Potential Vegetation Types of Western Oregon and Washington

Reference documents can be found on Ecoshare (http://ecoshare.info/category/publications/). The list of PVTs was generated from R6_PVT_LUT_2011Mar23.xlsx, R6_PAG_PVT_Crosswalk_2011March23.xlsx, both of which were extracted from R6_VDDT_ModelList_2011Mar23.accb (https://sharepoint.oregonstate.edu/sites/ARRAfuels/Delivery/VDDT/VDDT%20Model%20Lists/Forms/AllItems.aspx) and SWO_120109.doc. PVT name x PVT code crosswalk is "R6ModelsFromRollout_FVSandMTBS_20120702" table in R6_PVT-Models_20120702.mdb

PVT code & cover types

Douglas-fir–cold			
Douglas-fir – dry	fdd		
Douglas-fir – moist	fdm	DF	
Douglas-fir/white oak	fdw	DF, Oa	
Douglas-fir – xeric	fdx	DFmx	
Grand fir-cool/moist	fcm		
Grand fir-warm/dry	fdg		
Grand fir – valley	fvg	BM, DFGF	
Lodgepole pine – Dry	fld		
Lodgepole pine – Wet	flw		
Mixed Conifer - Cold/dry	fmz		
Mixed Conifer – Dry	fmd		
Mixed Conifer - Dry (Pumice soils)	fmx		
Mixed Conifer – Moist	fmm		
Mountain hemlock - cold/dry (coastal, west Cascades)	fmc	LP, MH	
Mountain hemlock – cold/dry	fmh		
Mountain hemlock – intermediate	fmi	LP, MH	
Mountain hemlock – wet	fmt		
Oregon white oak	fwo	Oa	
Pacific silver fir – intermediate	fsi	SFDF	
Pacific silver fir – warm	fsw		
Pacific silver fir – wet	fst		
Ponderosa pine – dry	fpd		
Ponderosa pine – dry with juniper	fdp		
Ponderosa pine – lodgepole pine	fpl		
Ponderosa pine – xeric	fxp		
Shasta red fir – dry	frf		
Shasta red fir – moist	frm		
Sitka spruce	fss	DFmx, SS	
Subalpine fir	faf	AF	
Subalpine fir-cold, dry	fcd		
Subalpine parkland and Subalpine woodland	fal, fsw		PK
Tanoak/Douglas-fir – dry	ftd	TO, DF	
Tanoak/Douglas-fir – moist	ftm	TO, DF	
Tanoak – moist	fto	TO	
Ultramafic	fuc		
Western hemlock – coastal	fhc		
Western hemlock – cold	fwc	DFWH	
Western hemlock – hyperdry	fwx	WH	
Western hemlock – intermediate	fwi	DFWH	
Western hemlock – moist	fwm	DFWH	
Western hemlock - moist (coastal)	fwn		
Western hemlock – wet	fww	Al, DFal, DFWH	
White fir – cool	fcw	RF, RFWF	
White fir – intermediate	fiw	DF, DFWF	
White fir – moist	fvw	DF, DFWF	

In the StSim class last week, we were looking for a list of the PVT codes and names from the ILAP project. Here is the cribsheet that I use.

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PVT name — PVT code crosswalk is "R6 Models From Rollout_FVS and MTBS_20120702" table in R6_PVT-Models_20120702.mdb 151 entries

Potential Vegetation Types of Western Oregon and Washington

This listing of potential vegetation types (PVTs) describes general characteristics of the aggregations of plant associations and plant association groups used in the Integrated Landscape Assessment Project to stratify vegetation environments and build state and transition models. This set of descriptions is for the PVTs of Oregon Coast Range, Oregon West Cascades, Oregon Southwest, Washington Coast Range/Olympic Mountians, Washington West Cascades, and Washington North Cascades modeling regions. Reference documents can be found on Ecoshare (http://ecoshare.info/category/publications/). The list of PVTs was generated from R6_PVT_LUT_2011Mar23.xlsx, R6_PAG_PVT_Crosswalk_2011March23.xlsx, both of which were extracted from R6_VDDT_ModelList_2011Mar23.accb (https://sharepoint.oregonstate.edu/sites/ARRAfuels/Delivery/VDDT/VDDT%20Model%20Lists/Forms/AllItems.aspx) and SWO_120109.doc. The PVTs described may occur in modeling regions in addition to those listed, but were judged too limited in extent to describe as a separate model.

Douglas-fir–cold

The Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) –cold PVT is defined in mid- and upper-elevation, dry forested environments in the WNE modeling region. This PVT frequently intergrades with the subalpine fir PVTs at its upper limits. Western larch (*Larix occidentalis* Nutt.) and ponderosa pine (*Pinus ponderosa* C. Lawson) are long-lived early seral species in many stands. While many other conifer species may occur in small amounts, Douglas-fir dominates the late seral cover type. Lodgepole pine (Pinus contorta Douglas ex Louden) is often abundant in early seral stands. The understory vegetation is similar to that of the subalpine fir-cold/dry PVT.

Douglas-fir – dry fdd ✓

The Douglas-fir–dry PVT is defined in dry forested environments in the OBM, OSW, WCB, and WNE modeling regions. Ponderosa pine (*Pinus ponderosa* C. Lawson) is a long-lived early seral species in many stands. While many other conifer species may occur in small amounts, Douglas-fir dominates the late seral cover type. The understory vegetation is similar to that of east-side areas, often including Idaho fescue (*Festuca idahoensis* Elmer) and other dry-site indicators, as well as snowberry (*Symphoricarpos* Duham.) and other shrubs in WNE, WCB and OBM.

Douglas-fir – moist fdm ✓ DF

The Douglas-fir – moist PVT occurs in the OSW, OWC, and OCR on sites too dry to support western hemlock or white fir. The environment is more moist than that found in the Douglas-fir-dry PVT. Ponderosa pine (*Pinus ponderosa* C. Lawson) and incense cedar (*Calocedrus decurrens* (Torr.) Florin) are long-lived early seral species in many stands. Pacific madrone (*Arbutus menziesii* Pursh), bigleaf maple (*Acer macrophyllum* Pursh), and Oregon white oak (*Quercus garryana* Douglas ex Hook.) are common in the overstory or small tree layers. The understory is generally shrubby, often including dwarf Oregongrape (*Mahonia repens* (Lindl.) G. Don), vine maple (*Acer circinatum* Pursh), salal (*Gaultheria shallon* Pursh), and oceanspray (*Holodiscus discolor* (Pursh) Maxim.).

Douglas-fir/white oak fdw ✓ DF, Ox

The Douglas-fir/white oak PVT occurs in OWC and OCR modeling regions on sites too dry to support western hemlock, grand fir, or white fir. This PVT is found at lower elevations on the east side of the Oregon Coast Range, lower slopes and dry environments in the OWC and, as isolated areas in the WWC. Large areas of Oregon white oak spill out of the eastern side of the Columbia Gorge to the north and south, where the type is often mixed with ponderosa pine and is designated as a different Oak-Pine PVT. The environment is generally warmer and drier than that found in the Douglas-fir-dry PVT. Pacific madrone is common many stands. The understory is generally shrubby where fires have been effectively suppressed, often including Oregongrape (*Mahonia repens* (Lindl.) G. Don), vine maple (*Acer circinatum* Pursh), poison oak (*Toxicodendron diversilobum* (Torr. & A. Gray) Greene), and oceanspray (*Holodiscus discolor* (Pursh) Maxim.). Historically, this PVT supported large areas of open oak woodland with abundant grass cover. Much of that area has been lost to development or filled in with Douglas-fir following fire suppression.

Douglas-fir – xeric fdx ✓ DFmx

The Douglas-fir– xeric PVT occurs in the OWC modeling region on sites too dry to support western hemlock or white fir. The environment is generally somewhat more moist than that found in the Douglas-fir/white oak PVT. Ponderosa pine (*Pinus ponderosa* C. Lawson) and incense cedar (*Calocedrus decurrens* (Torr.) Florin) are long-lived early seral species in many stands. Pacific madrone (*Arbutus menziesii* Pursh) and Oregon white oak, and bigleaf maple are also common. Grand fir (*Abies grandis* (Douglas ex D. Don) Lindl.),if present, is uncommon and not the late-seral dominant. The understory vegetation is generally shrubby and often includes poison oak, oceanspray, common whipplea (*Whipplea modesta* Torr.) and many other species.

Grand fir-cool/moist fcm ✓

The grand fir-cool/moist PVT occurs primarily in the OBM, WNE, and WCB modeling regions. This moist and productive forest type often includes Douglas-fir, western larch, Engelmann spruce, and, in early seral conditions, lodgepole pine. Grand fir, usually with Douglas-fir, dominates late seral stands.

Grand fir-warm/dry fdg ✓

This relatively warm and dry grand fir PVT occurs in the OBM and, to a much lesser extent, WCB modeling regions. Grand fir and Douglas-fir are the dominant late seral species. Ponderosa pine is frequently present as a long-lived early seral species. The understory is variously shrubby or dominated by dry-site grasses and herbs.

Grand fir – valley fvg ✓ BM, DFGF

The valley grand fir PVT occurs below the lower limits of western hemlock on the east side of the OCR modeling region, in the rain-shadow portion of the WCR, dry lower elevation areas of the OWC and WWC, and very limited similar areas in the WNC modeling regions. Grand fir is generally the late seral species on these sites, but Douglas-fir is abundant in most places. Bigleaf maple often occurs, especially following wildfire or timber harvest. Oregon white oak and Pacific madrone are common on some sites.

The understory is typically shrubby, often including oceanspray, chinquapin (*Chrysolepis chrysophylla* (Douglas ex Hook.) Hjelmqvist), salal, vine maple, dwarf Oregongrape and others.

Lodgepole pine – Dry fld ✓

The lodgepole pine – dry PVT occurs mostly on pumice-dominated soils in along lower slopes or flat areas in the OEC and OSE modeling regions. The environment is difficult for growth of most conifer trees. Soils are excessively well drained and dry by mid-summer. Growing season frost is common. Lodgepole pine dominates all stands and is often dense. Ponderosa pine may occur on microsites with better soil conditions, often on slightly raised areas. Bitterbrush (*Purshia tridentata* (Pursh) DC) is a common understory species and often provides important winter browse for mule deer and other species. Pinemat manzanita (*Arctostaphylos nevadensis* A. Gray), long-stolon sedge (*Carex inops* L.H. Bailey), Idaho fescue (*Festuca idahoensis* Elmer), and other indicators of dry/cold sites may be abundant.

Lodgepole pine – Wet flw ✓

The lodgepole pine – wet PVT occurs mostly on pumice-dominated soils in flat areas and depressions in the OEC and OSE modeling regions. The environment is difficult for growth of most conifer trees. The water table is often high in early spring but substantially below the surface in late summer and fall, producing a wide range of moisture availability. Growing season frost is common. Lodgepole pine dominates all stands and is often dense. Ponderosa pine may occur on microsites with better soil conditions, often on slightly raised areas. Understory plants typically include bog blueberry (*Vaccinium uliginosum* L.), sedges (*Carex* L.) species, fewflower spikerush (*Eleocharis quinqueflora* (Hartmann) O. Schwarz), rose spirea (*Spiraea douglasii* Hook.) and similar indicators of wet sites.

Mixed Conifer - Cold/dry fmz ✓

The mixed conifer – cold/dry PVT is a mix of plant associations that occur on upper elevation, cool, dry sites in the OEC and OBM regions. White fir, grand fir, and Douglas-fir are the major late-seral conifer species. Grand fir occurs mostly in the central and northern portions of the OEC region. Ponderosa pine is the dominant tree species in mature and old forests and likely would give way to white fir, grand fir, or Douglas-fir in very old stands in the absence of wildfire. Douglas-fir is often present in the overstory as well. White fir and grand fir are generally common in the sub-canopy. The understory may be shrubby with greenleaf manzanita (Arctostaphylos patula Greene), snowbrush ceanothus (Ceanothus velutinus Douglas ex Hook.), pinemat manzanita, and other species. Alternatively, pinegrass (*Calamagrostis rubescens* Buckley), long-stolon sedge and other species may dominate a grassy understory.

Mixed Conifer – Dry fmd ✓

This type occurs primarily in the OEC area, but is also found in the WEC, OSE, and WCB regions. White fir, Douglas-fir or grand fir are the dominant late seral species. White fir is common at upper-elevations at the southern end of the OEC region. Grand fir replaces white fir to the north. Ponderosa pine is an important, long-lived early seral species in most areas. Several other conifers, including lodgepole pine, incense cedar, or western larch may be present. The understory is often shrubby and may include common snowberry (*Symphoricarpos albus* (L.) S.F. Blake), pinemat manzanita, pinegrass (*Calamagrostis rubescens* Buckley), long-stolon sedge and other species. Pinegrass dominates the herbaceous layer on many sites.

Mixed Conifer - Dry (Pumice soils) fmx ✓

The mixed conifer – dry (pumice soils) PVT is restricted to the OEC, and adjacent OSE, regions and occurs on deep volcanic pumice deposits. White fir, ponderosa pine, and grand fir dominate the canopy of most mature and older stands. Lodgepole pine may also be abundant, depending on site conditions and wildfire regime. Douglas-fir is not generally present. The understory is often shrubby, including greenleaf manzanita (*Arctostaphylos patula* Greene), snowbrush ceanothus (*Ceanothus velutinus* Douglas ex Hook.), bitterbrush, and other species.

Mixed Conifer – Moist fmm ✓

The mixed conifer – moist PVT is found on relatively moist and productive sites at mid- to upper elevations in the OEC, WEC, and WCB regions. Depending on geographic region, the dominant late seral tree species are Douglas-fir, grand fir, and white fir. White fir is most abundant at the southern end of the OEC modeling region. Grand fir increases to the north and replaces white fir in Washington. Douglas-fir is common throughout. Several other conifer species may be common, including western larch, Engelmann spruce, lodgepole pine, and ponderosa pine. The understory is variously shrubby or herbaceous and may include chinquapin (*Chrysolepis chrysophylla* (Douglas ex Hook.) Hjelmqvist var. chrysophylla), creeping snowberry (*Symphoricarpos mollis* Nutt.), oceanspray (*Holodiscus discolor* (Pursh) Maxim.), pipsissewa (*Chimaphila umbellata* (L.) W. Bartram), starry false lily of the valley (*Maianthemum stellatum* (L.) Link), and many other species.

Mountain hemlock - cold/dry (coastal, west Cascades) ~~fmh~~ fmc ✓ LP, MH

The mountain hemlock (*Tsuga mertensiana* (Bong.) Carrière) -cold/dry (coastal, west Cascades) PVT represents mountain hemlock and any related seral lodgepole pine forests occurring at high elevations in the OWC, WCR, WNC, and WWC modeling regions where conditions are cold and relatively dry. This type is restricted to dry sites in the northern portion of its range. The lodgepole pine cover type may be abundant early seral stands, especially in somewhat more inland or continental areas. Mountain hemlock dominates later-seral conditions. Pacific silver fir (*Abies amabilis* (Douglas ex Louden) Douglas ex Forbes) may be present, especially in more maritime locations and at lower elevations or on somewhat warmer sites. Fire return intervals are long in many areas. Mountain pine beetle outbreaks may occur in lodgepole pine stands. Laminated root rot is frequent, especially in the central and southern Oregon Cascades. Thinleaf huckleberry (*Vaccinium membranaceum* Douglas ex Torr.) and queencup beadlily (*Clintonia uniflora* (Menzies ex Schult. & Schult. f.) Kunth) are present on most sites. Grouse whortleberry (*Vaccinium scoparium* Leiberg ex Coville) and luzula species (*Luzula* DC.) may be present in somewhat drier locations.

Mountain hemlock – cold/dry ~~fmc~~ fmh ✓

The mountain hemlock-cold/dry PVT represents mountain hemlock and associated early-seral lodgepole pine forests occurring at high elevations locations on and somewhat east of the Cascade Crest in the OEC, WEC, and WCB modeling regions and the drier portions of the OSW region. Lodgepole pine often dominates early seral stands. Mountain hemlock, sometimes with subalpine fir or whitebark pine, dominates later-seral conditions. Pacific silver fir is generally not present, but may occur in more maritime locations. The understory of more open stands often consists of grouse whortleberry, thinleaf huckleberry , sidebells pyrola (*Orthilia secunda* (L.) House), luzula species (*Luzula* DC.), and several other

species. Fire return intervals are long in many areas. Mountain pine beetle outbreaks may occur in lodgepole pine stands. Laminated root rot is frequent, especially in the central and southern Oregon Cascades.

Mountain hemlock – intermediate fmi ✓ LP, MH

The mountain hemlock-intermediate PVT occurs in the OWC, WNC, WWC, and, to a limited extent, elsewhere on sites of intermediate temperature and moisture within the mountain hemlock zone. Fire return intervals can be very long. Lodgepole pine may be present in early seral stands, especially in somewhat more inland or continental areas. Mountain hemlock, sometimes with Alaska cedar (*Cupressus nootkatensis* D. Don) or Pacific silver fir, dominates later-seral conditions in which a full range of tree sizes is often represented. Pacific silver fir may be present or abundant, especially in more maritime locations and at lower elevations or on somewhat warmer sites. The understory of more open stands often consists of thinleaf huckleberry, Alaska huckleberry (*Vaccinium alaskaense* Howell), and several other species. Pacific rhododendron (*Rhododendron macrophyllum* D. Don ex G. Don) is common in the Oregon West Cascades but spotty or absent elsewhere.

Mountain hemlock – wet fmt ✓

The mountain hemlock – wet potential vegetation type is found at high elevations in relatively maritime environments of the WCR, WWC, and WNC modeling regions. Fire return intervals are very long. Mountain hemlock, often with Alaska cedar (*Cupressus nootkatensis* D. Don) and Pacific silver fir, dominates later-seral conditions. Lodgepole pine is uncommon and does not often form extensive stands. The understory of more open stands often consists of Cascades azalea (*Rhododendron albiflorum* Hook.), devil's club (*Oplopanax horridus* (Sm.) Miq.), Alaska huckleberry, rusty menziesia (*Menziesia ferruginea* Sm.), and several other species.

Oregon white oak fwo ✓ Ox

The Oregon white oak PVT occurs in the OSW region, with spotty representation in the Willamette Valley and elsewhere. A similar PVT occurs east of the Cascades in Oregon and Washington to the north and south of the Columbia Gorge, where ponderosa pine is often a co-dominant species. The environment is generally too warm and dry to support Douglas-fir but small amounts may occur with fire suppression and in relatively more moist sites. The understory is generally shrubby, especially where fires have been effectively suppressed and often includes hollyleaved barberry (*Mahonia aquifolium* (Pursh) Nutt.), dwarf Oregongrape , vine maple, poison oak, oceanspray, and several other species. Historically, this PVT supported large areas of open oak woodland with abundant grass cover fostered by frequent wildfire.

Pacific silver fir – intermediate fsi ✓ SFDF

The Pacific silver fir-intermediate PVT represents extensive areas dominated by Pacific silver fir and Douglas-fir at mid- to upper elevations in the OWC, WWC, WNC, and WCR modeling regions. Isolated patches occur in the Oregon Coast Range, often indicated by the presence of noble fir (*Abies procera* Rehder), and at higher-elevations in maritime climatic areas of the OSW region. Growing seasons are short and cooler than in the western hemlock zone and summer frosts more common. Winter snow packs can be persistent, especially in openings such as meadows or clearcuts. Douglas-fir and noble fir

commonly dominate early and mid-seral stands, though noble fir does not occur in the northern portion of the WWC and WNC. Pacific silver fir and western hemlock form the regeneration layer in most mature stands and come to dominate under late seral conditions. While western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) is common, the presence of Pacific silver fir indicates a cooler environment than that typical of the western hemlock zone. The understory is variously shrubby or herb dominated, though foamflower (*Tiarella trifoliata* L.), Alaska huckleberry, and thinleaf huckleberry are common in most stands. Dwarf Oregongrape (*Mahonia repens* (Lindl.) G. Don) is often abundant in on more well-drained soils. Fire return intervals are long, but shorter than those in the Pacific silver fir-wet. Wind disturbances occur, but generally at low severity. Insect disturbance, including hemlock looper and balsam wooly adelgid, may occur.

Pacific silver fir – warm fsw all DF? ~~SFDF~~ ~~OCR fsw is different from OWC fsw?~~

The Pacific silver fir-warm PVT occurs in the lower elevation portions of the Pacific silver fir zone in the OWC and OEC modeling regions. Isolated patches occur in the OCR, often indicated by the presence of noble fir (*Abies procera* Rehder). Growing seasons are short and cooler than in the western hemlock zone and summer frosts more common. Winter snow packs can be persistent, especially in openings such as meadows or clearcuts. Early seral conditions often consist of Douglas-fir and, to the south, noble fir while later seral forests are usually dominated by Pacific silver fir and western hemlock, often with scattered, large, old Douglas-fir. Western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) is often common, but the presence of Pacific silver fir indicates a cooler environment than that typical of the western hemlock zone. Pacific rhododendron, dwarf Oregongrape, and salal are often abundant. Fire return intervals are long, but shorter than those in the Pacific silver fir-wet. Wind disturbances occur, but generally at low severity. Insect disturbance, including hemlock looper and balsam wooly adelgid, may occur.

Pacific silver fir – wet ~~fsw~~ fst

The Pacific silver fir-wet PVT is found on very moist sites at moderate to upper elevations in the WNC, WCR, and WWC regions. Growing seasons are short and cooler than in the western hemlock zone, and summer frosts more common. Winter snow packs can be persistent, especially in openings such as meadows or clearcuts. Early seral conditions often consist of Douglas-fir and, to the south, noble fir while later seral forests are usually dominated by Pacific silver fir, western hemlock, and Alaska cedar, often with scattered, large, old Douglas-fir. Western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) is often common, but the presence of Pacific silver fir indicates a cooler environment than that typical of the western hemlock zone. The understory is variously shrubby or herb dominated, though devil's club, Alaska huckleberry, and Oregon oxalis (*Oxalis oregana* Nutt.) are common in most stands. Fire return intervals are longer than those for the other silver fir potential vegetation type in this region and longer than those of most western hemlock potential vegetation types. Wind disturbances occur, but generally at low severity. Insect disturbance, including hemlock looper and balsam wooly adelgid, may occur.

Ponderosa pine – dry fpd ✓

Ponderosa pine is the major late seral conifer species in many environments that are too dry to support most other conifers. The ponderosa pine – dry PVT occurs in the WEC and WNE regions and in the driest, interior portions of SWO. Similar types are extensive in the OEC and OBM regions. Ponderosa

pine is the dominant species in both early and late-seral forests. Other conifer species are uncommon or absent. Many of these stands extend into the fringes of sagebrush-steppe types and ponderosa pine is actively invading sagebrush communities in some areas. Idaho fescue, bitterbrush, Wyoming big sagebrush (*Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young), and other species indicating the driest forest environments are characteristic.

Ponderosa pine – dry with juniper fdp ✓

The ponderosa pine – dry with juniper PVT is found on very dry forest sites in the OEC, OBM, and, to a lesser extent, OSE regions. This type is similar to the ponderosa pine – dry PVT in many respects, but includes western juniper (*Juniperus occidentalis* Hook.) woodlands that may be persistent following disturbance. Western juniper, if it occurs, can be replaced by ponderosa pine if seed sources are present. Incense cedar is a common associate in portions of the OEC area, but not in the OBM. Idaho fescue, bitterbrush, Wyoming big sagebrush (*Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young), and other species indicating the driest forest environments are characteristic.

Ponderosa pine – lodgepole pine fpl ✓

The ponderosa pine – lodgepole pine PVT generally occurs on pumice-derived soils in the OEC region. Mature forests are often a mosaic of ponderosa pine and lodgepole pine. Ponderosa pine often occupies slightly raised micro-sites while lodgepole pine dominates flatter areas. Bitterbrush is the main understory shrub. Several grasses and forbs are often present, including Pacific lupine (*Lupinus lepidus* Douglas ex Lindl.), western needlegrass (*Achnatherum occidentale* (Thurb.) Barkworth ssp. *Occidentale)*, and several other species of grasses and forbs may be present.

Ponderosa pine – xeric fxp ✓

The ponderosa pine – xeric PVT occurs mainly in the OBM area, but extends into small parts of the OEC, OSE, and WCB regions. This type is similar to the ponderosa pine – dry and ponderosa pine – dry with juniper PVTs. Ponderosa pine is the major conifer species in both early and late seral stands. Western juniper and mountain mahogany (*Cercocarpus ledifolius* Nutt.) may be locally abundant in early seral conditions and adjacent woodlands.

Shasta red fir – dry frf ✓

The Shasta red (Abies ×shastensis (Lemmon) Lemmon [magnifica × procera]) fir-dry PVT occurs in relatively dry, cool, upper elevation forest areas in the southern portion of the OEC region, frequently on soils derived from volcanic ash and pumice. The forest overstory is frequently composed of Shasta red fir and lodgepole pine with ponderosa pine only on the warmest areas in the type. Several shrubs may be present or common, including pinemat manzanita, greenleaf manazanita, bitterbrush, and wax currant (*Ribes cereum* Douglas). Long-stolon sedge may be abundant in particularly cold and excessively well drained areas.

Shasta red fir – moist frm ✓

The Shasta red fir - moist PVT occurs in moist, upper elevation locations (generally above 4500 feet) in the Siskiyou Mountains in SWO and limited locations in the OWC. Douglas-fir is often the most abundant tree species in the overstory, especially in early seral stands. Shasta red fir and white fir (*Abies concolor* (Gord. & Glend.) Lindl. ex Hildebr.) are usually present. The understory is often a mix of

low shrubs and herbaceous species, especially Sadler oak (*Quercus sadleriana* R. Br.; OSW only), dwarf Oregongrape, thinleaf huckleberry, beargrass (*Xerophyllum tenax* (Pursh) Nutt.), and other species.

Sitka spruce fss ✓ DFmx, SS

The Sitka spruce (*Picea sitchensis* (Bong.) Carrière) PVT occurs in near-coast, lower elevation environments in the OCR and WCR regions with small amounts in the WWC and OSW regions. Early and late seral stands are dominated by Sitka spruce and western hemlock, with smaller amounts of Douglas-fir. Red alder is common along riparian areas (RA cover type). Douglas-fir mixed with other species, including red alder and western hemlock, occurs in early seral stands (DFmx). Sitka spruce, usually with western hemlock, dominates the late seral cover type (SS). The understory is often very shrubby, containing salmonberry (*Rubus spectabilis* Pursh), salal, swordfern, and Oregon oxalis. Very shaded stands often lack abundant salmonberry, but salmonberry is an abundant species in early seral conditions and under red alder canopies. Devil's club is often abundant in wet areas.

Subalpine fir faf ✓ AF

The subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) PVT occurs in high elevation areas with relatively continental climates primarily in the WNE modeling region. It is similar to many subalpine fir, and associated lodgepole pine, forests found north into British Columbia, Alberta, and east into Idaho and Montana. Smaller areas are present in other modeling regions, particularly east of the Cascade Crest and in rain-shadows. Subalpine fir dominates late-seral stands, but Douglas-fir, Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), and other species may be present. Lodgepole pine and western larch (*Larix occidentalis* Nutt.) are often present or abundant in early seral stands. Wildfire frequencies are moderate (often around 100 years) and extensive, mixed- to high-severity wildfires have produced extensive early and mid-seral stands in much of the upper elevations of the WNE area. Bark beetle outbreaks may be extensive, especially to the north. Understory vegetation is often shrubby with big huckleberry, Cascades azalea, and other species.

Subalpine fir-cold, dry fcd ✓

The subalpine fir-cold, dry PVT occupies high elevation, closed forest and woodland environments in the OBM region and smaller portions of the WNE and other regions. Engelmann spruce is a frequent associate. This PVT is similar to the subalpine fir PVT found farther north, with which it could have been combined, but may have no western larch and is less boreal in aspect and composition. Lodgepole pine, and to a lesser extent, western larch often form extensive early seral stands, which are highly susceptible to bark beetle outbreaks and wildfire.

Subalpine parkland and Subalpine woodland fal ✓ fsw ? PK

The subalpine parkland and subalpine woodland potential vegetation types occur in high elevation areas that support tree growth in all the Oregon and Washington regions. Trees are patchy or dispersed rather than contiguous, often occurring as islands in grassland, shrubland, and alpine tundra. Subalpine fir is the dominant late seral tree species in most areas, though other species may be more abundant locally. The subalpine parkland (PK) cover type is a mix of tree species depending on local environment, seed sources, stand development history, and disturbances. Early seral conditions consist of a variety of species, most commonly including one or more of: subalpine fir, subalpine larch (*Larix lyallii* Parl.),

mountain hemlock, and whitebark pine (*Pinus albicaulis* Engelm.). Lodgepole pine may dominate early seral conditions. Subalpine fir, Engelmann spruce, mountain hemlock, or subalpine larch generally dominate late seral conditions. Pacific silver fir and mountain hemlock may occur, especially near the Cascade Crest. Mountain hemlock often dominates subalpine parklands west of the Cascade Crest. The understory of more open stands often consists of huckleberry species (*Vaccinium* spp.), beargrass, and many other species.

Tanoak/Douglas-fir – dry ftd ✓ TO, DF

The tanoak (*Lithocarpus densiflorus* (Hook. & Arn.) Rehder)/Douglas-fir – dry PVT is limited to moderately dry sites in the SWO region, south into California, and very small areas at the south end of the OCR region. Tanoak is persistent following disturbance in these areas, but is generally replaced by conifers, especially Douglas-fir, over time. Many stands are two-storied, with shorter, smaller tanoak beneath an overstory of Douglas-fir, occasionally with sugar pine. Several other tree species may be present, often including Pacific madrone and canyon live oak (*Quercus chrysolepis* Liebm.). The two cover types are tanoak (TO), early seral and very shrubby, and Douglas-fir (DF), later seral also quite shrubby. The understory is often densely shrubby, containing tanoak, golden chinquapin (*Chrysolepis chrysophylla* (Douglas ex Hook.) Hjelmqvist), poison oak, dwarf Oregongrape, honeysuckle (*Lonicera hispidula* (Lindl.) Douglas ex Torr. & A. Gray), and others.

Tanoak/Douglas-fir – moist ftm ✓ TO, DF

The tanoak/Douglas-fir – moist PVT occurs in the SWO region, south into California, and very small areas at the south end of the OCR region. While similar to the Tanoak/Douglas-fir-dry PVT, this type occurs on more mesic sites and is more productive. Tanoak is persistent following disturbance in these areas, but is generally replaced by conifers, especially Douglas-fir, over time. Many stands are two-storied, with shorter, smaller tanoak beneath an overstory of Douglas-fir, occassionally with sugar pine (*Pinus lambertiana* Douglas). Several other tree species may be present, often including bigleaf maple, Pacific madrone and canyon live oak (*Quercus chrysolepis* Liebm.). The two cover types are tanoak (TO), early seral and very shrubby, and Douglas-fir (DF), later seral. The species-rich understory often includes dwarf Oregongrape, red huckleberry (*Vaccinium parvifolium* Sm.), poison oak, and salal.

Tanoak – moist fto ✓ TO

The tanoak – moist PVT is limited to SWO and adjacent California where it occurs on relatively moist sites dominated by tanoak. Tanoak is persistent following disturbance in these areas is not often out-competed by conifers. Most stands are composed of a dense small tree and shrub layer, dominated by tanoak, California laurel (*Umbellularia californica* (Hook. & Arn.) Nutt.), Pacific madrone, canyon live oak, and several other species. There are frequently a few large, emergent conifers, especially Douglas-fir and, occasionally, sugar pine (*Pinus lambertiana* Douglas), western hemlock, or Port Orford cedar (*Chamaecyparis lawsoniana* (A. Murray) Parl.). There is only one cover type, dominated by tanoak (TO). The understory is usually densely shrubby with evergreen huckleberry (*Vaccinium ovatum* Pursh), Pacific rhododendron, dwarf Oregongrape, salal, and other species.

Ultramafic fuc ✓

The ultramafic PVT is defined only in southwestern Oregon on sites where soils have developed from serpentine, peridotite, and similar bedrock. The resulting soils are high in magnesium, iron, silica, nickel, and chromium and are toxic or limiting for many plant species. While this condition occurs elsewhere in Oregon and Washington, it was not defined as a PVT elsewhere due to limited distribution. Jeffrey pine (*Pinus jeffreyi* Balf.) is a characteristic species in SWO. Douglas-fir and incense cedar (*Calocedrus decurrens* (Torr.) Florin) occur in most stands. Several other conifers are locally important, including Port Orford cedar, western white pine (*Pinus monticola* Douglas ex D. Don), and western hemlock. Most stands consist of scattered trees over a continuous and dense shrub layer. There is one cover type, dominated by Jeffrey pine (JP). The understory is variable, depending on local environment, but often includes otherwise unusual species such as hoary manzanita (*Arctostaphylos canescens* Eastw.), whiteleaf manzanita (*Arctostaphylos viscida* Parry), broadleaved silk-tassel (*Garrya buxifolia* A. Gray), squaw carpet (*Ceanothus prostratus* Benth.), dwarf ceanothus (*Ceanothus pumilus* Greene), and others. Idaho fescue (*Festuca idahoensis* Elmer) may be abundant on very dry sites.

Western hemlock – coastal fhc ✓

The western hemlock – coastal PVT is found in a relatively narrow strip along the coast in SWO and the southern portion of the OCR region. This PVT is a southern extension of much more abundant western hemlock types that occur in the several regions to the north. Western hemlock–coastal types are variable in the southwest Oregon area, but all include stands dominated by Douglas-fir in early seral conditions and tending toward western hemlock in later seral conditions. Depending on location and environment, Port Orford cedar, white fir, bigleaf maple, and California laurel may be present. The Douglas-fir (DF) cover type represents earlier seral conditions and the western hemlock (WH) cover type represents later-seral conditions. The understory is often shrubby. Salmonberry, dwarf Oregongrape, and evergreen huckleberry are common shrubs and swordfern, Oregon oxalis, along with several others are common herbs.

Western hemlock – cold fwc ✓ DFWH

The western hemlock-wet/cold PVT represents stands composed of a mix of western hemlock and Douglas fir on very moist sites in the higher, colder portions of the western hemlock zone in the OCR, OWC, WCR, WWC, and WNC regions. Fire is not common, but is likely more frequent than in higher elevation potential vegetation types of silver fir or the Sitka spruce potential vegetation type. Wind disturbances occur, but generally at low severity. Hemlock looper outbreaks may occur. The single cover type (DFWH) is dominated by Douglas fir and western hemlock, often with western redcedar (*Thuja plicata* Donn ex D. Don). Douglas-fir is ubiquitous in early seral stands and may live 500 or more years. Western hemlock becomes abundant in later seral conditions. The understory is generally shrubby with Alaska huckleberry and thinleaf huckleberry common in most stands. Devil's club or Oregon oxalis may be abundant in very moist areas.

Western hemlock – hyperdry fwx ✓ WH

The western hemlock – hyperdry PVT occurs in the OSW and limited areas of the OCR and OWC modeling regions. This PVT occurs in the very driest areas capable of supporting western hemlock and is often transitional to Douglas-fir and grand fir PVTs. Douglas-fir dominates the overstory of most stands.

dominated, though swordfern (*Polystichum munitum* (Kaulf.) C. Presl), Oregon oxalis (*Oxalis oregana* Nutt.), vine maple, and huckleberry species are common in most stands.

Western hemlock – wet fww ✓ Al, DFal, DFWH

The western hemlock-wet PVT occurs in areas of poor soil drainage or similarly wet conditions in the OCR, OWC, WCR, WWC, and WNC regions. Fire is not common. Wind disturbances occur, but generally at low severity. Hemlock looper outbreaks may occur. Douglas fir and western hemlock dominated the late seral (DFWH) cover type, generally with western redcedar. The Douglas-fir and western red alder (DFal) cover type usually dominates early seral stands. Western hemlock becomes abundant in later seral conditions. The red alder (Al) cover type dominates some early seral conditions, particularly in riparian areas. The understory is variously shrubby or herb dominated, though Devil's club, swordfern, Oregon oxalis, vine maple, and huckleberry species are common in most stands. Skunkcabbage (*Lysichiton americanus* Hultén & H. St. John) is common in swampy areas.

White fir – cool fcw ✓ RF, RFWF

The white fir – cool PVT occurs mostly in the Cascade and Siskiyou Mountains of the OSW modeling region. White fir replaces Pacific silver fir typically found in upper-elevation forests farther north. While Douglas-fir is common, white fir and Shasta red fir dominate many stands. Incense cedar may be abundant. Shasta red fir (RF) is the major early seral cover type and often includes Douglas-fir. White fir and Shasta red fir (RFWF) are dominant in later-seral conditions in which long-lived Douglas-fir may present. The understory is often herb-rich with vanilla leaf (*Achlys triphylla* (Sm.) DC.), starry false solomon's seal (*Maianthemum stellatum* (L.) Link), Sadler oak, dwarf bramble (*Rubus lasiococcus* A. Gray), and other species.

White fir – intermediate fiw ✓ DF, DFWF

The white fir–intermediate type is a relatively dry PVT that occurs at mid- to upper-elevations in SWO, with smaller areas at the southern end of the OWC region. Douglas-fir dominates most stands, usually mixed with white fir and, to a lesser extent, incense cedar. The Douglas-fir (DF) cover type represents earlier seral forests and the Douglas-fir/white fir cover type (DFWF) represents later seral conditions. The understory is usually shrubby, often with baldhip rose (*Rosa gymnocarpa* Nutt.), dwarf Oregongrape, oceanspray, and other species.

White fir – moist fvw ✓ DF, DFWF

The white fir–moist type is a productive mid- to upper-elevation PVT that occurs mostly in southwestern Oregon, with smaller areas at the southern end of the OWC region. Douglas-fir dominates most stands, usually mixed with white fir and, to a lesser extent, incense cedar. There are two cover types. The Douglas-fir (DF) cover type represents earlier seral forests and the Douglas-fir/white fir cover type (DFWF) represents later seral conditions. The understory is generally herb-rich with vanilla leaf, white inside-out flower (*Vancouveria hexandra* (Hook.) C. Morren & Decne.), twinflower (*Linnaea borealis* L.), Oregon oxalis, and other species.

Western hemlock, sugar pine, and incense cedar are common. The Douglas-fir cover type represents earlier seral conditions and the western hemlock (WH) cover type represents later seral forests. The understory is densely shrubby, often including salal, Pacific rhododendron, red huckleberry, vine maple, and other species.

Western hemlock – intermediate fwi ✓ DFWH

The western hemlock-intermediate PVT represents lower and middle elevation forests on well-drained, but not dry sites. This PVT is extensive throughout the OCR, OWC, WCR, WWC, and WNC regions. It was not defined in southwestern Oregon though the western hemlock – coastal PVT is similar. Most stands are composed of western hemlock and Douglas fir. Fire is more common than in the wet and cold western hemlock potential vegetation types. Wind disturbances occur, but generally at low severity. Hemlock looper outbreaks may occur. The single cover type (DFWH) is dominated by Douglas fir and western hemlock, often with western redcedar. Douglas-fir is ubiquitous in early seral stands and may live 500 or more years. Western hemlock becomes abundant in later seral conditions. The understory is generally shrubby, often containing dwarf Oregongrape, vine maple, salal, and huckleberry species are common in most stands. Swordfern (*Polystichum munitum* (Kaulf.) C. Presl) is often well represented.

Western hemlock – moist fwm ✓ DFWH

The western hemlock-moist PVT represents stands composed of a mix of western hemlock, Douglas fir, and western redcedar that occur on relatively moist and productive sites in the western hemlock zone of the Washington West Cascades, Washington North Cascades, and Oregon West Cascades. This type was separated from the western hemlock-coastal PVT because it occurs in the generally somewhat less productive environments of the Cascade Range rather than the coastal ranges. Fire is not as common as in western hemlock-intermediate potential vegetation types. Wind disturbances occur, but generally at low severity. Hemlock looper outbreaks may occur. The single cover type (DFWH) is dominated by Douglas fir and western hemlock, often with western redcedar. Douglas-fir is ubiquitous in early seral stands and may live 500 or more years. Western hemlock becomes abundant in later seral conditions. Red alder (*Alnus rubra* Bong.) dominates in some early seral conditions, especially in riparian areas. The understory is variously shrubby or herb dominated, though swordfern, Oregon oxalis (*Oxalis oregana* Nutt.), vine maple, and huckleberry species are common in most stands.

Western hemlock - moist (coastal) ~~fhc~~ fwn DFWH?

The western hemlock-moist (coastal) PVT represents stands composed of western hemlock, Douglas fir, and western redcedar that occur on relatively moist and productive sites in the western hemlock zone of the WCR and northern portion of the OCR regions. Fire is not as common as in western hemlock-intermediate potential vegetation types. Wind disturbances occur, but generally at low severity. Hemlock looper outbreaks may occur. This potential vegetation type has two density classes: medium and closed. The single cover type (DFWH) is dominated by Douglas fir and western hemlock, often with western redcedar. Douglas-fir is ubiquitous in early seral stands and may live 500 or more years. Western hemlock becomes abundant in later seral conditions. Red alder (*Alnus rubra* Bong.) dominates in some early seral conditions, especially in riparian areas. The understory is variously shrubby or herb