	5	
Goosefoot violet	VIPU4	50	4	

PIMO3 6

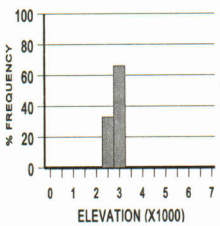
WESTERN WHITE PINE-TANOAK/HUCKLEBERRY OAK/COMMON BEARGRASS
Pinus monticola-Lithocarpus densiflorus/Quercus vaccinifolia/Xerophyllum tenax
PIMO3-LIDE3/QUVA/XETE (N=3; FS=3)

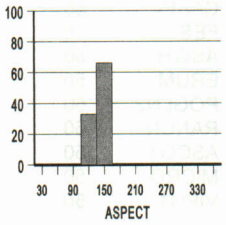
Distribution. Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass occurs on the Chetco and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

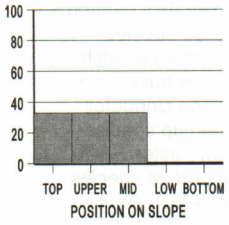
Distinguishing Characteristics. Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass is found at warm temperatures and high precipitation relative to other associations in the Series. The presence of tanoak and California laurel both indicate moist conditions.

Soils. Parent materials can be serpentine, hornblend, or basalt. Soils are shallow to moderately deep, with an average depth of 18 inches. Average surface rock cover is 18 percent, with 16 percent gravel, and 4 percent exposed bedrock.

Environment. Elevation averages 3160 feet. Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass occurs on southeast aspects. Slope averages







23 percent and ranges from 7 to 50 percent Ridge top to middle one-third slope positions predominate

Vegetation Composition and Structure. Total species richness averages 34 species Overstory tree layer is dominated by western white pine, with Douglas-fir and knobcone pine common, and sugar pine, Jeffrey pine, Port-Orford-cedar, and western hemlock occasional Western white pine dominates the understory, with tanoak and California laurel frequently occurring. Port-Orford-cedar, Douglas-fir, and knobcone pine are common Jeffrey pine, incense-cedar, sugar pine, lodgepole pine, ponderosa pine, and golden chinquapin occur occasionally In the shrub layer, huckleberry oak, red huckleberry, common juniper, pinemat manzanita, and pygmy Oregongrape are frequently found In the herb/grass layer, common beargrass, toothleaf pyrola, and whipplevine are frequently found. Sedge species, slender-tubed iris, obscure bedstraw, and western starflower are common Moss cover averages 8 percent

Upper layer tree cover is low for the Series, averaging 10 percent Mid-layer tree cover is intermediate, averaging 32 percent, and lower layer tree cover is high, averaging 60 percent High shrub and low shrub cover are both intermediate, averaging 28 and 32 percent, respectively Herb/grass cover is low, ranging from 7 to 17 percent, with an average of 13 percent

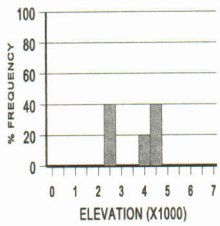
Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Western white pine	PIMO3	100	17	
Douglas-fir	PSME	67	8	
Knobcone pine	PIAT	67	6	
Understory trees				7
Western white pine	PIMO3	100	28	
Tanoak	LIDE3	100	16	
California laurel	UMCA	100	3	
Port-Orford-cedar	CHLA	67	11	
Douglas-fir	PSME	67	10	
Knobcone pine	PIAT	67	4	
Shrubs				11
Huckleberry oak	QUVA	100	23	
Red huckleberry	VAPA	100	8	
Common juniper	JUCO6	100	5	
Pinemat manzanita	ARNE	100	5	
Pygmy Oregongrape	BEPU	100	2	
Coffeeberry	RHCA	67	5	
Box-leaved silk-tassel	GABU2	67	4	
Western serviceberry	AMAL2	67	1	
Baldhip rose	ROGY	67	1	
Herbs				12
Common beargrass	XETE	100	3	
Toothleaf pyrola	PYDE	100	1	
Whipplevine	WHMO	100	1	
Toothleaf pyrola	PYDE	100	1	
Sedge species	CAREX	67	10	
Slender-tubed iris	IRCH	67	2	

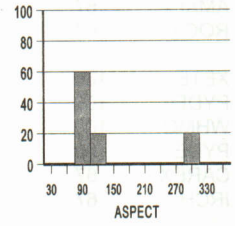
WESTERN WHITE PINE-JEFFREY PINE/HUCKLEBERRY OAK/COMMON BEARGRASS
Pinus monticola-Pinus jeffreyi/Quercus vaccinifolia/Xerophyllum tenax
PIMO3-PIJE/QUVA/XETE (N=5; FS=5)

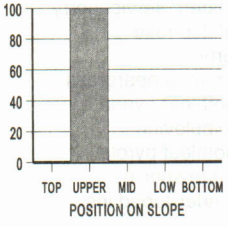
Distribution. Western White Pine-Jeffrey Pine/Huckleberry Oak/Common Beargrass occurs on the Galice and Illinois Valley Ranger Districts, Siskiyou National Forest. It may also occur on adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Western White Pine-Jeffrey Pine/Huckleberry Oak/ Common Beargrass is found at warm temperatures and moderate precipitation relative to other associations in the Series. Average annual temperature is slightly less than Western White Pine-Tanoak/Huckleberry Oak/Common Beargrass, however, average annual precipitation is much less, 80 inches for this Association as compared to 120 inches for Western White Pine-Tanoak/Huckleberry Oak/ Common Beargrass. Western White Pine-Jeffrey Pine/Huckleberry Oak/Common Beargrass lacks tanoak and has less constancy and cover of other high moisture indicators.

Soils. Parent material is serpentine or peridotite. Soils are moderately deep, with an average depth of 24 inches. Average surface rock cover is 59 percent, with 8







percent gravel One plot has 10 percent bare ground cover

Environment Elevation averages 3800 feet Western White Pine-Jeffrey Pine/ Huckleberry Oak/Common Beargrass occurs on east, southeast, and west aspects, but may occur on other aspects as well Slope averages 27 percent and ranges from 5 to 50 percent Upper one-third slope positions predominate

Vegetation Composition and Structure. Total species richness averages 29 species Overstory tree layer is dominated by Jeffrey pine, with incense-cedar, western white pine, and Douglas-fir frequently occurring. The understory is dominated by western white pine, with incense-cedar, Jeffrey pine, and Douglas-fir frequently occurring. California laurel, Port-Orford-cedar, and white fir occur occasionally The shrub layer is dominated by huckleberry oak with moderate to high covers. Box-leaved silk-tassel, pinemat manzanita, pale serviceberry, and pygmy Oregongrape are frequent Squaw carpet and red huckleberry are common In the herb/grass layer, common beargrass and western starflower are frequent, with Oregon trillium, rock fern, slender-tubed iris, and woodland tarweed common Moss cover averages 3 percent

Upper layer and mid-layer tree covers are intermediate for the Series, averaging 15 and 35 percent, respectively Lower layer tree cover is high, averaging 73 percent High shrub cover is low, averaging 8 percent, however, low shrub cover is high, averaging 45 percent Herb/grass cover is low for the Series, ranging from 15 to 30 percent, with an average of 23 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Jeffrey pine	PIJE	100	9	
Incense-cedar	CADE27	100	6	
Western white pine	PIMO3	100	5	
Douglas-fir	PSME	100	3	
Understory trees				6
Western white pine	PIMO3	100	14	
Incense-cedar	CADE27	100	10	
Jeffrey pine	PIJE	100	6	
Douglas-fir	PSME	100	4	
Shrubs				8
Huckleberry oak	QUVA	100	39	
Box-leaved silk-tassel	GABU2	80	15	
Pinemat manzanita	ARNE	80	8	
Pale serviceberry	AMPA2	80	3	
Pygmy Oregongrape	BEPU	80	2	
Squaw carpet	CEPR	60	6	
Red huckleberry	VAPA	60	2	
Whiteleaf manzanita	ARVI4	40	23	
Herbs				14
Common beargrass	XETE	80	12	
Western starflower	TRLA6	80	1	
Oregon trillium	TRRI2	60	2	
Rock fern	ASDE6	60	1	
Slender-tubed iris	IRCH	60	1	
Woodland tarweed	MAMA	60	1	

MOUNTAIN HEMLOCK SERIES

MOUNTAIN HEMLOCK SERIES

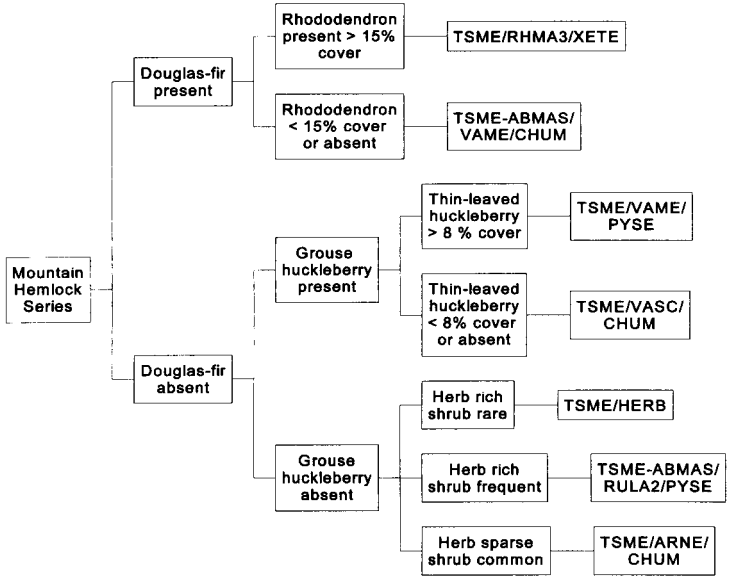
Tsuga mertensiana

TSME

Lisa A McCrimmon

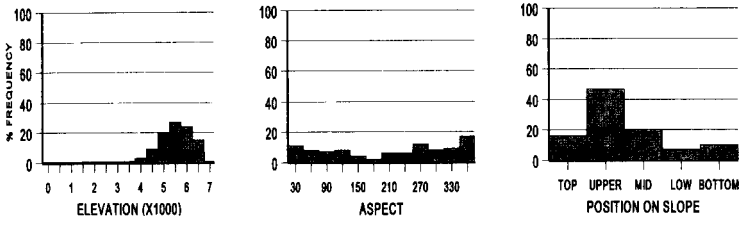
Mountain hemlock ranges from southeast Alaska, south through the Cascade Mountains, to the Sierra Nevada in California. In southwestern Oregon mountain hemlock occurs at high elevations with cold temperatures and moderate precipitation.

The Mountain Hemlock Series is the highest elevation forested series in southern Oregon In the southern Oregon Cascades it occurs as a fairly continuous band, but in the Siskiyou Mountains it is fragmented, found only on northerly aspects of the higher peaks and ridges. The Mountain Hemlock Series is replaced at lower elevations by the Shasta Red Fir Series and at higher elevations by subalpine meadows The flowchart below shows a graphical presentation of the classification and the relationship between associations.

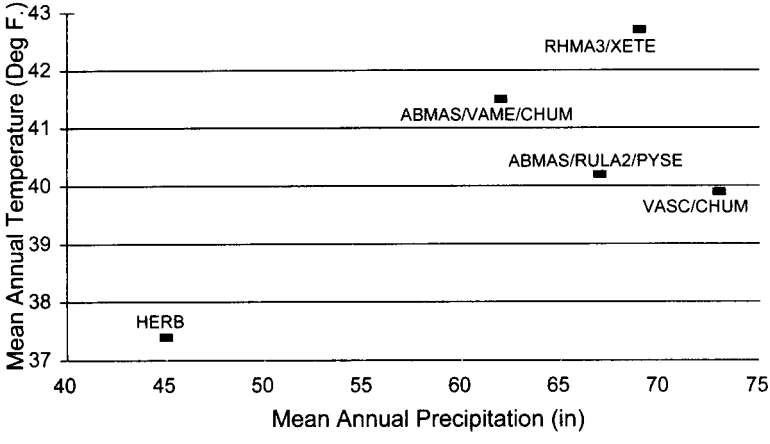


TSME 2

Elevation ranges from approximately 3950 feet to 6790 feet in the Cascades and from 5330 feet to 7340 feet in the Siskiyous. All aspects are represented and slope can range from flat to very steep. Topographic position can range from ridge tops to valley bottoms, but most frequently occurs between ridge tops and middle one-third slope.



The Mountain Hemlock Series generally occurs in areas that are cool to cold, and wet. Average annual temperature ranges from 36 degrees F to 45 degrees F with an average of 40 degrees F Average annual precipitation ranges from 40 inches to 80 inches with an average of 63 inches The relative environments of the plant associations are shown below. Each association is plotted by average annual temperature and average annual precipitation. No climatic data is available for Mountain Hemlock/Thin-leaved Huckleberry/One-sided Pyrola and Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine.



Parent material is highly variable, although pumice, andesite, and basalt are the most common, with schist, granodiorite, and mixed metamorphic materials occurring less frequently. Soils range from shallow to deep Surface gravel cover ranges from 0 to 60 percent, with an average of 5 percent. Surface rock cover ranges from 0 to 85 percent, with an average of 9 percent Exposed bedrock cover ranges from 0 to 15 percent, with an average of 2 percent. Bare ground ranges from 0 to 15 percent,

with an average of 1 percent Litter cover ranges from 30 to 100 percent, with an average of 92 percent Moss cover, however, is low, ranging from 0 to 15 percent, with an average of 2 percent This reflects the cold soil conditions typical of the Series.

Mountain hemlock and Shasta red fir are dominant tree species in the overstory, with western white pine and Douglas-fir occurring occasionally. Mountain hemlock is dominant in the understory, with Shasta red fir occurring frequently. On warmer sites, Douglas-fir, white fir, and western hemlock may be present Thin-leaved huckleberry, one-sided pyrola, and common prince's-pine occur commonly.

Total species richness (the average number of species of vascular plants) is calculated for each Association. The average total species richness for the Mountain Hemlock Series ranges between 9 and 28 Richness is rated as very low, 9 to 12 species, low, 13 to 16 species; intermediate, 17 to 20 species, high, 21 to 24 species, and very high, 25 to 28 species.

Estimates of total cover by vegetation layer were made for wildlife interpretations. Upper layer tree cover ranges from 50 percent in Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine to 61 percent in Mountain Hemlock/Herb and averages 57 percent for the Series Mid-layer tree cover ranges from 25 to 55 percent and averages 31 percent. Lower layer tree cover ranges from 14 to 28 percent and averages 20 percent. High shrub cover ranges from 0 to 71 percent and averages 9 percent Low shrub cover ranges from 0 to 38 percent and averages 26 percent Herb/grass layer cover ranges from 1 to 33 percent and averages 18 percent.

Seven final plant associations have been classified for the Series in southwestern Oregon. They were described from 98 plots· 62 Forest Service, 32 Sky Lakes Wilderness, and 4 Bureau of Land Management. The following shows the relationship of draft and final plant associations The draft associations are listed, with final associations below, each in order of most to least common, with the percentage of plots that make up each association (refer to Methods section)

TSME-ABAM/RHMA (N=7)
TSME/RHMA3/XETE (71%)
TSME-ABMAS/VAME/CHUM (14%)
PSME/ARNE-SWO (14%)

TSME-ABLA2/VASC (N=4)
TSME/VASC/CHUM (50%)
TSME-ABMAS/VAME/CHUM (50%)

TSME-ABMAS/VAME (N=18)
TSME-ABMAS/VAME/CHUM (56%)
TSME-ABMAS/RULA2/PYSE (44%)

TSME/CHUM/LIBOL (N=4)
TSME-ABMAS/VAME/CHUM (75%)
ABMAS/VAME/CHUM (25%)

TSME/POPU (N=12)
TSME/HERB (N=92%)
TSME-ABMAS/RULA2/PYSE (N=8%)

TSME/VASC/Depauperate (N=13)
TSME-ABMAS/VAME/CHUM (46%)
TSME/VASC/CHUM (38%)
TSME-ABMAS/RULA2/PYSE (15%)

KEY TO THE MOUNTAIN HEMLOCK PLANT ASSOCIATIONS

1a.	Pacific rhododendron (RHMA3) present with greater than 15 percent cover.	TSME/RHMA3/XETE Page TSME 6
1b.	Pacific rhododendron (RHMA3) absent, or if present, with less than 15 percent cover.	2
2a.	Douglas-fir (PSME) present.	TSME-ABMAS/VAME/CHUM Page TSME 8
2b.	Douglas-fir (PSME) absent.	3
3a	White fir (ABCO) and western white pine (PIMO3) present.	TSME-ABMAS/VAME/CHUM Page TSME 8
3b.	White fir (ABCO) and/or western white pine (PIMO3) absent.	4
4a.	Dwarf bramble (RULA2) present.	TSME-ABMAS/RULA2/PYSE Page TSME 10
4b.	Dwarf bramble (RULA2) absent.	5
5a.	Grouse huckleberry (VASC) present.	6
5b	Grouse huckleberry (VASC) absent.	7
6a.	Thin-leaved huckleberry (VAME) present with greater than 8 percent cover. Total combined cover of shrubs, herbs, and grasses, not including grouse huckleberry (VASC), greater than 20 percent.	TSME/VAME/PYSE Page TSME 12
6b.	Thin-leaved huckleberry (VAME) absent, or if present, with less than 8 percent cover. Total combined cover of shrubs, herbs, and grasses, not including grouse huckleberry (VASC), less than 20 percent.	TSME/VASC/CHUM Page TSME 14

7a	Common prince's-pine (CHUM) present with cover greater than or equal to 2 percent	8
7b	Common prince's-pine (CHUM) absent, or if present, with cover equal to 1 percent	9
8a.	Thin-leaved huckleberry (VAME) present	TSME/VAME/PYSE Page TSME 12
8b.	Thin-leaved huckleberry (VAME) absent	TSME/ARNE/CHUM Page TSME 16
9a	White fir (ABCO) present	TSME-ABMAS/RULA2/PYSE Page TSME 10
9b	White fir (ABCO) absent	TSME/HERB Page TSME 18

TSME 6

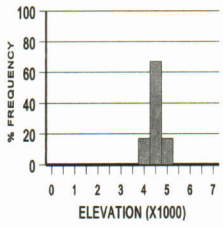
MOUNTAIN HEMLOCK/PACIFIC RHODODENDRON/COMMON BEARGRASS
Tsuga mertensiana/Rhododendron macrophyllum/Xerophyllum tenax
TSME/RHMA3/XETE (N=6; FS=6)

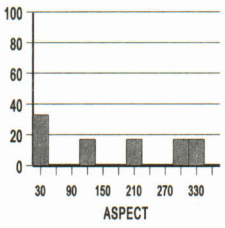
Distribution. Mountain Hemlock/Pacific Rhododendron/Common Beargrass occurs on the Cottage Grove, Diamond Lake, and North Umpqua Ranger Districts, Umpqua National Forest.

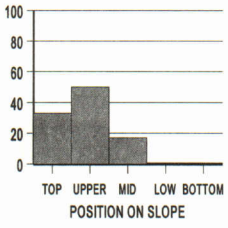
Distinguishing Characteristics. Mountain Hemlock/Pacific Rhododendron/Common Beargrass is found at warm temperatures and high precipitation relative to the other plant associations in the Series. The frequent occurrence of Douglas-fir and Pacific rhododendron indicate the warmer conditions.

Soils. Parent material is generally one of a variety of igneous materials, including andesite, pumice, tephra, or rhyolite. Soils can be shallow to deep, with an average depth of greater than 31 inches. Average surface rock cover is 25 percent, with 9 percent gravel.

Environment. Elevation averages 4770 feet. Mountain Hemlock/Pacific







Rhododendron/Common Beargrass occurs on most aspects, although rarely on southeast and south aspects Slope averages 39 percent and ranges from 15 to 62 percent Ridge top and upper one-third slope positions predominate

Vegetation Composition and Structure. Total species richness is high for the Series, averaging 23 species. Overstory tree layer is dominated by Douglas-fir Western white pine, mountain hemlock, and Shasta red fir frequently occur, Pacific silver fir is common, and white fir is occasional. Understory is dominated by mountain hemlock, with western hemlock, Pacific silver fir, Shasta red fir, golden chinquapin, and western white pine common. Pacific rhododendron dominates the shrub layer with high covers, thin-leaved huckleberry is frequent, and slender salal, dwarf Oregongrape, and Oregon boxwood are common In the herb/grass layer, rattlesnake-plantain, common beargrass, and western twinflower are common. Common beargrass may have high cover. Moss cover averages 5 percent

Upper layer tree cover is low for the Series, averaging 51 percent. Mid-layer tree cover is high, averaging 55 percent, and lower layer tree cover is low, averaging 16 percent. High and low shrub covers are both high, averaging 71 and 26 percent, respectively Herb/grass cover is also high for the Series, ranging from 1 to 80 percent, with an average of 33 percent.

Common name	Code	Constancy	Cover	Richness
Overstory trees				5
Douglas-fir	PSME	100	19	
Western white pine	PIMO3	100	5	
Mountain hemlock	TSME	83	19	
Shasta red fir	ABMAS	83	14	
Pacific silver fir	ABAM	67	7	
White fir	ABCO	33	2	
Understory trees				5
Mountain hemlock	TSME	100	27	
Western hemlock	TSHE	67	9	
Pacific silver fir	ABAM	67	6	
Shasta red fir	ABMAS	67	2	
Golden chinquapin	CACH6	50	8	
Western white pine	PIMO3	50	2	
Shrubs				6
Pacific rhododendron	RHMA3	100	74	
Thin-leaved huckleberry	VAME	83	7	
Slender salal	GAOV2	67	7	
Dwarf Oregongrape	BENE2	50	6	
Oregon boxwood	PAMY	50	1	
Pinemat manzanita	ARNE	33	2	
Sitka mountain-ash	SOSI2	33	1	
Dwarf bramble	RULA2	33	1	
Herbs				7
Rattlesnake-plantain	GOOB2	67	1	
Common beargrass	XETE	50	57	
Western twinflower	LIBOL	50	2	
Vanillaleaf	ACTR	33	8	
Alpine pyrola	PYAS	33	1	

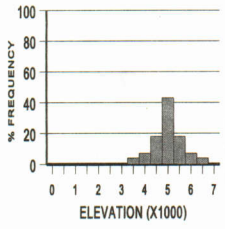
TSME 8

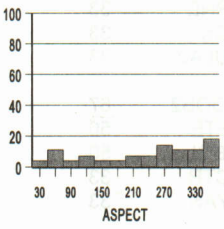
MOUNTAIN HEMLOCK-SHASTA RED FIR/THIN-LEAVED HUCKLEBERRY/COMMON PRINCE'S-PINE
Tsuga mertensiana-Abies magnifica shastensis/Vaccinium membranaceum/Chimaphila umbellata
TSME-ABMAS/VAME/CHUM (N=28; FS=25, Sky Lakes=3)

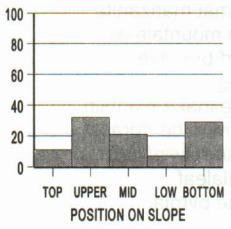
Distribution. Mountain Hemlock-Shasta Red Fir/Thin-leaved Huckleberry/Common Prince's-pine occurs mostly in the southern Oregon Cascades, but occasionally in the Siskiyous. It is found on all Ranger Districts of the Rogue River National Forest, the Diamond Lake Ranger District of the Umpqua National Forest, and in the Sky Lakes Wilderness.

Distinguishing Characteristics. Mountain Hemlock-Shasta Red Fir/Thin-leaved Huckleberry/Common Prince's-pine is found at low elevations with warm temperatures and moderate precipitation relative to the other plant associations in the Series. The presence of Douglas-fir, white fir, and western hemlock are all indicative of the warmer conditions.

Soils. Parent material is mostly pumice, andesite, and basalt. Soils are deep to moderately deep, with an average depth of greater than 41 inches. Average surface rock cover is 7 percent, with 2 percent gravel. Based on six plots sampled, surface







textures are sandy loam, loam, or clay loam, with 0 to 30 percent gravel and up to 40 percent cobbles Subsurface textures are sandy loam, clay loam, or loam, with 10 to 95 percent cobbles

Environment. Elevation averages 5260 feet. Mountain Hemlock-Shasta Red Fir/ Thin-leaved Huckleberry/Common Prince's-pine occurs on all aspects Slope averages 21 percent and ranges from 3 to 60 percent. Upper, middle one-third, and valley bottom slope positions predominate

Vegetation Composition and Structure. Total species richness is very high for the Series, averaging 28 species. Overstory tree layer is dominated by Shasta red fir, with mountain hemlock and Douglas-fir frequent, western white pine common, and white fir occasional Understory tree layer is dominated by mountain hemlock, with Shasta red fir and western white pine frequent, white fir and Douglas-fir common, and golden chinquapin and lodgepole pine occasional Shrub richness is very high for the Series, with thin-leaved huckleberry occurring frequently, occasionally with high covers. Oregon boxwood and dwarf bramble occur commonly. In the herb/grass layer, common prince's-pine and one-sided pyrola occur frequently, and queen's cup, threeleaf anemone, western twayblade, and rattlesnake-plantain commonly. Moss cover averages 3 percent

Upper layer tree cover is high for the Series, averaging 59 percent Mid-layer tree cover is low, averaging 30 percent, and lower layer tree cover is high, averaging 28 percent High shrub cover is low, averaging 4 percent, and low shrub cover is high, averaging 28 percent Herb/grass cover is intermediate, ranging from 0 to 90 percent, with an average of 18 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				4
Shasta red fir	ABMAS	86	24	
Mountain hemlock	TSME	79	15	
Douglas-fir	PSME	79	11	
Western white pine	PIMO3	71	6	
Understory trees				5
Mountain hemlock	TSME	100	26	
Shasta red fir	ABMAS	89	9	
Western white pine	PIMO3	75	3	
White fir	ABCO	57	7	
Douglas-fir	PSME	54	7	
Shrubs				7
Thin-leaved huckleberry	VAME	79	34	
Oregon boxwood	PAMY	68	3	
Dwarf bramble	RULA2	54	2	
Herbs				13
Common prince's-pine	CHUM	86	5	
One-sided pyrola	PYSE	82	1	
Queen's cup	CLUN2	61	3	
Threeleaf anemone	ANDE3	54	1	
Western twayblade	LICA10	54	1	
Rattlesnake-plantain	GOOB2	50	1	
White trillium	TROV2	46	1	

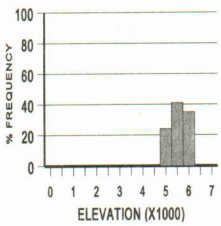
TSME 10

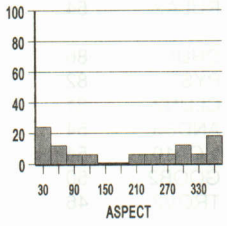
MOUNTAIN HEMLOCK-SHASTA RED FIR/DWARF BRAMBLE/ONE-SIDED PYROLA
Tsuga mertensiana-Abies magnifica shastensis/Rubus lasiococcus/Pyrola secunda
TSME-ABMAS/RULA2/PYSE (N=17; FS=13, BLM=4)

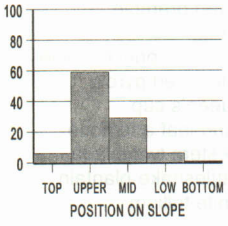
Distribution. In the Cascades, Mountain Hemlock-Shasta Red Fir/Dwarf Bramble/ One-sided Pyrola is found on the Butte Falls and Prospect Ranger Districts, Rogue River National Forest, and the Tiller, Diamond Lake, and North Umpqua Ranger Districts, Umpqua National Forest. In the Siskiyous, it is found on the Applegate Ranger District, Rogue River National Forest, the Illinois Valley Ranger District, Siskiyou National Forest, and the Grants Pass Resource Area, Medford District, Bureau of Land Management.

Distinguishing Characteristics. Mountain Hemlock-Shasta Red Fir/Dwarf Bramble/ One-sided Pyrola is found at moderate temperatures and precipitation relative to the other plant associations in the Series. The frequent occurrence of dwarf bramble and the occasional occurrence of white fir indicate the warmer conditions.

Soils. Parent material is mostly pumice, andesite and basalt, with some dacite, ash, and mixed metamorphic materials. Soils are mostly moderately deep and deep, with







an average depth of 40 inches Average surface rock cover is 6 percent, with 6 percent gravel Based on three plots sampled, surface textures are loam, silt loam, or sandy loam, with 0 to 25 percent gravel and cobbles. Subsurface textures are loam, sand, or loamy sand with 20 to 25 percent gravel and cobbles and up to 40 percent stones

Environment. Elevation averages 5780 feet Mountain Hemlock-Shasta Red Fir/ Dwarf Bramble/One-sided Pyrola occurs on most aspects, although rarely on south aspects Slope averages 27 percent and ranges from 5 to 55 percent Upper and middle one-third slope positions predominate.

Vegetation Composition and Structure Total species richness is very high for the Series, averaging 25 species Overstory tree layer is dominated by Shasta red fir, with mountain hemlock frequent, and white fir occasional Understory is dominated by mountain hemlock, with Shasta red fir frequent, and white fir and Pacific silver fir occasional. In the shrub layer, dwarf bramble frequently occurs, and thin-leaved huckleberry is common, occasionally with high covers. Herb/grass richness is very high for the Series, with one-sided pyrola frequent, and common prince's-pine, queen's cup, leafy pedicularis, western twayblade, and whitevein pyrola common. Moss cover averages 2 percent

On Forest Service sites, upper layer tree cover is high for the Series, averaging 58 percent. Mid-layer and lower layer tree cover are both low, averaging 25 and 14 percent, respectively High shrub cover is low, averaging 1 percent. Low shrub cover is intermediate, averaging 24 percent. Herb/grass cover is high for the Series, ranging from 1 to 90 percent, with an average of 26 percent

On Bureau of Land Management sites, tree cover exceeding 10 feet tall (3 meters) averages 76 percent while tree cover less than 10 feet tall averages 9 percent Cover for shrubs greater than 20 inches tall (50 centimeters) was absent and cover for shrubs less than 20 inches tall averages 2 percent Herb cover ranges from 2 to 30 percent, with an average of 13 percent.

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Shasta red fir	ABMAS	94	35	
Mountain hemlock	TSME	82	24	
Understory trees				3
Mountain hemlock	TSME	100	27	
Shasta red fir	ABMAS	100	8	
Shrubs				4
Dwarf bramble	RULA2	76	3	
Thin-leaved huckleberry	VAME	65	22	
Herbs				15
One-sided pyrola	PYSE	76	3	
Common prince's-pine	CHUM	65	2	
Queen's cup	CLUN2	59	3	
Leafy pedicularis	PERA	59	2	
Western twayblade	LICA10	59	1	
Whitevein pyrola	PYPI2	53	1	
Threeleaf anemone	ANDE3	47	2	

TSME 12

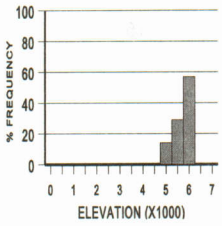
MOUNTAIN HEMLOCK/THIN-LEAVED HUCKLEBERRY/ONE-SIDED PYROLA
Tsuga mertensiana/Vaccinium membranaceum/Pyrola secunda
TSME/VAME/PYSE (N=7; Sky Lakes=7)

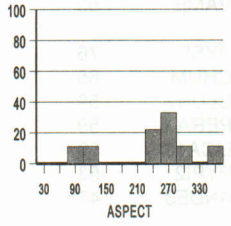
Distribution. Mountain Hemlock/Thin-leaved Huckleberry/One-sided Pyrola occurs in the Sky Lakes Wilderness in the southern Oregon Cascades. It may also occur on the Prospect, Butte Falls, or Ashland Ranger Districts, Rogue River National Forest.

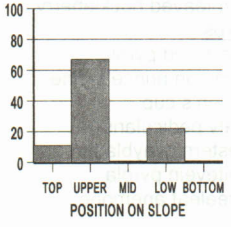
Distinguishing Characteristics. Mountain Hemlock/Thin-leaved Huckleberry/One-sided Pyrola is found at moderate elevations relative to the other plant associations in the Series. Warmer species, such as Douglas-fir and white fir, are rare in the overstory and understory.

Soils. Soil data are not available.

Environment. Elevation averages 5980 feet. Mountain Hemlock/Thin-leaved Huckleberry/One-sided Pyrola occurs on most aspects, although rarely on northeast and south aspects. Slope averages 17 percent and ranges from 10 to 29 percent. Upper and middle one-third slope positions predominate.







Vegetation Composition and Structure Total species richness is very low for the Series, averaging 12 species Overstory tree layer is dominated by Shasta red fir, with mountain hemlock common, and western white pine and lodgepole pine occasional Understory is dominated by mountain hemlock, with Shasta red fir occurring frequently In the shrub layer, thin-leaved huckleberry is frequent and often at high covers, and grouse huckleberry is common. Herb/grass richness is very low for the Series, with one-sided pyrola and little prince's-pine frequent, and woods strawberry common. Moss cover averages 1 percent.

Vegetation layer cover data is not available

Common name	Code	Constancy	Cover	Richness
Overstory trees				3
Shasta red fir	ABMAS	100	37	
Mountain hemlock	TSME	71	21	
Western white pine	PIMO3	43	3	
Lodgepole pine	PICO	29	1	
Understory trees				2
Mountain hemlock	TSME	100	21	
Shasta red fir	ABMAS	100	2	
Shrubs				3
Thin-leaved huckleberry	VAME	86	51	
Grouse huckleberry	VASC	71	21	
Herbs				4
One-sided pyrola	PYSE	100	3	
Common prince's-pine	CHUM	86	7	
Woods strawberry	FRVEB3	57	1	
Leafy pedicularis	PERA	29	5	
Long stolon sedge	CAPE6	29	2	
Whitevein pyrola	PYPI2	29	1	
Western twayblade	LICA10	29	1	
White-flowered hawkweed	HIAL2	29	1	
Smooth woodrush	LUHI4	14	60	

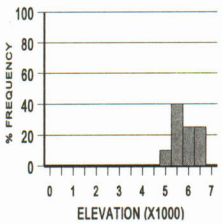
TSME 14

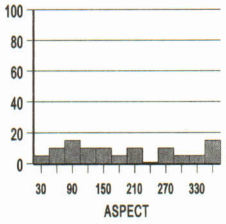
MOUNTAIN HEMLOCK/GROUSE HUCKLEBERRY/COMMON PRINCE'S-PINE
Tsuga mertensiana/Vaccinium scoparium/Chimaphila umbellata
TSME/VASC/CHUM (N=20; Sky Lakes=13, FS=7)

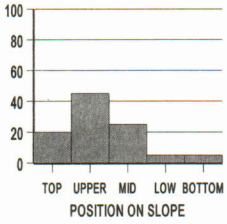
Distribution. Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine occurs in the southern Oregon Cascades on the Tiller and Diamond Lake Ranger Districts, Umpqua National Forest, the Prospect Ranger District, Rogue River National Forest, and in the Sky Lakes Wilderness.

Distinguishing Characteristics. Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine is found at moderate temperatures and high precipitation relative to the other plant associations in the Series. It is the coldest of the mountain hemlock plant associations in the Cascades. The lack of warm species, such as Douglas-fir and white fir, indicate cold temperatures as does the common occurrence of lodgepole pine on the flatter sites.

Soils. Parent material is mostly pumice or andesite. Soils are moderately deep to deep, with an average depth of greater than 39 inches. Average surface rock cover







is 7 percent, with 9 percent gravel Based on two plots sampled, surface texture is sand, sandy loam, or loam, with 0 to 15 percent cobbles Subsurface textures are sand or sandy loam, with 25 to 90 percent cobbles

Environment. Elevation averages 6120 feet. Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine occurs on all aspects. Slope averages 11 percent and ranges from 1 to 33 percent Ridge top, upper, and middle one-third slope positions predominate.

Vegetation Composition and Structure. Total species richness is very low for the Series, averaging nine species. Overstory tree layer is dominated by mountain hemlock, with Shasta red fir and lodgepole pine occasional Understory is dominated by mountain hemlock, with Shasta red fir common, and lodgepole pine and western white pine occasional In the shrub layer, grouse huckleberry occurs frequently, and thin-leaved huckleberry occurs occasionally. Herb/grass richness is very low for the Series, with long stolon sedge and common prince's-pine common and one-sided pyrola and smooth woodrush occasional Moss cover averages 2 percent.

Upper layer tree cover is low for the Series, averaging 50 percent Mid-layer and lower layer tree covers are both low, averaging 31 and 15 percent, respectively. High shrub cover is absent, and low shrub cover is intermediate, averaging 23 percent Herb/grass cover is low for the Series, ranging from 0 to 3 percent, with an average of 1 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Mountain hemlock	TSME	100	49	
Shasta red fir	ABMAS	45	3	
Lodgepole pine	PICO	40	4	
Subalpine fir	ABLA	20	6	
Western white pine	PIMO3	20	3	
Understory trees				2
Mountain hemlock	TSME	100	23	
Shasta red fir	ABMAS	60	2	
Lodgepole pine	PICO	40	3	
Western white pine	PIMO3	25	3	
Subalpine fir	ABLA	20	8	
Shrubs				2
Grouse huckleberry	VASC	100	19	
Thin-leaved huckleberry	VAME	25	3	
Herbs				2
Long stolon sedge	CAPE6	50	2	
Common prince's-pine	CHUM	50	2	
One-sided pyrola	PYSE	35	1	
Smooth woodrush	LUHI4	25	13	

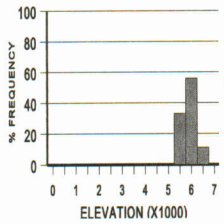
TSME 16

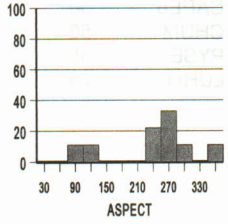
MOUNTAIN HEMLOCK/PINEMAT MANZANITA/COMMON PRINCE'S-PINE
Tsuga mertensiana/Arctostaphylos nevadensis/Chimaphila umbellata
TSME/ARNE/CHUM (N=9; Sky Lakes=9)

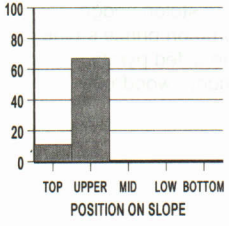
Distribution. Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine occurs in the Sky Lakes Wilderness in the southern Oregon Cascades. It may also occur on the Ashland, Butte Falls, or Prospect Ranger Districts, Rogue River National Forest.

Distinguishing Characteristics. Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine and Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine are found at the highest elevations of the Mountain Hemlock Series. Mountain Hemlock/Pinemat Manzanita/Common Prince's-pine generally occurs on relatively steeper slopes (20 percent), with lodgepole pine and grouse huckleberry rarely occurring. Mountain Hemlock/Grouse Huckleberry/Common Prince's-pine is found on relatively flatter slopes (11 percent), and grouse huckleberry is frequently present with lodgepole pine commonly present.

Soils. Soil data are not available.







Environment Elevation averages 6130 feet Mountain Hemlock/Pinemat Manzanita/ Common Prince's-pine occurs on most aspects, although rarely on southeast and south aspects Slope averages 20 percent and ranges from 8 to 55 percent Upper one-third slope positions predominate

Vegetation Composition and Structure Total species richness is very low for the Series, averaging 11 species. Overstory tree layer is dominated by Shasta red fir, with mountain hemlock occurring frequently, and western white pine occasionally Understory is dominated by mountain hemlock, with Shasta red fir frequent, and western white pine occasional In the shrub layer, pinemat manzanita is common Herb/grass richness is very low for the Series, with common prince's-pine, long stolon sedge, and one-sided pyrola frequent, and white-flowered hawkweed occasional. Moss cover averages less than 1 percent.

Vegetation layer cover data are not available.

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Shasta red fir	ABMAS	100	42	
Mountain hemlock	TSME	100	13	
Western white pine	PIMO3	33	4	
Understory trees				2
Mountain hemlock	TSME	100	30	
Shasta red fir	ABMAS	89	5	
Western white pine	PIMO3	33	1	
Shrubs				2
Pinemat manzanita	ARNE	56	5	
Herbs				4
Common prince's-pine	CHUM	89	13	
Long stolon sedge	CAPE6	78	2	
One-sided pyrola	PYSE	78	2	
White-flowered hawkweed	HIAL2	33	2	
California brome	BRCA5	22	6	
Pacific bleedingheart	DIFO	22	3	
Whitevein pyrola	PYPI2	22	1	
Little prince's-pine	CHME	22	1	

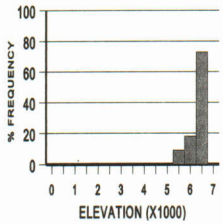
TSME 18

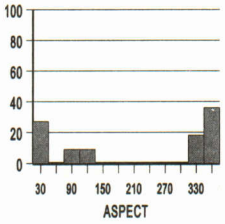
MOUNTAIN HEMLOCK/HERB
Tsuga mertensiana/Herb
TSME/HERB (N=11; FS=11)

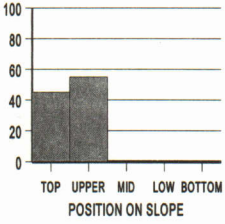
Distribution. Mountain Hemlock/Herb occurs in the Siskiyou Mountain Province on the Ashland and Applegate Ranger Districts, Rogue River National Forest. It may also occur on the Illinois Valley Ranger District, Siskiyou National Forest, and adjacent Bureau of Land Management lands.

Distinguishing Characteristics. Mountain Hemlock/Herb is found at cold temperatures and low precipitation relative to the other plant associations in the Series. The lack of species indicating warmer conditions, such as white fir and Douglas-fir, indicate these conditions.

Soils. Parent material is mostly schist or granodiorite, with some mixed metamorphic or igneous materials. Soils can be shallow or deep, with an average depth of greater than 34 inches. Average surface rock cover is 10 percent, with 4 percent gravel. Based on six plots sampled, surface textures are loam, sandy loam, or loamy







sand, with 15 to 40 percent gravel and cobbles. Subsurface textures are loam, sand, sandy loam, or loamy sand, with 25 to 50 percent gravel and up to 85 percent cobbles.

Environment Elevation averages 6710 feet. Mountain Hemlock/Herb occurs on northwest to east aspects. Slope averages 33 percent and ranges from 8 to 59 percent. Ridge top and upper one-third slope positions predominate.

Vegetation Composition and Structure. Total species richness is intermediate for the Series, averaging 17 species. Overstory and understory tree layers are dominated by mountain hemlock, with Shasta red fir frequently occurring. Shrub richness is very low for the Series, with shrub species occurring rarely Herb/grass richness is high for the Series, with mountain heliotrope, skunkleaf polemonium, mountain bunchgrass, and Ross's sedge found commonly. Moss cover averages 1 percent.

Upper layer tree cover is high for the Series, averaging 61 percent. Mid-layer and lower layer tree cover are both low, averaging 28 and 14 percent, respectively. High and low shrub covers are absent on most plots. Herb/grass cover is intermediate for the Series, ranging from 3 to 35 percent, with an average of 15 percent

Common name	Code	Constancy	Cover	Richness
Overstory trees				2
Mountain hemlock	TSME	100	45	
Shasta red fir	ABMAS	91	21	
Understory trees				2
Mountain hemlock	TSME	100	35	
Shasta red fir	ABMAS	91	4	
Shrubs				1
No shrub species occurs with a constancy greater than 9 percent.				
Herbs				12
Mountain heliotrope	VASI	64	2	
Skunkleaf polemonium	POCA3	64	1	
Mountain bunchgrass	FEVI	55	5	
Ross's sedge	CARO5	55	2	
Heart-leafed arnica	ARCO9	45	7	
One-sided pyrola	PYSE	45	1	
Small flowered woodrush	LUPA4	36	2	
Hood's sedge	CAHO5	36	1	
California false hellebore	VECA2	36	1	
Pussypaws	SPUM	36	1	
Bigleaf sandwort	ARMA18	36	1	
White-flowered hawkweed	HIAL2	36	1	
Sedge species	CAREX	27	2	
Stream violet	VIGL	27	2	
Common yarrow	ACMI2	27	2	
Whitevein pyrola	PYPI2	27	1	
Alice fleabane	ERAL3	27	1	
Leafy pedicularis	PERA	27	1	
Tongue-leaved penstemon	PEAN3	27	1	
Pale fawn-lily	ERGR9	27	1	
Mountain sweet-root	OSCH	18	2	